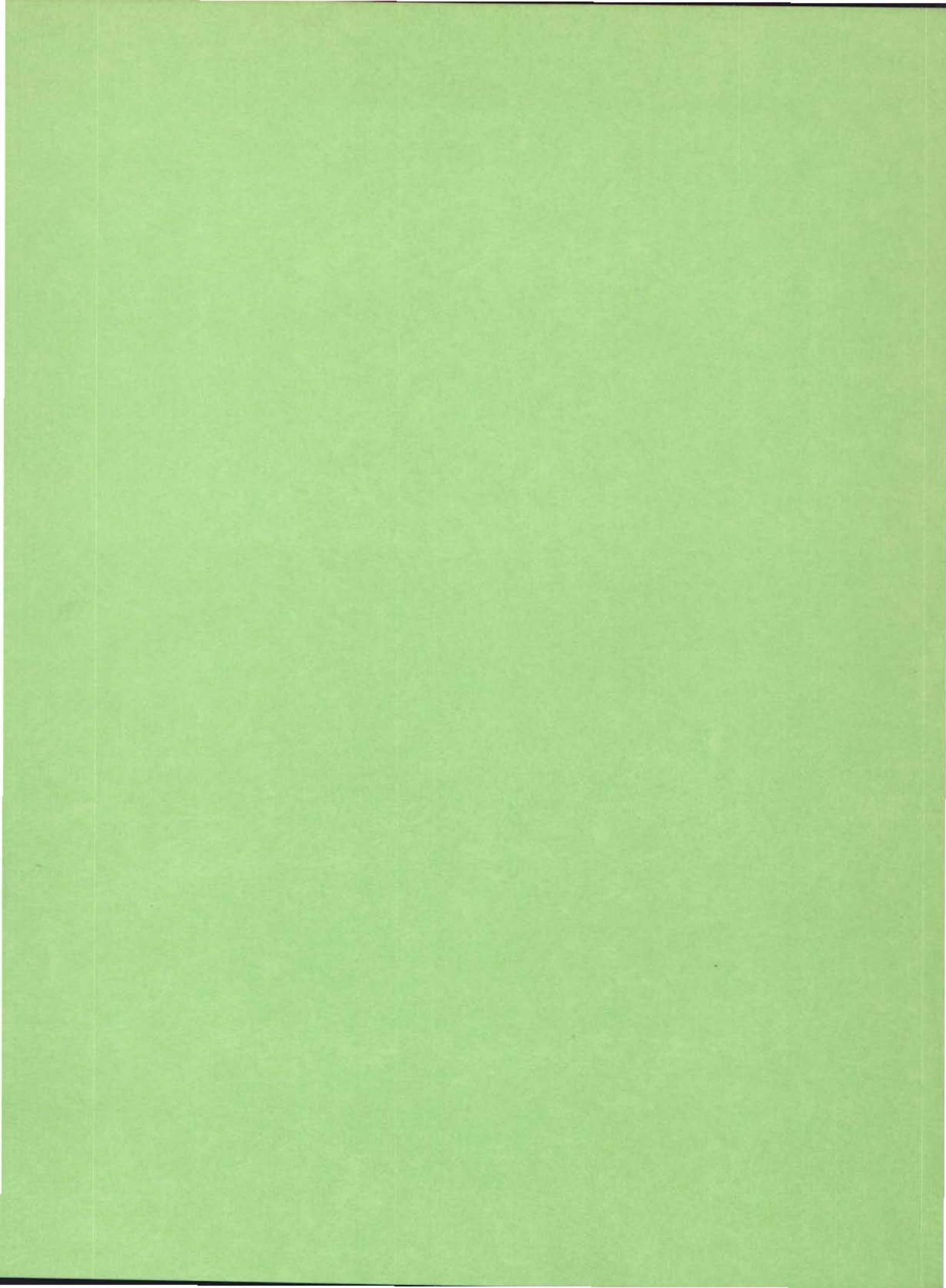


# Water for Nevada

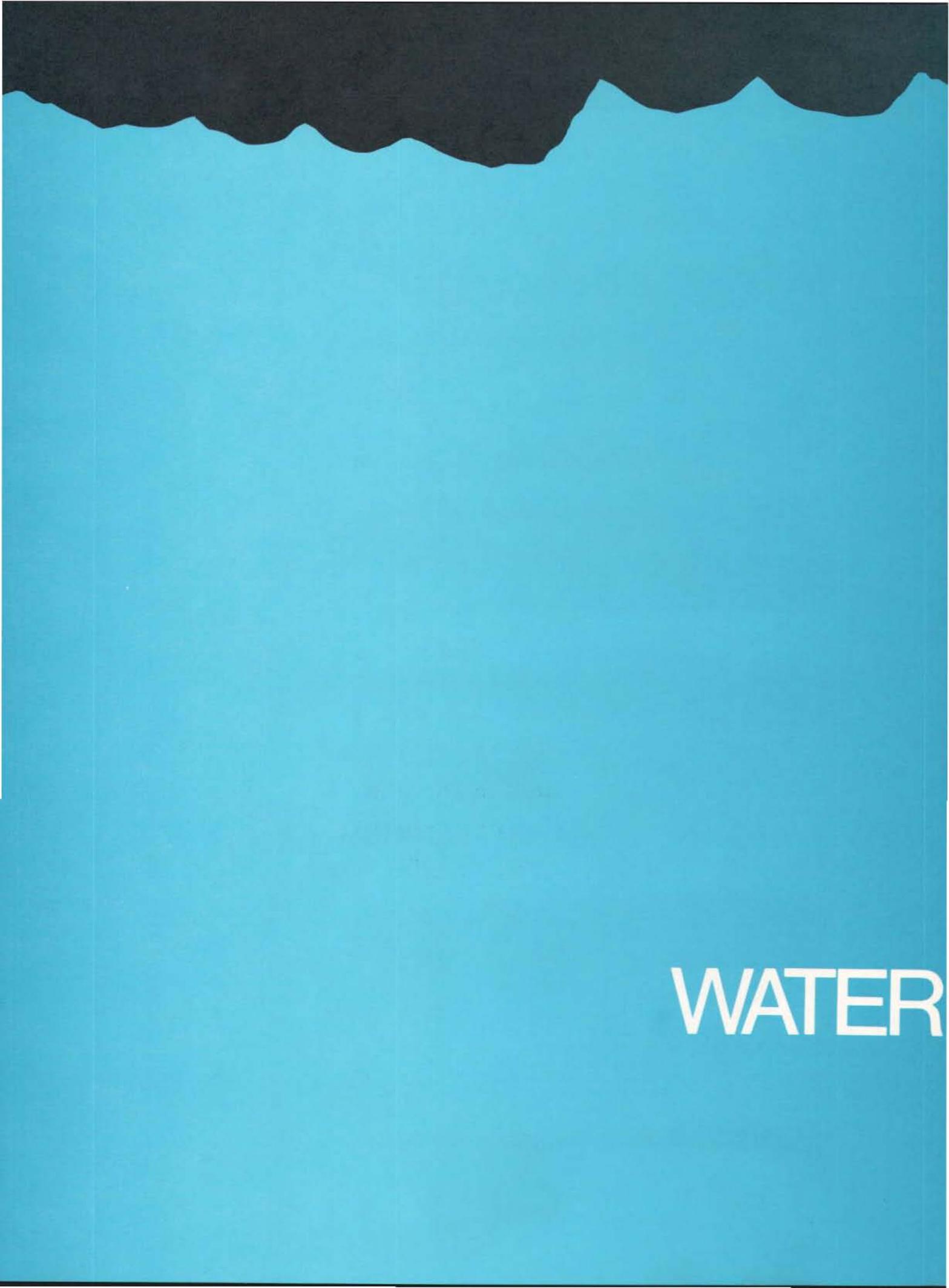


WATER-RELATED RECREATION IN NEVADA  
PRESENT AND FUTURE





State of Nevada  
WATER PLANNING  
REPORT

The image features a solid blue background. At the top, there is a black, scalloped-edged border that resembles a torn piece of paper. In the bottom right corner, the word "WATER" is printed in a bold, white, sans-serif font.

**WATER**

# FOR NEVADA

Prepared by the State Engineers Office, and  
Division of Agricultural and Resource Economics  
Max C. Fleischmann College of Agriculture  
University of Nevada, Reno  
Reno, Nevada

DECEMBER, 1973

WATER-RELATED RECREATION  
IN NEVADA  
PRESENT AND FUTURE



REPORT NO.

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Director

STATE OF NEVADA

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DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES  
DIVISION OF WATER RESOURCES

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No.

Address All Communications to  
the State Engineer, Division  
of Water Resources

TO THE CITIZENS OF THE STATE OF NEVADA

As a part of the development of the State Water Plan, the Division of Water Resources is estimating the need for water and related land resources for the coming fifty-year period. The years 1970 (Base Year), 1980, 2000, and 2020 have been selected by the Division to serve as markers in tracing the estimated water requirements for the next half-century.

Agreements have been made with several Federal and State agencies to assist the Division in the preparation of estimates of future usage for particular activities. Such an agreement was made with the Division of Agricultural and Resource Economics, University of Nevada, Reno, to estimate future water requirements for water-related recreation in Nevada. The principal authors of this report are Theodore J. Dixon and John G. McNeely, Jr. Bruce Scott, formerly with the Division of Water Resources, provided direct supervision of the report and made several valuable modifications. Lawrence M. Roach, Jr., draftsman, assisted in the compilation of the report. B. J. Vasey, former Planning Engineer with the Division, provided general supervision in its preparation and production.

This Planning Report is one of a series of reports related to the projection phase of the State Water Planning effort. Estimates of future water needs for Nevada's water-related recreation are presented for each of the States' fourteen hydrographic regions and its seventeen counties. A summary for the entire state is also given.

In addition to the estimates of recreational activity and associated water requirements, the Report also presents estimates of the economic value of water-based recreation.

The conclusions presented in this report summarize at least some of the conditions and problems related to future water requirements for water-related recreation that may well have an important impact on the lives of all the people of this State, both those now living and those of future generations.

Respectfully,



Roland D. Westergard  
State Engineer

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## WATER-RELATED RECREATION IN NEVADA — PRESENT AND FUTURE

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## SUMMARY AND CONCLUSIONS

### SUMMARY

Water is a prerequisite for many forms of outdoor recreation and enhances most others. Nevada's arid to semi-arid climate makes its water resources scarce and limits some of the supply of outdoor recreation facilities. The objectives of this report were to:

1. estimate current use of Nevada's water resources for outdoor recreation purposes for various activities
2. project to the year 2020, the use of Nevada's water resources for outdoor recreation
3. estimate quantities of water used currently for recreation and make estimates of future needs.

All of the above objectives relate to publicly owned areas in Nevada including city, county, State and Federally owned or controlled areas.

In spite of Nevada's limited precipitation, there are nearly 180 million acre-feet of water stored in its lakes and reservoirs and more than 1,100 streams in the state, many of which are fishable. Of the 110,540 square miles within its borders, approximately 87 percent of the state is in Federal ownership. Thus, there exists considerable potential for public outdoor recreation facilities in Nevada.

The procedure used to inventory existing recreation areas and use of these areas consisted of contacting all

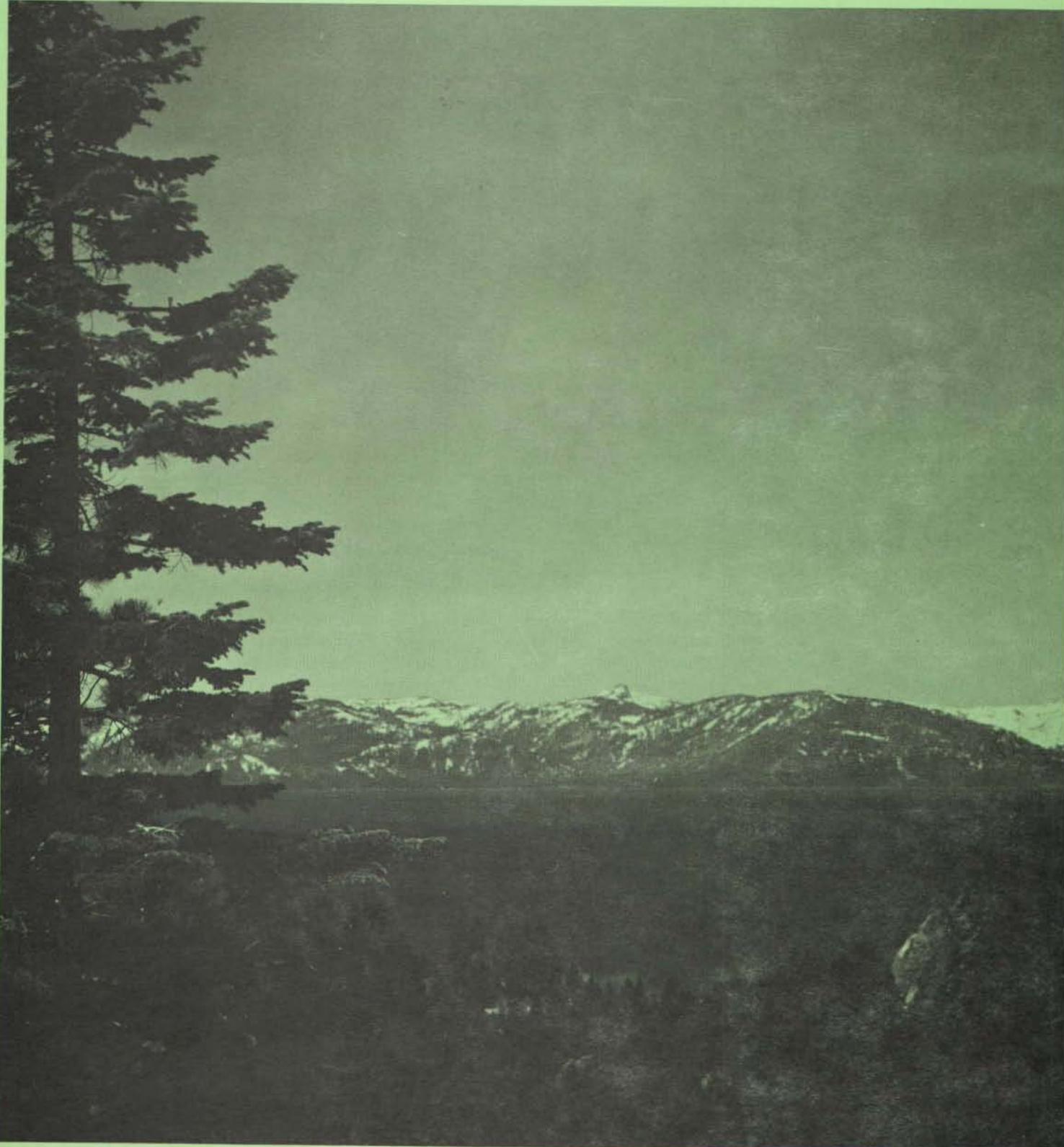
public agencies involved with such locations. Personnel of each of these agencies were questioned regarding each area's recreational characteristics and use. Altogether, 1,209 areas were inventoried, of which nearly 700 were streams, over 200 were lakes and reservoirs, 155 were city and county parks and 85 were campgrounds. These areas were categorized by county and hydrographic region. Elko, White Pine, Humboldt and Washoe Counties had the greatest number of recreational areas with over 100 each.

The use of these areas amounted to over 21 million recreation days<sup>1</sup> in 1970, of which 68 percent was resident use. Use was estimated by county and hydrographic region. County recreation use ranged from nearly 10 million recreation days use in Washoe County areas to 3,824 recreation days of use in Storey County.

The three most frequently occurring recreational activities at each site were delineated and are shown in the Data Supplement. The detailed data concerning individual sites, which were generated as a part of this report have been published separately to minimize costs. Limited copies of the data supplement are available on request from the Division of Water Resources. Additionally, the three most frequently occurring activities are shown by type of site for each county, hydrographic

1 — A recreation-day or visitor-day means any portion of a day of recreational use at any of the recreation sites by an individual.

Lake Tahoe



region and the state. Hunting small game was the most popular activity on the small streams of Nevada. On the large streams and at all of the lakes fishing was the most frequent activity. Hunting small game was also the most common activity at springs. Picnicking and camping were most common at the parks and campgrounds.

In order to make projections several variables were tested to determine their effect upon recreation use within a county. Such factors as size of county, surface water in the county, growing season (frost free period), average precipitation, number of sites in the county, county population and existence of major highways were tested. The most important variables influencing county recreation attendance were surface acres of water in the county, county population and length of growing season.

The acres of land and water and consumptive water use for the 1,209 sites were determined by type of sites, by county and by hydrographic regions. Washoe County had the greatest area of water, while Clark County had the largest area of recreation land with both the Desert National Wildlife Range and the Lake Mead National Recreation Area. Lincoln County had the greatest consumptive water use where large quantities of water were pumped from wells to irrigate and maintain waterfowl habitat.

The value of a recreation visit was estimated for each type of site, by county and hydrographic region, in Nevada. These values were based on work done by the U.S. Forest Service and the Water Resources Council. They provide an estimate of the amount that users would be willing to pay to avail themselves of the recreation resources at a particular type of site if such payment were required. The highest values are associated with the streams, lakes and springs, where hunting and fishing are the most common activities. The highest values for a single visit are found in Elko County, which provides some of the best fishing and hunting opportunities in Nevada. The highest total value was in Washoe County, with nearly \$19 million worth of recreation use. Clark County was second with a value of \$13.7 million while Storey County, with the fewest recreation visits, had the lowest total value of \$8,200.

Projections of future use of Nevada's public recreation resources were made using two separate techniques. The first utilized the best expectations of the agency administering each area concerning future use. Projections were made by county and by hydrographic regions. Recreation use at all areas was projected to

increase from 21 million recreation days in 1970 to 116 million recreation days by the year 2020.

The second procedure used to project recreation use based the projections upon anticipated population growth. Use was projected to increase from 21 million recreation days in 1970 to 78 million by the year 2020 using this technique. Because of Nevada's interest in promoting its large recreation potential the higher projections are felt to be better for planning purposes.

The annual percentage increases in recreational use for each county and hydrographic region were estimated based on the higher projections. Nye County expected the greatest increase with 31.9 percent. The average increase for all counties was 8.9 percent.

Future land and water needs for city and county parks and golf courses were estimated by county and by hydrographic region. Statewide consumptive water needs for city and county parks are projected to increase from 2,121 acre-feet in 1970 to about 41,000 acre-feet by the year 2020. Land needs for city and county parks will increase from 6,008 acres in 1970, to 18,000 acres by the year 2020. Currently, eleven counties are deficient in city and county park recreation land. Four counties have adequate park land now to meet projected needs to the year 2020.

Public golf course water requirements will increase from 3,246 acre-feet in 1970 to nearly 25,000 acre-feet by the year 2020. During this same period, golf course land needs will increase from 1,287 acres in 1970 to over 6,300 acres in the year 2020. Clark County will require the bulk of future public golf course land and water needs.

Surface water requirements for outdoor recreation were estimated using waters needed for boating as the limiting factor. Estimates were made by county and by hydrographic region. In 1970, there were about 355,000 surface acres of water suitable for boating. It was estimated that these waters could handle nearly 9 million boat-days of use, while less than half a million days were estimated for 1970. Nearly 2.4 million boat-days were projected for the year 2020, considerably below the capacity of current surface water area. These figures indicate that statewide, there are adequate boatable waters. But, this is not to say that future lakes developed would not be used. Many of the existing areas are not used to their potential because they are either far removed from population centers, are inaccessible because of poor roads, or there are inadequate launching and other facilities necessary for boating. Additionally,

these projections are based upon current trends in use, which might change if more waters were available and access and facilities were improved.

There are many problems concerning water based and water related public outdoor recreation in Nevada. Some of these directly concern water, while others are indirectly related to water availability.

The quality of Nevada's waters for recreation as well as other uses is a major potential problem. If Pyramid and Walker Lakes continue at their present rates of decline, it won't be many years before their quality is such that they will be unable to support fish life. Of the two lakes, Walker Lake would deteriorate to this point within the next 50 years while Pyramid Lake would not until well beyond this period. In some cases use of streams can often remove most or all of the water, destroying the fish habitat. Erosion is a serious problem which, if unchecked, can often ruin the recreational value of a stream in a few years time.

Pollution, in many forms, is showing its effect on the streams and lakes of Nevada. While much is being done at Lake Tahoe to maintain the quality of its clear waters, there are still many problems. Sewage disposal from cities and towns is a frequent detractant from water quality. Thermal pollution is a newer threat, as some streams are being warmed by loss of protective shading along the banks or from cooling waters discharged from thermal electric plants. Warmer waters promote the growth of algae and can easily exceed the temperature limits for trout and other cold water fish.

Lack of access to lakes, streams and rivers is a major problem in some areas because of private ownership of adjacent lands. A similar problem exists concerning access to public lands. Many of these areas could be opened for public use by purchase or lease of easements or right-of-ways.

Subdivision planning for outdoor recreation is another important area of need concerning recreation planning. The 1973 session of the Nevada Legislature passed a law designed to require subdividers to set aside a portion of the land subdivided to assure adequate park facilities for those living in the subdivisions.

The esthetic properties of many wild and scenic streams and rivers are often decreased by damming, diverting the water, or channelization. Additionally, fish habitat may also be destroyed. Wherever possible, when the best interests of all concerned are considered, streams and rivers should be protected to preserve their esthetic and recreational quality. However, in many cases

manmade structures are often the only way of assuring perennial flows in many Nevada streams.

Floodplain zoning is another problem related to development along rivers and streams and also in some cases to development around lakes. Instead of having a green belt area along the major river and lake shores, many areas become urbanized to the exclusion of the general public. Many of these scenic areas could be zoned as green belts to provide for more recreational use and reduce the cost of flood protection.

Recreational facilities are continually needed in urban areas as a means to give people of all ages and walks of life, park areas at reasonable distances to their residence. Such areas are physical outlets for the energies of the young and young-at-heart and also provide areas of beauty when the parks are well designed and maintained.

Other types of urban outdoor recreational facilities that are needed are adequate walking, horseback riding, jogging and bicycle trails. One might consider the use of irrigation ditch right-of-ways in a multiple use manner to provide such trails as a water related recreation resource.

Under present State laws, fish and wildlife have no water rights unless the Department of Fish and Game applies for use permits on the behalf of wildlife. Legislation should be considered which assures wildlife adequate water at traditional sources when such sources are developed for the interests of private or public entities. Another important need is for establishment of minimum recreation pools for lakes and minimum flows for streams and rivers. It should be recognized that in virtually all cases maintenance of minimum flows without infringing on existing water rights would require additional storage facilities.

## CONCLUSIONS

Nevada is a vast state and has numerous water based and water related opportunities. But, increasing population pressures, increasing out-of-state visitor demands and increasing leisure time, income and mobility of residents and non-residents alike, have created pressures upon many of these outdoor recreation facilities.

Planning to meet current and future demands is needed as is the legal and institutional framework to implement such plans. Planning should strive to make allowance for the heritage and beauty of Nevada so that these features of the state will be protected. Environ-

mental impacts of various alternatives must be considered. Multiple-use of many of the land and water resources could be sought where possible.

This study should provide a basis for future planning in the area of outdoor recreation in Nevada and hopefully the information will be updated and refined as new estimates become available. Improvement of enumeration of use data by agencies providing recreational facilities in the state will greatly enhance the study and planning of recreational needs in Nevada.

## INTRODUCTION

In Nevada, as in much of the Western United States, water is in short supply in relation to the many uses to which it may be put. Outdoor recreation's claim to the use of water until recently was one of only an incidental nature to other uses. It was not until 1969 that outdoor recreation was declared by statute as a beneficial use of water [23]. However, this use was recognized as beneficial prior to that time.

Now that outdoor recreation has been recognized as a legitimate user of water on a par with such uses as agriculture, municipal use and industry, its demands for water need to be evaluated for the present and the future.

### SCOPE AND OBJECTIVES

The Nevada Division of Water Resources is publishing a series of reports which will provide information for the Nevada State Water Plan. One series of these reports is the current and projected future use of water for six major purposes:

1. municipal and industrial.
2. agricultural.
3. power.
4. mining.
5. fish and wildlife.
6. outdoor recreation.

Projections are being made to the years 1980, 2000, and 2020.

This report addresses outdoor recreation at publicly sponsored areas. These include developed and undeveloped areas of the Bureau of Land Management,

United States Forest Service, Bureau of Sport Fisheries and Wildlife, National Park Service, Nevada State Parks System and county and city facilities.

The specific objectives of this study were as follows:

1. to estimate current use of Nevada's water resources for outdoor recreation purposes for various activities
2. to project to the year 2020 the use of Nevada's water resources for outdoor recreation
3. to estimate current quantities of water used for recreation and for future needs

The current study does not consider total recreation activity in the State of Nevada. Except for specific management areas such as the Desert National Wildlife Range, outdoor recreation at non-water related areas is not enumerated nor is the recreational activity at private sites. Indoor recreation was not considered a part of this study.

## NEVADA'S OUTDOOR RECREATION ENVIRONMENT

### Land Resources

Nevada is truly an outdoor recreation state. With approximately 87 percent of the total 110,540 square miles in Federal ownership, Nevada's residents and visitors alike have a vast expanse of area for outdoor recreation.

Among the reasons for such a large percentage of public ownership is that Nevada is one of the driest states in the United States with an average precipitation ranging from as little as three inches annually at the lower elevations to over 30 inches annually at the higher elevations. Much of the public land in Nevada is not located in the vicinity of available surface water sources and is not readily adaptable to private development. Therefore it has remained in the public domain.

Nevada is a mountainous state with many narrow mountain ranges which separate fairly level valleys. Most of the mountain ranges are oriented in a north-south direction. The altitude of the mountains range from 6,000 to 13,000 feet while that of the valleys range from 1,000 to 6,000 feet.

### Water Resources

Because of its very limited precipitation, Nevada has only limited runoff from the mountains. Of the approximately 54 million acre-feet of average annual precipitation, only 3.2 million acre-feet or six percent is runoff from the mountains (Table 1). Ground water recharge for valley-fill reservoirs averages 2.2 million acre-feet

**TABLE 1**  
**SUMMARY OF NEVADA'S WATER RESOURCES**

Item	Acre-Feet Per Year (Except As Otherwise Stated)
Precipitation:	
Estimated annual average	54,000,000
Surface water:	
Estimated runoff from mountains	3,200,000
Estimated inflow crossing the state line (excluding the Colorado River)	1,300,000
Colorado River	9,700,000
Estimated outflow crossing the state line (excluding the Colorado River) <sup>1</sup>	700,000
Colorado River	9,400,000
Surface water storage capacity (excluding Nevada's portion of Lake Mead, Lake Mohave, Lake Tahoe and Topaz Lake in acre-feet)	25,000,000
Lake Mead (total capacity, acre-feet)	29,700,000
Lake Mohave (total capacity, acre-feet)	1,820,000
Lake Tahoe (total capacity, acre-feet)	122,000,000
Topaz Lake (total capacity, acre-feet)	59,400
Ground water: (ground water budget for valley-fill reservoirs) <sup>2</sup>	
Estimated ground water inflow	2,000,000
Estimated ground water outflow	2,000,000
Ground water recharge from precipitation	2,200,000
Perennial yield of valley-fill reservoirs	1,700,000
Ground water stored in upper 100 feet of saturated valley-fill (acre-feet)	250,000,000
Estimated transitional storage reserve (acre-feet)	84,000,000
Estimated outflow crossing the state line	150,000
Estimated inflow crossing the state line	3,000

<sup>1</sup>Includes 1970 flow to Lake Mead from Las Vegas Wash.

<sup>2</sup>Water underground in a given valley.

annually or four percent of average annual precipitation (Table 1). About 180 million acre-feet of water are stored in Nevada's lakes and reservoirs (including water in Lake Tahoe, and other lakes which extend into other states).

In spite of Nevada being an arid to semi-arid state over most of its area, it can still boast of some impressive water resources in terms of its natural lakes such as Pyramid Lake, Walker Lake and Lake Tahoe. Also, Nevada's man-made lakes such as Wildhorse Reservoir, Topaz Lake, Lahontan Reservoir, Lake Mohave and Lake Mead are all excellent recreational resources. In addition, there are over 1,100 streams in the State, of which 480 are declared fishable streams by the Nevada Fish and Game Department. There are also numerous areas where springs provide drinking water for wildlife and moisture for vegetation.

### *Climate*

Nevada's precipitation is quite sparse because of the rain shadow cast by the Sierra Nevada. In most areas, the moisture is fairly well distributed over the entire year with a slight emphasis upon winter precipitation. Winds are generally from the west and strong and gusty during certain times of the year. The high altitude areas in the mountains have greater precipitation and also lower temperatures which result in snow accumulation during the winter months.

The low levels of precipitation create low humidity which allows for daily temperature fluctuations of up to 50 degrees over most of the State. Temperatures ranging from the 40's and 50's in the summer nights to the 80's and 90's during the days are common in the northern portions of the State, while summer temperatures 10 to 20 degrees warmer are experienced in the south.

Winter temperatures vary from below zero to freezing most mornings and rise to 50 or above during the days.

In general, Nevada's climate is quite conducive to many forms of outdoor recreation. It is moderate with warm enough days during the summer for water-based activities and cold enough in the winter for snow-related activities.

### **OTHER NEVADA OUTDOOR RECREATION PLANS**

Outdoor recreation facilities were taken for granted until sometime in the 1950's when demand seemed to be far outstripping existing supplies. It was in 1958 that Dr. Marion Clawson, a former Nevadan, who has written several books in the field of resource economics, wrote a paper entitled, "The Crises in Outdoor Recreation" [5]. This paper illustrated a growing problem in the provision of facilities for outdoor recreation. In response to this problem, President Eisenhower created the Outdoor Recreation Resources Review Commission in 1959, which put together the first really comprehensive set of studies concerning outdoor recreation in America [41]. From this beginning came the decade of the 1960's which created more studies, legislative acts and general interest regarding outdoor recreation than probably all the years prior to that time. Outdoor recreation was recognized in benefit-cost analysis in 1964 in a supplement to Senate Document 97 [67]. Recreation was formally recognized as a beneficial use of water in Nevada by legislation passed in 1969 although special water use permits were issued in prior years [23]. The Land and Water Conservation Fund Act passed by Congress in 1965 authorized the states to conduct comprehensive outdoor recreation planning as a prerequisite to being able to cost share in the provision of outdoor recreation facilities development with the federal government [6]. The Nevada State Comprehensive Outdoor Recreation Plans I, II and III published in 1965, 1967 and 1971, respectively, are results of this act [52]. Some of the major findings of these plans are used as a basis for projections in this study.

In 1971, the Type I Framework Studies were completed under auspices of the Water Resources Council. Nevada falls in parts of three of the Framework planning regions — The Great Basin, covering 78% of the state, the Lower Colorado Region, which includes 17% of Nevada, and the Columbia North Pacific Region, encompassing the remaining 5%.

It is difficult to compare reports of recreation projections because of such variables as population, per capita use rates, types of activities included, etc. However, because of the national significance of the Type I Studies, general comparisons should be made.

The Framework studies used 1965 as a base year. This water related recreation study uses 1970 as a base.

The Type I Study showed needs for additional water surface acreage while this report projects only a small need for surface water in White Pine County by 2020. In the Framework study much of this need was based on projected non-resident demands. This study was done using a non-resident demand of 32% while the Type I used 45% of the total projected demand.

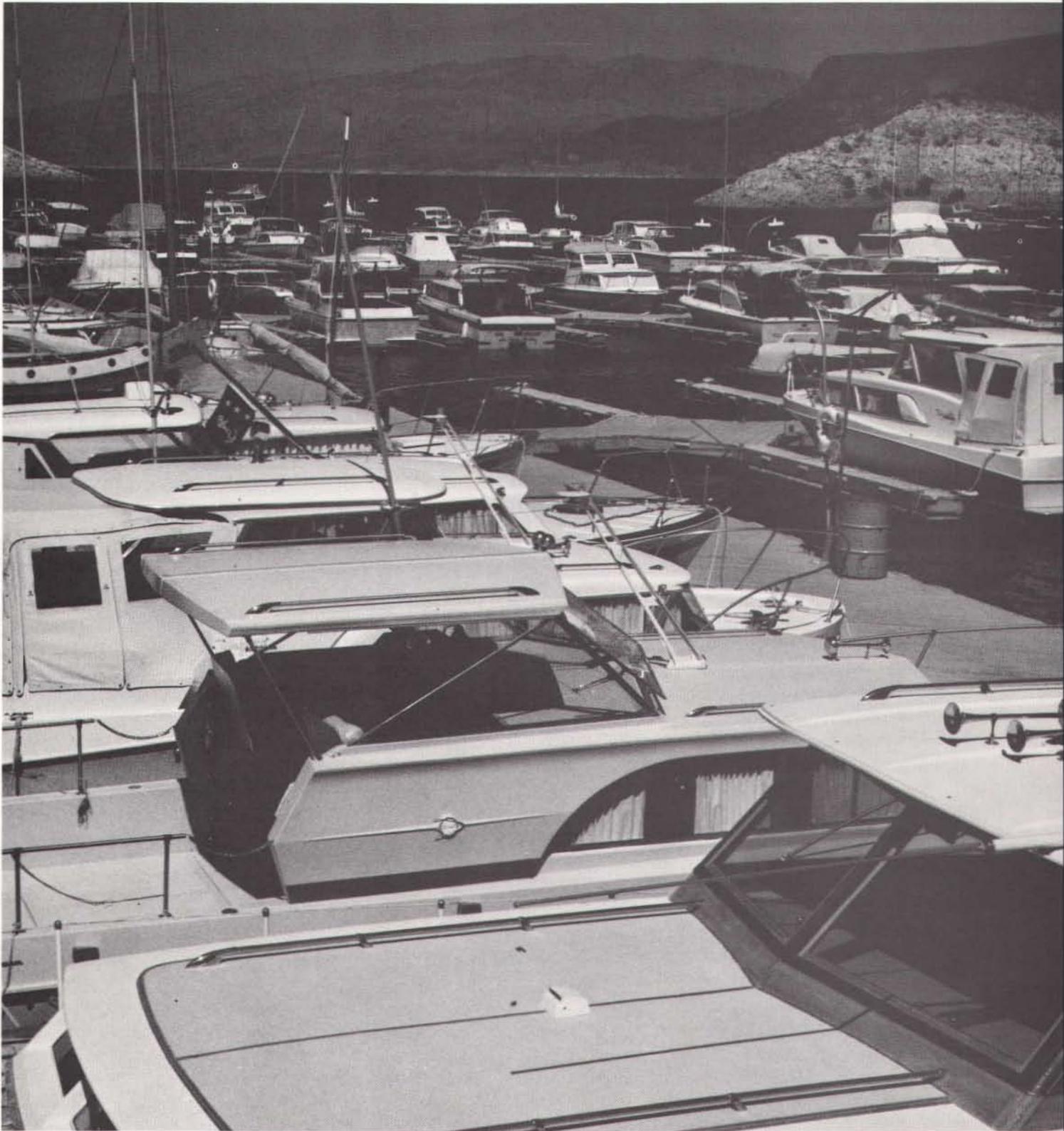
The state populations which were used by the two studies may help explain some of the differences. The two sets of projections and the chart below show that there is very little similarity in the trend of growth or total population projected.

POPULATION PROJECTIONS

	Type I Study	This Study
1965	425,900	Not Available
1970	Not Available	488,738
1980	673,500	806,500
2000	1,245,700	1,438,500
2020	2,091,500	1,805,000

Even with these discrepancies, the recreation day projections are quite close. The Type I studies show a 2020 estimate of 111,000,000 recreation days for water based and water oriented activities, compared to 116,000,000 recreation days shown in this report.

Lake Mead



## DEFINITION OF TERMS

Because of the obvious necessity of water in our lives and the growing part of our time devoted to recreation pursuits, both of these areas have been the subject of much research and scientific study. As a result, there have developed a number of technical terms and word usages which may be unfamiliar to the reader. Even within the field of study, there may be more than one usage for a particular term. Some of these terms are defined here as they apply to this report.

### DEFINITIONS

#### *Recreation Visits*

There are a number of terms used in this and other studies which all have essentially the same meaning. These include visitor-day, recreation-day, and user-day. They are defined as being any portion of a day of recreational use at any of the recreation sites by one individual. This may be a period of 20 minutes or 24 hours as long as it is the same individual at the same recreation site. This should not be confused with the definitions used by other agencies. The Forest Service, for example, in their reporting of data, considers a visitor-day as a definite 12-hour period.

#### *Activity-Day*

The reader must be careful not to confuse this term with those defined above. An activity-day is any portion of a day that a person spends engaged in one recreational activity. During the course of one recreation-day, a person may engage in a number of activity-days. For example, a person may spend the day at a local reservoir. This would be recorded as one visitor-day. While there, however, he may fish, do a little swimming and have a ride in a friend's boat. This would be counted as three activity-days because he spent a part of a day at each of these activities.

#### *Water-Related Recreation Areas*

By water-related recreational sites it is meant all public recreational areas, either improved or unimproved that are located at or near a water source or those which require water in significant amounts. These would include most public (city, county, state and federal) swimming pools, lakes, streams, springs and parks. It should be pointed out that many of the areas are unimproved and have a few if any facilities other than a natural environment. Although many of the areas do have improved

facilities, no distinction has been made between unimproved and improved areas. Before deciding to visit any of the areas which may be unfamiliar to potential users, it would be advisable to visit with local authorities regarding specific conditions one might encounter.

#### *Day Visit*

A day visit is counted for each person who visits or uses the recreation site for any length of time during the day but does not stay overnight.

#### *Overnight Visit*

An overnight visit would be counted for each person who stays overnight, one night. A three night stay would count as three overnight visits. A person counted as an overnight visitor would not also be counted as a day visitor during his stay at the recreation site.

#### *Resident*

A resident, for the purposes of this report, is defined as anyone residing within the State of Nevada. Resident use for a particular county or hydrographic region includes not only those visitors who live within the particular unit but all visitors who reside within the State.

#### *Nonresident*

Nonresidents are all people who do not reside within the State of Nevada. They may be from another state or from a foreign country.

#### *Deficiencies*

When present recreation facilities do not equal or exceed the recommended minimum requirements to satisfy the demand, the difference between the actual current facilities available and the recommended minimum standards is recorded as a deficiency. This may be for 1970 or any of the projection periods.

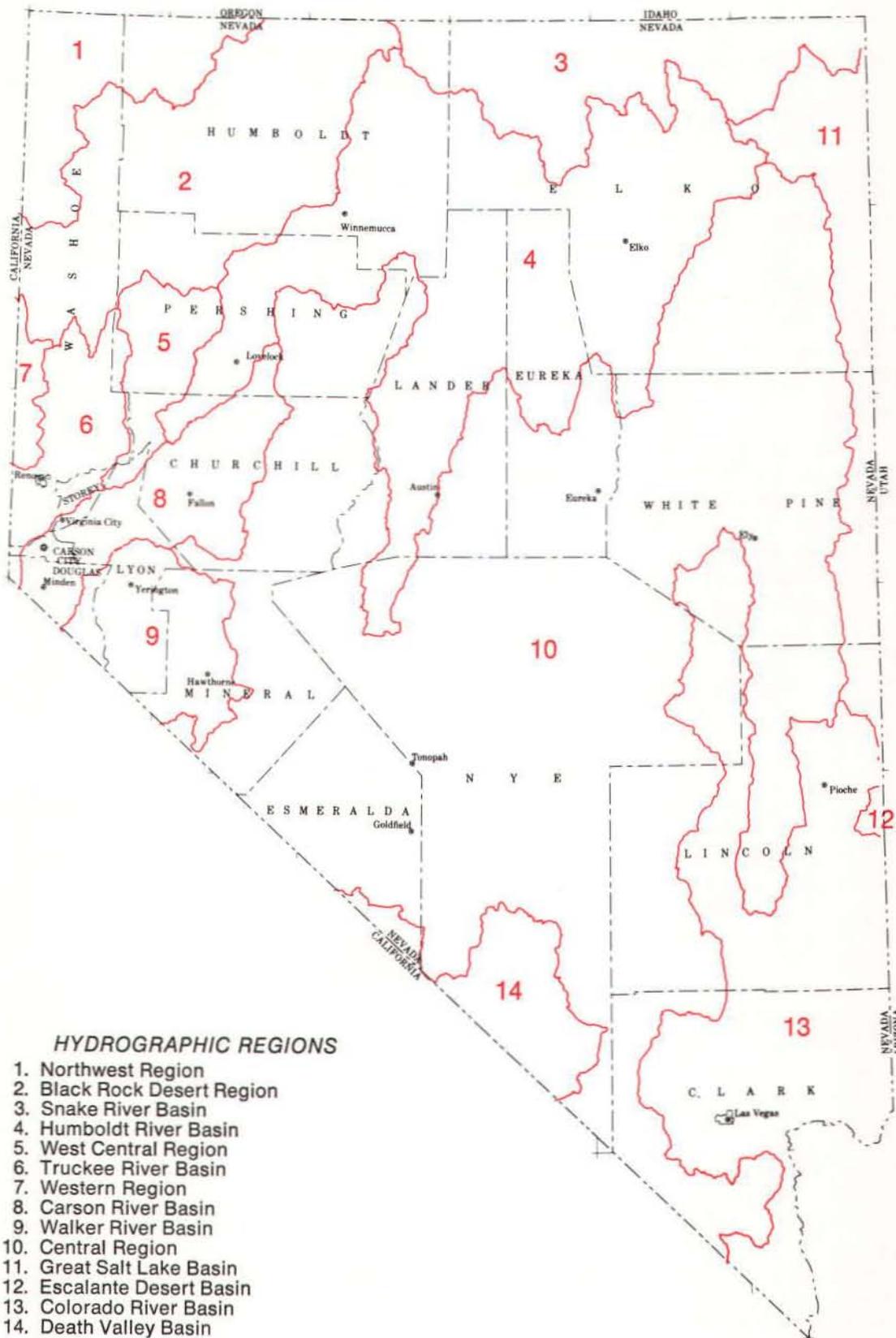
#### *Type of Site*

For analysis purposes all of the recreation sites considered within the scope of this study were grouped into 11 categories or types of sites. These were designed to group together recreation areas of a similar nature so that they could be considered together and compared to other types of areas.

The descriptions of the 11 types of sites are as follows:

1. All streams and rivers under 15 cubic feet per second (c.f.s.) average minimum flow (August-October).
2. All streams and rivers 15 c.f.s. or more average minimum flow (August-October).
3. All lakes and reservoirs with less than 500 total visits in 1970.

FIGURE 1  
MAP OF NEVADA SHOWING HYDROGRAPHIC  
REGIONS OR BASINS AND COUNTIES



- HYDROGRAPHIC REGIONS**
1. Northwest Region
  2. Black Rock Desert Region
  3. Snake River Basin
  4. Humboldt River Basin
  5. West Central Region
  6. Truckee River Basin
  7. Western Region
  8. Carson River Basin
  9. Walker River Basin
  10. Central Region
  11. Great Salt Lake Basin
  12. Escalante Desert Basin
  13. Colorado River Basin
  14. Death Valley Basin

4. All lakes and reservoirs with 500 or more total visits in 1970.
5. All surveyed springs.
6. All city and county parks as of 1970.
7. All state parks as of 1970.
8. All other unclassified parks and campgrounds.
9. All Forest Service and Bureau of Land Management campgrounds as of 1970.
10. All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
11. All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

#### **Hydrographic Region**

Nevada has been divided into 14 hydrographic regions or basins, which are now used by the Nevada Division of Water Resources — Department of Conservation and Natural Resources and the U. S. Geological Survey to compile information pertaining to water resources and water use. These regions are listed and shown on Figure 1. These regions are also subdivided into 232 hydrographic areas (valleys) for more detailed study.

#### **Surface Water**

Surface water is water on the surface of the earth. Surface water withdrawals include water taken from streams, rivers, ponds, lakes, reservoirs, springs and all effluent and other waste water.

#### **Ground water**

Ground water lies under the surface, in the ground's zone of saturation, from which wells and springs are supplied. In this report, ground water withdrawals include all water taken from wells.

#### **Municipal water**

Municipal water may come from either ground water or surface water sources. However, for purposes of this report, once water has entered a municipal water system, from whatever source, it will be considered municipal water.

#### **Consumptive use**

Consumptive use of water is the removal of water from the system by evaporation, use by plants, industry, people, etc. Consumptive use of water for recreation as used in this report did not include evaporation from lakes and reservoirs, but did include water used at recreation sites, parks, and water pumped from wells for use on wildlife management areas.

#### **Nonconsumptive use**

Nonconsumptive water use includes water withdrawn from use that is not consumed, for example, water withdrawn for purposes such as hydro-power generation. This also includes uses such as boating or fishing where the water is still available for other uses at the same site.

#### **Units of Measurement**

Quantities of water given in this report are in gallons, acre-feet (AF), gallons per minute (GPM) or cubic feet per second (CFS). An acre-foot of water will cover an area of one acre to a depth of one foot; it is about 325,900 gallons. One GPM will equal about 1.6 AF per year. One CFS is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to 7.48 gallons per second or about 450 gallons per minute.

## **METHODS AND PROCEDURES**

### **PRIMARY DATA COLLECTION**

Sufficient secondary data did not exist among the public agencies to provide the necessary information for this study. Therefore, it became necessary to devise a questionnaire (see Appendix) which would allow for an orderly assemblage of data from the most knowledgeable agencies. In many cases, the agency administering the land was less familiar with the use of undeveloped areas near streams and springs than the Nevada Fish and Game Department. This might be expected because of the contact made in the enforcement of fish and game laws. For developed areas, the administering agency was contacted in almost every case.

#### **Rivers and Streams**

The Nevada Fish and Game Department provided most primary data regarding identification, description and use of rivers and streams in Nevada. Their records were invaluable in obtaining names of streams, size and location, and water quality and quantity. Some information regarding angler-days at most of the larger streams was available. For the smaller streams, this information had to be estimated. Additionally, the use of these

streams for other than fishing also had to be estimated in most cases. Data for any improved areas along the rivers and streams were collected separately from the agency administering the improved site.

#### **Lakes and Reservoirs**

Methods similar to those employed in data collection for rivers and streams were used for lakes and reservoirs. Again the Nevada Fish and Game Department provided most of the data regarding description and use in terms of angler-days, but they were not able to provide information regarding other recreational use for most of the more significant bodies of water. Generally, the agencies administering these lakes provided data regarding their recreational use. The major exception to this was Lake Tahoe, where a host of agencies are involved and the data had to be assembled from all of them.

#### **City and County Parks and Other Recreational Facilities**

Each city, town and county that had outdoor recreational facilities was contacted and information for each facility was gathered using the questionnaire (see Vol. II Statistical Supplement). These facilities were predominantly playgrounds, grassed park areas, swimming pools and golf courses. But they also included a wide variety of other facilities which ranged from rodeo grounds to rifle ranges. All of these facilities were enumerated regardless of their dependence upon water.

#### **Nevada State Parks System**

The Nevada State Parks System provided data regarding each of the state parks. For the areas where fees were charged for overnight camping counts were available. For many of the day use areas where no fees were charged, estimates had to be used. Again, the questionnaire was used for systematic data gathering.

#### **Federal Facilities**

The major federal agencies involved in providing outdoor recreation facilities in Nevada are the U. S. Forest Service, the Bureau of Land Management, the Bureau of Indian Affairs and the National Park Service. Each of these agencies was contacted and questionnaires were completed for each of the improved areas.

## **SECONDARY DATA COLLECTION**

Most of the secondary data used in the study consists of published information which was used to help determine outdoor recreation trends in Nevada. Data used

included Nevada Fish and Game license sales, Nevada highway statistics, Lake Mead use data, population data and income data.

Other published or unpublished information concerning outdoor recreation use in Nevada was used to supplement primary data collected.

## **DATA ANALYSIS**

Over 1,200 questionnaires were gathered for all the public water-related recreational areas in the State. All information on each questionnaire was coded to enable the information to be analyzed by use of a computer. This process is time consuming but has the advantages of improving accuracy and ease of data analysis. It also creates a data bank which can be used on a continuing basis.

The data were first analyzed by counties. Additionally, stratifications within counties by hydrographic regions were made. Within the hydrographic regions, the information was further categorized by type of site. These site classifications include small streams, large streams, small lakes, large lakes, city and county parks, state parks, BLM campgrounds and Forest Service campgrounds. (See Definitions; page 16.)

Once broken down into categories, tables were constructed to present much of the data. The computer was used to sort and print the data. The tables are presented in Vol. II, Statistical Supplement. A summary of this analysis is presented in the following section. Information concerning total water use, total acres, total recreational use and so forth, was determined in this manner for each county, hydrographic region and site classification. The expected future use data were used as part of the basis for projecting future outdoor recreational use of public areas in Nevada.

## CURRENT RECREATIONAL USE OF LAND AND WATER

### OUTDOOR RECREATION AREAS

Outdoor recreation areas were inventoried by interviewing persons who were familiar with their use and characteristics. These areas are presented individually by county and by hydrographic region in Vol. II, Statistical Supplement. Altogether, there were 1,209 water-based and water-related areas inventoried (Table 2). These areas ranged from parks, campgrounds, swimming pools and other improved areas to streams, rivers, lakes and springs which were largely unimproved.

#### County Areas

There is a wide divergence in the number of areas in each county. Elko County has, by far, the most areas with 348, followed by White Pine with 156, Humboldt with 124, Washoe with 119 and Nye County with 82 (Table 2). Storey County has the least number of facilities with six sites recorded.

#### Hydrographic Regions

A wide variation also occurs between hydrographic regions with regard to the number of water-related sites in each. The Central Region has the greatest number with 299 sites (Table 3). This is due largely to its containing 42 percent of the total land area of the State. The Humboldt River Region is second with 236 followed by the Snake River Region with 159, the Truckee River Region with 115 and the Colorado River Region with 103 water-related sites. Land area is only one factor influencing the number of sites. Precipitation, local population and nonresident demand are also important areas of influence.

#### Types of Sites

The most predominant type of water-based recreation sites were the streams and rivers in the less than 15 cubic feet per second minimum flow category. There were 654 sites inventoried in this category (Tables 2 & 3). Also, there were an additional 30 streams and rivers in the greater than 15 cubic feet per second average minimum flow category. Some of the larger rivers of the State were divided into sections for study purposes. This was done where conditions were materially different between sections and would affect the use significantly. Generally, these rivers were divided between counties or where

they entered an Indian Reservation. Indian Reservations were treated differently because of variations regarding recreational use on their land. The streams and rivers made up 57% of the total number of areas.

Lakes and reservoirs were broken into two categories: those with less than 500 total visits in 1970 and those with greater than 500 visits. There were 141 in the former category and 72 in the latter. Together, lakes and reservoirs made up over 17 percent of the total number of sites inventoried.

Many of the major springs in the State were inventoried. A total of 60 were identified, or five percent of the total number of recreation sites.

City and county parks were placed in a single category. There were 155 of these facilities which included playgrounds, parks, campgrounds, swimming pools and so forth. This amounts to nearly 13 percent of the total.

There were also seven State Parks in 1970, 26 unclassified parks and campgrounds, 59 Forest Service and Bureau of Land Management Campgrounds and five other unclassified recreation areas which received over 500 total visits in 1970.

### USE OF OUTDOOR RECREATION AREAS

For each of the water-based and water-related outdoor recreation areas, counts or estimates were made of current use by Nevada residents and nonresidents. Additionally, the number of day visits and overnight visits were also enumerated. This information is presented individually for each site in the recreational data supplement and is summarized in the current section by counties and by hydrographic regions. Total recreation use in 1970 was 21,184,049 visitor-days, of which 68 percent was resident use and 32 percent was nonresident use (Table 4).

#### Recreation Use by Counties

The use of recreational areas in each county was influenced by many factors. These include such factors as the size of the resident population of the county or nearby counties, nonresident travel through the county, number and type of facilities available and so on. Washoe County led all counties in recreation use with nearly 10 million visitor-days, of which nearly 80 percent was Nevada resident use (Table 4).

#### Recreation Use by Hydrographic Regions

The Truckee River Hydrographic Region had almost double the water related recreational use of any other

Desert Inn Golf Course, Las Vegas



**TABLE 2**  
**TOTAL NUMBER OF OUTDOOR RECREATION AREAS IN EACH COUNTY**  
**BY TYPE OF SITE, NEVADA, 1970**

County	1 <sup>1</sup>	2	3	4	5	6	7	8	9	10	11	Total
Carson City	6	1	0	1	0	7	0	1	1	0	1	18
Churchill	11	4	4	11	0	4	0	1	0	0	0	35
Clark	2	1	1	7	1	42	1	3	14	0	0	72
Douglas	24	4	2	4	1	3	0	1	2	0	0	41
Elko	240	10	57	13	0	11	0	0	17	0	0	348
Esmeralda	8	0	0	2	4	0	0	1	0	0	0	15
Eureka	28	0	2	1	1	1	0	2	0	0	0	35
Humboldt	81	1	21	3	9	5	0	2	1	0	1	124
Lander	31	0	3	1	0	0	0	0	4	0	0	39
Lincoln	11	0	1	2	10	8	4	0	0	0	1	37
Lyon	7	5	5	5	0	1	0	1	1	0	0	25
Mineral	3	1	1	2	0	3	0	4	1	0	0	15
Nye	56	0	11	1	1	9	0	0	4	0	0	82
Pershing	14	1	3	3	17	2	0	1	0	0	1	42
Storey	1	1	3	1	0	0	0	0	0	0	0	6
Washoe	33	1	18	8	4	47	1	5	1	0	1	119
White Pine	98	0	9	7	12	12	1	4	13	0	0	156
Totals	654	30	141	72	60	155	7	26	59	0	5	1,209

<sup>1</sup>The column numbers refer to the following descriptions of type of site:

- 1 — All streams and rivers under 15 c.f.s. average minimum flow (August-October).
- 2 — All Streams and rivers 15 c.f.s. or more average minimum flow (August-October).
- 3 — All lakes and reservoirs with less than 500 total visits in 1970.
- 4 — All lakes and reservoirs with 500 or more total visits in 1970.
- 5 — All surveyed springs.
- 6 — All city and county parks as of 1970.
- 7 — All state parks as of 1970.
- 8 — All other unclassified parks and campgrounds.
- 9 — All Forest Service and Bureau of Land Management campgrounds as of 1970.
- 10 — All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
- 11 — All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

**TABLE 3**  
**TOTAL NUMBER OF OUTDOOR RECREATION AREAS IN EACH**  
**HYDROGRAPHIC REGION BY TYPE OF SITE,**  
**NEVADA, 1970**

Hydrographic Region	1 <sup>1</sup>	2	3	4	5	6	7	8	9	10	11	Total
Northwest	14	0	17	4	12	1	0	0	0	0	0	48
Black Rock Desert	57	0	11	1	3	1	0	0	0	0	1	74
Snake River	118	6	16	5	0	3	0	0	11	0	0	159
Humboldt River	159	6	30	13	3	14	0	4	6	0	1	236
West Central	1	1	1	1	6	0	0	0	0	0	0	10
Truckee River	32	2	15	9	2	46	1	5	2	0	1	115
Western	0	0	0	0	0	1	0	0	0	0	0	1
Carson River	25	10	4	14	1	14	0	2	2	0	1	73
Walker River	9	4	4	6	0	4	0	5	2	0	0	34
Central	195	0	34	6	20	18	1	9	16	0	0	299
Great Salt Lake	31	0	8	3	5	0	0	0	5	0	0	52
Escalante Desert	0	0	0	0	0	0	0	0	0	0	0	0
Colorado River	13	1	1	10	8	48	5	1	15	0	1	103
Death Valley	0	0	0	0	0	5	0	0	0	0	0	5
Totals	654	30	141	72	60	155	7	26	59	0	5	1,209

<sup>1</sup>The column numbers refer to the following descriptions of type of site:

- 1 — All streams and rivers under 15 c.f.s. average minimum flow (August-October).
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- 9 — All Forest Service and Bureau of Land Management campgrounds as of 1970.
- 10 — All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
- 11 — All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

**TABLE 4**  
**TOTAL VISITOR-DAYS ATTENDANCE AT RECREATION SITES FOR RESIDENTS**  
**AND NONRESIDENTS BY COUNTY, 1970**

County	Resident		Nonresident		Total Use
	Visitor-Days	Percent	Visitor-Days	Percent	
Carson City	330,098	52.9	293,329	47.1	623,427
Churchill	243,965	84.5	44,747	15.5	288,712
Clark	3,872,496	60.2	2,560,984	39.2	6,433,480
Douglas	803,689	39.2	1,244,341	60.8	2,048,030
Elko	325,738	70.0	140,160	30.0	465,898
Esmeralda	15,626	70.5	6,530	29.5	22,156
Eureka	17,985	59.3	12,340	40.7	30,325
Humboldt	91,031	59.7	61,485	40.3	152,516
Lander	29,870	44.1	37,805	55.9	67,675
Lincoln	132,937	71.8	52,236	28.2	185,173
Lyon	185,760	87.7	26,083	12.3	211,843
Mineral	98,301	73.5	35,445	26.5	133,746
Nye	114,793	91.7	10,431	8.3	125,224
Pershing	115,095	76.2	36,015	23.8	151,110
Storey	3,774	98.7	50	1.3	3,824
Washoe	7,730,147	79.3	2,012,317	20.7	9,742,464
White Pine	366,610	73.5	131,836	26.5	498,446
<b>Total</b>	<b>14,477,915</b>	<b>68.3</b>	<b>6,706,134</b>	<b>31.7</b>	<b>21,184,049</b>

**TABLE 5**  
**TOTAL VISITOR-DAYS ATTENDANCE AT RECREATION SITES FOR RESIDENTS**  
**AND NONRESIDENTS BY HYDROGRAPHIC REGIONS, 1970**

Hydrographic Region	Resident		Nonresident		Total Use
	Visitor-Days	Percent	Visitor-Days	Percent	
Northwest	11,707	82.6	2,465	17.4	14,172
Black Rock Desert	26,465	81.4	6,037	18.6	32,502
Snake River	99,328	70.0	42,834	30.0	142,162
Humboldt River	400,063	69.8	173,229	30.2	573,292
West Central	4,065	95.0	215	5.0	4,280
Truckee River	8,625,317	71.5	3,439,077	28.5	12,064,394
Western	5,000	100.0	0	0	5,000
Carson River	545,925	82.8	113,135	17.2	659,060
Walker River	184,811	70.2	78,508	29.8	263,319
Central	572,758	63.2	333,991	36.8	906,749
Great Salt Lake	35,653	50.7	34,627	49.3	70,280
Escalante Desert	0	0	0	0	0
Colorado River	3,945,882	61.4	2,481,356	38.6	6,427,238
Death Valley	20,941	96.9	660	3.1	21,601
<b>Total</b>	<b>14,477,915</b>	<b>68.3</b>	<b>6,706,134</b>	<b>31.7</b>	<b>21,184,049</b>

**TABLE 6**  
**THREE MOST FREQUENT RECREATIONAL ACTIVITIES, BY TYPE OF SITE,**  
**STATE OF NEVADA<sup>1</sup>**

Type of Site	Most Frequent Activity	Number of Occurrences	Second Most Frequent Activity	Number of Occurrences	Third Most Frequent Activity	Number of Occurrences
1	Hunting small game	389	Hunting big game	363	Fishing	263
2	Fishing	27	Hunting small game	22	Hunting big game	8
3	Fishing	53	No Use	36	Relaxing outdoors	30
4	Fishing	58	Hunting small game	23	Tent camping	12
5	Hunting small game	49	Hunting big game	30	Tent camping	26
6	Relaxing outdoors	93	Playing games	75	Viewing outdoor sports	56
7	Trailer camping	6	Tent camping	4	Picnicking	2
8	Relaxing outdoors	21	Picnicking	20	Nature study	13
9	Picnicking	32	Tent camping	26	Trailer camping	15
10	No sites	—	No sites	—	No sites	—
11	Relaxing outdoors	3	Playing games	2	Viewing outdoor sports	2

<sup>1</sup>Derived from the tables of Three Most Important Activities, By County.

*Types of Sites*

- 1 — All streams and rivers under 15 c.f.s. average minimum flow (August-October).
- 2 — All streams and rivers 15 c.f.s. or more average minimum flow (August-October).
- 3 — All lakes and reservoirs with less than 500 total visits in 1970.
- 4 — All lakes and reservoirs with 500 or more total visits in 1970.
- 5 — All surveyed springs.
- 6 — All city and county parks as of 1970.
- 7 — All state parks as of 1970.
- 8 — All other unclassified parks and campgrounds.
- 9 — All Forest Service and Bureau of Land Management campgrounds as of 1970.
- 10 — All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
- 11 — All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

**TABLE 7**  
**STREAMS SURVEYED BY COUNTY, NEVADA**

County	Miles of Stream	Number of Streams
Carson City	33	7
Churchill	138	15
Clark	30	3
Douglas	127	28
Elko	2,673	250
Esmeralda	47	8
Eureka	145	28
Humboldt	1,081	82
Lander	390	31
Lincoln	98	11
Lyon	216	12
Mineral	36	4
Nye	471	56
Pershing	159	15
Storey	11	2
Washoe	389	34
White Pine	533	98
<b>Total</b>	<b>6,577</b>	<b>684</b>

**TABLE 8**  
**STREAMS SURVEYED BY HYDROGRAPHIC REGION, NEVADA**

Hydrographic Region	Miles of Stream	Number of Streams
Northwest	152	14
Black Rock Desert	796	57
Snake River	1,171	124
Humboldt River	2,389	165
West Central	19	2
Truckee River	163	34
Western	0	0
Carson River	268	35
Walker River	204	13
Central	991	195
Great Salt Lake	256	31
Escalante Desert	0	0
Colorado River	168	14
Death Valley	0	0
<b>Total</b>	<b>6,577</b>	<b>684</b>

region in Nevada with over 12 million visitor-days in 1970 (Table 5). This is due largely to the tremendous drawing power of the two large nationally-known lakes, Tahoe and Pyramid, which are at the origin and terminus respectively of the Truckee River. The Colorado River Hydrographic Region was next with six and a half million visitor-days followed by the Central Region with 919 thousand visitor-days. The Humboldt River, Walker River and Snake River Hydrographic Regions follow and are the last of the regions with greater than 100,000 visitor-days.

### RECREATIONAL ACTIVITIES

Recreational activities engaged in at a particular site are directly related to the type of site and the facilities available at the particular location. Question 13 of the questionnaire (Appendix) ranked the three most frequently engaged in activities at each site and also showed all other activities participated in at the site. These three most frequent activities for each of the 1,209 sites are shown in Vol. II, Statistical Supplement. Additionally, the total number of other activities also engaged in at each of the sites is shown to give a better idea of the total recreational use at each of the sites.

A summary which lists the three most frequent activities for each type of site on a statewide basis and also shows the types of sites is shown in Table 6. The number of occurrences shown indicates the number of times that particular activity was one of the top three at an individual site. This gives an indication of the relative popularity of a particular activity at one type of site, but may not necessarily be the total number of sites where the particular activity occurs. Activities ranking below third at an individual site were not tabulated.

Hunting small game was the most popular activity on the small streams of the State (site type #1), followed by big game hunting and fishing. As might be expected, fishing was the most frequently occurring activity on large streams and all lakes. There are a large number of lakes in Nevada that receive little or no recreational use. This is because of their inaccessibility, poor land or water quality, lack of recreational facilities. As a result there were 36 lakes with less than 500 visits per year (site type #3) which actually received no use, and this became the second most frequent activity recorded.

Hunting was again most popular at the springs within the State while camping and picnicking were most common at the campgrounds and State parks. At our local

city and county parks, relaxing outdoors and playing games were the most frequent activities. At site type #10, all other recreation areas with less than 500 visits, no sites were identified.

### RECREATIONAL STREAM LENGTH

The total miles of surveyed rivers and streams in the State by counties and by hydrographic regions are presented in Tables 7 and 8. The 165 streams and rivers of the Humboldt River Basin had a total length of 2,389 miles while the Snake River Region's 124 streams had a total length of 1,171 miles. The Central Region has the most streams with 195 with a total length of 991 miles. Most regions averaged around ten miles per stream except for the Central and Truckee River Regions which averaged around five miles. Three regions had no surveyed streams; the Western Region, the Escalante Desert and Death Valley.

## ESTIMATED VALUE OF PUBLIC RECREATION IN NEVADA

### ESTIMATION OF RECREATION VALUES

Considerable difficulties are inherent in applying monetary values to the use of outdoor recreation resources. For the most part, outdoor recreation is produced publicly and distributed in the absence of a viable market mechanism. While the private provision of recreation opportunities has been increasing in recent years, analysis of recreation needs is conducted in the absence of any substantial amount of feedback from effectively functioning markets to guide the evaluation of publicly produced recreation goods and services.

Outdoor recreation is considered an "industry" and is rated near the top income producer in many states, including Nevada. However, most economic surveys of tourism and recreation are based on tourist spending and there is little uniformity between states, or even between surveys, on items included. The approach to recreation value in much of the current literature is focused

on the expenditures by tourists, hunters, fishermen, and other recreationists. Generally, this approach reflects income as gross national product, gross local product, or total dollars spent on tourism in the community or state. Some expenditures that are included are found to have been made a considerable distance from the community and double counting of dollars is very possible. This expenditure system is without uniform requirements, making comparisons between areas very difficult.

#### **Other Approaches**

There are a number of other methods which have been used to establish recreation prices. Most of these methods propose the use of travel costs as a proxy for price. Using marginal travel costs (i.e., variable costs of automobile operation directly related to the number of miles driven) taken as a measure of what people are willing to pay for water-related recreation and how price affects use, the relationship between price and per capita attendance can be established. This relationship sums up the response of users' demand to alternative prices of recreational products or experiences. If there is no entrance fee charged at the site, per capita rates for each distance or travel cost would be consistent with the demand curve of the relationship between price and per capita attendance. If a fee is charged, the cost to the recreationist would then be equal to the fee plus his travel cost, thus reducing the per capita use rate.

In general, no one method is completely satisfactory to the exclusion of all others. In this report, the unit day value method has been used.

#### **Unit Day Value Approach**

The unit value approach has been adopted by the Water Resources Council [71], the U. S. Forest Service [59], and others, as the most applicable alternative at present for determining the value of a recreation day. The guidelines for this approach are found in Senate Document No. 97, 86th Congress, Supplement No. 1, entitled, *Evaluation Standards for Primary Outdoor Recreation Benefits*, June 4, 1964 [68]. The schedule of monetary unit values provided in Supplement No. 1 has been updated by the Water Resources Council in the *Federal Register*, December 21, 1971 [13] and in *A Model for the Determination of Wildland Resource Values* by the U. S. Forest Service, issued in June, 1971 [59].

#### **Schedule of Monetary Unit Values**

A single unit value is assigned per recreation day, regardless of whether the user engages in one activity or

several. The unit value, however, reflects both the quality of activity and the degree to which opportunities are provided to engage in a number of activities. The value determined provides an estimate of the amount that users would be willing to pay to avail themselves of the recreation resources at a particular type of site if such payment were required.

Two classes of outdoor recreation-days, general and specialized, are differentiated for evaluation purposes.

A GENERAL recreation-day is one involving primarily those activities attractive to the majority of outdoor recreationists and which generally require the development and maintenance of convenient access and adequate facilities. The unit value range is \$0.75 to \$2.25 [71].

A SPECIALIZED recreation-day is one involving those activities for which opportunities, in general, are limited, intensity of use is low, and often, may involve a large personal expense by the user. The unit value range is \$3.00 to \$9.00 [71].

In view of the fewer alternatives available and the likelihood that higher total costs are generally incurred by those engaged in hunting and fishing activities compared with those engaged in other types of outdoor recreation, it may be anticipated that the monetary unit values applicable to fish and wildlife recreation will ordinarily be larger than those applied to other types of recreation. A more specific breakdown of the general and specialized recreation-days is given in Table 9.

## **NEVADA RECREATION VALUES**

### **Values by County**

The value of a recreation visit was determined for each type of site, by county and hydrographic region. These values are based on the most frequently occurring activities at each of these sites. These two breakdowns produce statewide results which are slightly different because the sites are aggregated differently. Using the range of values described in Table 9, and considering both the quality of the site for the activities engaged in, as compared to other areas in Nevada and elsewhere, and the degree to which opportunities are provided to engage in a number of activities, a unit value was estimated for each type of site. As an example, the three most common activities on small streams (site type #1) in Elko County are hunting small game, fishing and hunting big game, in that order. Because the quality of these activities is perhaps better here than anywhere else in Nevada, on a county basis, a value of \$7.00 was

**TABLE 9**  
**SCHEDULE OF MONETARY UNIT VALUES<sup>1</sup>**

Type of Outdoor Recreation Day <sup>2</sup>	Range of Unit Day Values
<p><b>General</b></p> <p>A recreation day involving primarily those activities attracting the majority of outdoor recreationists and which, in general, require the development and maintenance of convenient access and adequate facilities. This category includes, but is not limited to, most warm water fishing, swimming, picnicking, hiking, sightseeing, most small game hunting, nature studies (except nature photography), tent and trailer camping, marine pier and party boat fishing, water skiing, scuba diving, motor boating, sailing, and canoeing in placid waters.</p>	\$0.75 - \$2.25
<p><b>Specialized</b></p> <p>A recreation day involving primarily those activities for which opportunities, in general, are limited, intensity of use is low, and which often may involve a large personal expense by the user. This category includes, but is not limited to, cold water fishing for resident and migratory species, upland bird and waterfowl hunting, specialized nature photography, big game hunting, wilderness pack trips, white-water boating and canoeing, and long-range cruises in areas of outstanding scenic environment.</p>	\$3.00 - \$9.00

<sup>1</sup>Source: *Guidelines for Implementing Principles and Standards for Multiobjective Planning of Water Resources*, Review Draft, Water Resources Council, December 1972.

<sup>2</sup>A recreation-day is any portion of a day (24 hours) of recreational use at any of the recreation sites by one individual.

assigned to the hunting small game and fishing activities on small streams in Elko County (See Table 9). A value of \$8.00 per visitor-day was estimated for hunting big game on these same sites. These three values average an estimated value of \$7.30 per visitor-day for all recreationists visiting the small streams of Elko County. This figure is shown in Table 10 under site type #1, Elko County.

In contrast, the small streams in Clark County were used most frequently for trailer camping, hiking and walking, and fishing, in that order. The values assigned (from Table 9) were \$2.00, \$1.00 and \$5.00, respectively. This averaged out to a value of \$2.65 per visitor-day for site type #1 in Clark County. These values are shown in Table 10.

Generally, the highest values are associated with the streams, lakes and springs, where hunting and fishing are the most common activities. The lower values associated with city and county parks are attributable to the convenience of access and the use by large numbers of visitors with little or no personal investment.

Elko County, which provides some of the best fishing and hunting opportunities in Nevada, has the highest

values for streams and lakes. Here, too, fishing and hunting are the main recreation activities at these sites while in some of the other counties, there may be more use of these sites for camping or boating or just relaxing outdoors.

The estimated value of one visit at a particular type of site is multiplied by the 1970 total use for that type of site to give a total value, by type of site, by county, for 1970, in Table 11. Although the highest values per visit are shown for Elko County, the total value there is much less than the more populous counties. Washoe County, with nearly \$19 million worth of recreation use, was highest, followed by Clark County with a value of \$13.7 million. Storey County, which had the fewest recreation visits, also had the lowest recreation value of \$8,200.

#### **Values by Hydrographic Region**

Table 12 shows the value of a recreation visit, by type of site, for each of the hydrographic regions. These values are based on the most frequently occurring activities at each of these types of sites. Again, the highest values are associated with the streams, lakes and springs, where the primary activities are fishing and

**TABLE 10**  
**ESTIMATED VALUE OF A RECREATION VISIT IN NEVADA, BY TYPE OF SITE, BY COUNTY<sup>1</sup>**

County	Type of Site										
	1	2	3	4	5	6	7	8	9	10	11
Carson City	\$2.90	\$2.25	\$ —	\$1.75	\$ —	\$1.10	\$ —	\$1.10	\$1.50	\$ —	\$1.00
Churchill	3.75	5.00	1.50	5.50	—	1.35	—	1.60	—	—	—
Clark	2.65	3.35	2.25	2.50	2.00	1.40	1.40	1.30	1.50	—	—
Douglas	4.50	4.50	2.85	4.50	1.30	1.40	—	1.10	1.50	—	—
Elko	7.30	6.50	7.00	4.50	—	1.40	—	—	3.75	—	—
Esmeralda	3.50	—	—	4.35	5.00	—	—	1.10	—	—	—
Eureka	4.90	—	3.50	2.50	4.00	1.40	—	1.50	—	—	—
Humboldt	4.90	3.50	4.00	3.75	4.80	1.10	—	1.50	3.00	—	1.35
Lander	5.80	—	3.00	2.70	—	—	—	—	2.40	—	—
Lincoln	4.10	—	2.70	5.25	4.25	1.25	2.40	—	—	—	2.50
Lyon	4.00	2.70	4.50	3.40	—	1.20	—	1.25	3.00	—	—
Mineral	4.90	4.70	1.50	4.30	—	1.30	—	1.25	2.50	—	—
Nye	5.20	—	4.25	4.25	4.60	1.35	—	—	2.40	—	—
Pershing	5.25	4.65	3.00	3.00	2.90	1.20	—	1.20	—	—	1.15
Storey	2.45	4.50	1.50	1.25	—	—	—	—	—	—	—
Washoe	4.40	4.50	2.50	4.10	4.90	1.25	1.70	1.30	1.50	—	4.65
White Pine	5.40	—	3.60	4.00	5.40	1.20	1.50	1.40	2.75	—	—

<sup>1</sup>A recreation visit, visitor-day and recreation-day are all terms referring to the same thing. They are defined as any portion of a day (24 hours) of recreational use at any of the recreation sites by one individual.

#### Types of Sites

- 1 — All streams and rivers under 15 c.f.s. average minimum flow (August-October).
- 2 — All streams and rivers 15 c.f.s. or more average minimum flow (August-October).
- 3 — All lakes and reservoirs with less than 500 total visits in 1970.
- 4 — All lakes and reservoirs with 500 or more total visits in 1970.
- 5 — All surveyed springs.
- 6 — All city and county parks as of 1970.
- 7 — All state parks as of 1970.
- 8 — All other unclassified parks and campgrounds.
- 9 — All Forest Service and Bureau of Land Management campgrounds as of 1970.
- 10 — All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
- 11 — All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

hunting. The Snake River Region, in Northern Elko County, which has some of the best fishing and hunting in Nevada, shows the highest values.

The total value of recreation in 1970, by hydrographic region, is shown in Table 13. Here again the highest total values are in the regions with the greatest populations. The Truckee River Basin with \$25.5 million worth of recreation use was the largest. This is due in part to the inclusion of two of Nevada's most popular lakes, Tahoe and Pyramid, and also city and county park systems. The Colorado River Basin, with Las Vegas and Lake

Mead, was second with \$16.4 million of recreation values. The Escalante Desert Basin, with no recorded recreation use, showed no value for 1970.

#### State Values

The total value shown for each county in Table 11 was added together in Table 14 to arrive at a total value of outdoor water-related public recreation in 1970. This amounted to nearly \$48.5 million. With total recreation use in 1970 of 21,184,049 visitor-days, the average value, statewide, for all types of recreation sites is \$2.29.

**TABLE 11**  
**TOTAL ESTIMATED VALUE OF 1970 RECREATION VISITS, BY TYPE OF SITE,**  
**BY COUNTY, NEVADA<sup>1</sup>**

County	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
Carson City	1	4,364	\$2.90	\$ 12,656
	2	20,000	2.25	45,000
	3	0	—	0
	4	439,646	1.75	769,381
	5	0	—	0
	6	114,975	1.10	126,473
	7	0	—	0
	8	15,942	1.10	17,536
	9	13,500	1.50	20,250
	10	0	—	0
	11	15,000	1.00	15,000
Total		623,427		\$ 1,006,296
Churchill	1	1,160	\$3.75	\$ 4,350
	2	30,025	5.00	150,125
	3	225	1.50	338
	4	126,371	5.50	695,041
	5	0	—	0
	6	89,460	1.35	120,771
	7	0	—	0
	8	41,471	1.60	66,354
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		288,712		\$ 1,036,979
Clark	1	11,000	\$2.65	\$ 29,150
	2	500	3.35	1,675
	3	300	2.25	675
	4	4,188,114	2.50	10,470,285
	5	0	2.00 <sup>3</sup>	0
	6	927,840	1.40	1,298,976
	7	184,526	1.40	258,336
	8	195,200	1.30	253,760
	9	926,000	1.50	1,389,000
	10	0	—	0
	11	0	—	0
Total		6,433,480		\$13,701,857
Douglas	1	2,990	\$4.50	\$ 13,455
	2	24,035	4.50	108,158
	3	200	2.85	570
	4	1,634,981	4.50	7,357,415
	5	100	1.30	130
	6	19,500	1.40	27,300
	7	0	—	0
	8	38,624	1.10	42,486
	9	327,600	1.50	491,400
	10	0	—	0
	11	0	—	0
Total		2,048,030		\$ 8,040,914

(continued)

TABLE 11 (continued)

County	Type of Site <sup>a</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
Elko	1	63,255	\$7.30	\$ 461,762
	2	24,850	6.50	161,525
	3	4,180	7.00	29,260
	4	101,514	4.50	456,813
	5	0	—	0
	6	184,106	1.40	257,748
	7	0	—	0
	8	0	—	0
	9	87,993	3.75	329,974
	10	0	—	0
	11	0	—	0
Total		465,898		\$ 1,697,082
Esmeralda	1	4,926	\$3.50	\$ 17,241
	2	0	—	0
	3	0	—	0
	4	1,450	4.35	6,308
	5	1,600	5.00	8,000
	6	0	—	0
	7	0	—	0
	8	14,180	1.10	15,598
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		22,156		\$ 47,147
Eureka	1	4,685	\$4.90	\$ 22,957
	2	0	—	0
	3	154	3.50	539
	4	1,505	2.50	3,763
	5	101	4.00	404
	6	2,250	1.40	3,150
	7	0	—	0
	8	21,630	1.50	32,445
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		30,325		\$ 63,258
Humboldt	1	20,270	\$4.90	\$ 99,323
	2	4,500	3.50	15,750
	3	560	4.00	2,240
	4	5,200	3.75	19,500
	5	3,552	4.80	17,050
	6	58,834	1.10	64,717
	7	0	—	0
	8	51,000	1.50	76,500
	9	5,000	3.00	15,000
	10	0	—	0
	11	3,600	1.35	4,860
Total		152,516		\$ 314,940

(continued)

TABLE 11 (continued)

County	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
Lander	1	12,101	\$5.80	\$ 70,186
	2	0	—	0
	3	499	3.00	1,497
	4	950	2.70	2,565
	5	0	—	0
	6	0	—	0
	7	0	—	0
	8	0	—	0
	9	54,125	2.40	129,900
	10	0	—	0
	11	0	—	0
Total		67,675		\$ 204,148
Lincoln	1	14,495	\$4.10	\$ 59,430
	2	0	—	0
	3	35	2.70	95
	4	1,620	5.25	8,505
	5	3,165	4.25	13,451
	6	50,700	1.25	63,375
	7	109,308	2.40	262,339
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	5,850	2.50	14,625
Total		185,173		\$ 421,820
Lyon	1	11,603	\$4.00	\$ 46,412
	2	34,820	2.70	94,014
	3	530	4.50	2,385
	4	131,734	3.40	447,896
	5	0	—	0
	6	14,050	1.20	16,860
	7	0	—	0
	8	15,106	1.25	18,883
	9	4,000	2.50	10,000
	10	0	—	0
	11	0	—	0
Total		211,843		\$ 636,450
Mineral	1	1,500	\$4.90	\$ 7,350
	2	6,770	4.70	31,819
	3	0	1.50 <sup>3</sup>	0
	4	54,130	4.30	232,759
	5	0	—	0
	6	21,375	1.30	27,788
	7	0	—	0
	8	45,271	1.25	56,589
	9	4,700	2.50	11,750
	10	0	—	0
	11	0	—	0
Total		133,746		\$ 368,055

(continued)

TABLE 11 (continued)

County	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
Nye	1	17,386	\$5.20	\$ 90,407
	2	0	—	0
	3	1,007	4.25	4,280
	4	10,000	4.25	42,500
	5	30	4.60	138
	6	73,301	1.35	98,956
	7	0	—	0
	8	0	—	0
	9	23,500	2.40	56,400
	10	0	—	0
	11	0	—	0
Total		125,224		\$ 292,681
Pershing	1	2,130	\$5.25	\$ 11,183
	2	3,500	4.65	16,275
	3	630	3.00	1,890
	4	66,300	3.00	198,900
	5	13,140	2.90	38,106
	6	26,400	1.20	31,680
	7	0	—	0
	8	31,010	1.20	37,212
	9	0	—	0
	10	0	—	0
	11	8,000	1.15	9,200
Total		151,110		\$ 344,446
Storey	1	153	\$2.45	\$ 375
	2	1,000	4.50	4,500
	3	0	1.50 <sup>3</sup>	0
	4	2,671	1.25	3,339
	5	0	—	0
	6	0	—	0
	7	0	—	0
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		3,824		\$ 8,214
Washoe	1	23,986	\$4.40	\$ 105,538
	2	600,000	4.50	2,700,000
	3	430	2.50	1,075
	4	1,519,374	4.10	6,229,433
	5	410	4.90	2,009
	6	6,690,351	1.25	8,362,939
	7	547,975	1.70	931,558
	8	291,888	1.30	379,454
	9	28,300	1.50	42,450
	10	0	—	0
	11	39,750	4.65	184,838
Total		9,742,464		\$18,939,294

(continued)

TABLE 11 (continued)

County	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
White Pine	1	110,720	\$5.40	\$ 597,888
	2	0	—	0
	3	1,000	3.60	3,600
	4	45,520	4.00	182,080
	5	385	5.40	2,079
	6	250,544	1.20	300,653
	7	4,500	1.50	6,750
	8	9,600	1.40	13,440
	9	76,177	2.75	209,487
	10	0	—	0
	11	0	—	0
Total		498,446		\$ 1,315,977
State total		21,184,049		\$48,439,558

<sup>1</sup>A recreation visit, visitor-day, and recreation-day are all terms referring to the same thing. They are defined as any portion of a day (24 hours) of recreational use at any of the recreation sites by one individual.

<sup>2</sup>See page 9 for definition.

<sup>3</sup>A value given where no visits are shown indicates that there are one or more areas in that type of site that received no recreational use in 1970 but were available recreational resources.

**TABLE 12**  
**ESTIMATED 1970 VALUE OF A RECREATION VISIT IN NEVADA,**  
**BY TYPE OF SITE, BY HYDROGRAPHIC REGION<sup>1</sup>**

Hydrographic Region	Type of Site <sup>2</sup>										
	1	2	3	4	5	6	7	8	9	10	11
Northwest	\$4.00	\$ —	\$3.00	\$3.75	\$4.80	\$1.10	\$ —	\$ —	\$ —	\$ —	\$ —
Black Rock Desert	4.90	—	4.00	3.75	4.00	1.45	—	—	—	—	1.35
Snake River	7.30	6.50	7.00	4.50	—	1.40	—	—	3.75	—	—
Humboldt River	5.75	5.00	5.00	3.80	2.90	1.25	—	—	3.50	—	1.15
West Central	3.75	2.50	3.50	2.00	2.90	—	—	—	—	—	—
Truckee River	4.25	4.50	2.40	3.50	3.50	1.25	1.70	1.30	1.50	—	4.65
Western	—	—	—	—	—	1.00	—	—	—	—	—
Carson River	4.00	4.00	2.00	4.40	1.25	1.30	—	1.20	1.50	—	1.00
Walker River	4.75	3.75	3.50	4.00	—	1.25	—	1.25	2.75	—	—
Central	5.20	—	3.80	4.00	5.00	1.30	1.50	1.35	2.65	—	—
Great Salt Lake	5.00	—	3.60	4.25	5.40	—	—	—	3.10	—	—
Escalante Desert	—	—	—	—	—	—	—	—	—	—	—
Colorado River	4.30	3.35	—	3.10	3.75	1.35	2.10	1.30	1.50	—	2.50
Death Valley	—	—	—	—	4.60	1.30	—	—	—	—	—

<sup>1</sup>A recreation visit, visitor-day and recreation-day are all terms referring to the same thing. They are defined as any portion of a day (24 hours) of recreational use at any of the recreation sites by one individual.

*Types of Sites*

- 1 — All streams and rivers under 15 c.f.s. average minimum flow (August-October).
- 2 — All streams and rivers 15 c.f.s. or more average minimum flow (August-October).
- 3 — All lakes and reservoirs with less than 500 total visits in 1970.
- 4 — All lakes and reservoirs with 500 or more total visits in 1970.
- 5 — All surveyed springs.
- 6 — All city and county parks as of 1970.
- 7 — All state parks as of 1970.
- 8 — All other unclassified parks and campgrounds.
- 9 — All Forest Service and Bureau of Land Management campgrounds as of 1970.
- 10 — All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
- 11 — All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

**TABLE 13**  
**TOTAL ESTIMATED VALUE OF 1970 RECREATION VISITS, BY TYPE OF SITE,**  
**BY HYDROGRAPHIC REGION, NEVADA<sup>1</sup>**

Hydrographic Region	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
Northwest	1	3,930	\$4.00	\$ 15,720
	2	0	—	0
	3	495	3.00	1,485
	4	5,825	3.75	21,844
	5	3,922	4.80	18,826
	6	0	1.10 <sup>3</sup>	0
	7	0	—	0
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		14,172		\$ 57,875
Black Rock Desert	1	24,507	\$4.90	\$ 120,084
	2	0	—	0
	3	315	4.00	1,260
	4	500	3.75	1,875
	5	480	4.00	1,920
	6	3,100	1.45	4,495
	7	0	—	0
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	3,600	1.35	4,860
Total		32,502		\$ 134,494
Snake River	1	36,175	\$7.30	\$ 264,078
	2	9,900	6.50	64,350
	3	895	7.00	6,265
	4	54,499	4.50	245,246
	5	0	—	0
	6	13,500	1.40	18,900
	7	0	—	0
	8	0	—	0
	9	27,193	3.75	101,974
	10	0	—	0
	11	0	—	0
Total		142,162		\$ 700,813
Humboldt River	1	43,436	\$5.75	\$ 249,757
	2	22,950	5.00	114,750
	3	3,090	5.00	15,450
	4	85,505	3.80	324,919
	5	1,790	2.90	5,191
	6	255,840	1.25	319,800
	7	0	—	0
	8	123,481	1.30	160,525
	9	29,200	3.50	102,200
	10	0	—	0
	11	8,000	1.15	9,200
Total		573,292		\$ 1,301,792

(continued)

TABLE 13 (continued)

Hydrographic Region	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
West Central	1	50	\$3.75	\$ 188
	2	1,200	2.50	3,000
	3	0	3.50 <sup>3</sup>	0
	4	1,020	2.00	2,040
	5	2,010	2.90	5,829
	6	0	—	0
	7	0	—	0
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		4,280		\$ 11,057
Truckee River	1	9,823	\$4.25	\$ 41,748
	2	601,000	4.50	2,704,500
	3	380	2.40	912
	4	3,543,747	3.50	12,403,115
	5	4,380	3.50	15,330
	6	6,682,251	1.25	8,352,814
	7	547,975	1.70	931,558
	8	291,888	1.30	379,454
	9	343,200	1.50	514,800
	10	0	—	0
	11	39,750	4.65	184,838
Total		12,064,394		\$25,529,069
Western	1	0	\$ —	\$ 0
	2	0	—	0
	3	0	—	0
	4	0	—	0
	5	0	—	0
	6	5,000	1.00	5,000
	7	0	—	0
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		5,000		\$ 5,000
Carson River	1	6,503	\$4.00	\$ 26,012
	2	79,360	4.00	317,440
	3	225	2.00	450
	4	253,171	4.40	1,113,952
	5	100	1.25	125
	6	223,935	1.30	291,116
	7	0	—	0
	8	54,566	1.20	65,479
	9	26,200	1.50	39,300
	10	0	—	0
	11	15,000	1.00	15,000
Total		659,060		\$ 1,868,874

(continued)

**TABLE 13 (continued)**

Hydrographic Region	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
Walker River	1	13,353	\$4.75	\$ 63,427
	2	35,090	3.75	131,588
	3	530	3.50	1,855
	4	109,844	4.00	439,376
	5	0	—	0
	6	35,425	1.25	44,281
	7	0	—	0
	8	60,377	1.25	75,471
	9	8,700	2.75	23,925
	10	0	—	0
	11	0	—	0
Total		263,319		\$ 779,923
Central	1	108,652	\$5.20	\$ 564,990
	2	0	—	0
	3	2,895	3.80	11,001
	4	72,235	4.00	288,940
	5	6,661	5.00	33,305
	6	331,794	1.30	431,332
	7	4,500	1.50	6,750
	8	225,410	1.35	304,304
	9	154,602	2.65	409,695
	10	0	—	0
	11	0	—	0
Total		906,749		\$ 2,050,317
Great Salt Lake	1	39,980	\$5.00	\$ 199,900
	2	0	—	0
	3	625	3.60	2,250
	4	5,000	4.25	21,250
	5	175	5.40	945
	6	0	—	0
	7	0	—	0
	8	0	—	0
	9	24,500	3.10	75,950
	10	0	—	0
	11	0	—	0
Total		70,280		\$ 300,295
Escalante Desert	1	0	\$ —	\$ 0
	2	0	—	0
	3	0	—	0
	4	0	—	0
	5	0	—	0
	6	0	—	0
	7	0	—	0
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		0		\$ 0

(continued)

TABLE 13 (continued)

Hydrographic Region	Type of Site <sup>2</sup>	1970 Total Visits	Value of One Visit	Total Value of 1970 Use
Colorado River	1	20,315	\$4.30	\$ 87,355
	2	500	3.35	1,675
	3	300	2.00	600
	4	4,199,734	3.10	13,019,175
	5	2,665	3.75	9,994
	6	951,540	1.35	1,284,579
	7	293,834	2.10	617,051
	8	15,200	1.30	19,760
	9	937,300	1.50	1,405,950
	10	0	—	0
	11	5,850	2.50	14,625
Total		6,427,238		\$16,450,764
Death Valley	1	0	\$ —	\$ 0
	2	0	—	0
	3	0	—	0
	4	0	—	0
	5	300	4.60	1,380
	6	21,301	1.30	27,691
	7	0	—	0
	8	0	—	0
	9	0	—	0
	10	0	—	0
	11	0	—	0
Total		21,601		\$ 29,071
State total		21,184,049		\$49,229,344

<sup>1</sup>A recreation visit, visitor-day and recreation-day are all terms referring to the same thing. They are defined as any portion of a day (24 hours) of recreational use at any of the recreation sites by one individual.

<sup>2</sup>See page 9 for definition.

<sup>3</sup>A value given where no visits are shown indicates that there are one or more areas in that type of site that received no recreational use in 1970 but were available recreational resources.

**TABLE 14**  
**TOTAL ESTIMATED VALUE OF 1970 RECREATION VISITS,**  
**BY TYPE OF SITE, STATE OF NEVADA<sup>1</sup>**

Type of Site	1970 Total Visits	Average Value of One Visit	Total Value of 1970 Use
1	306,724	\$5.38	\$ 1,649,663
2	750,000	4.44	3,328,841
3	9,750	4.97	48,444
4	8,331,080	3.26	27,126,483
5	22,483	3.62	81,367
6	8,523,686	1.27	10,801,386
7	846,309	1.72	1,458,983
8	770,922	1.31	1,010,257
9	1,550,895	1.74	2,705,611
10	0	0	0
11	72,200	3.17	228,523
Total	21,184,049	\$2.29	\$48,439,558

<sup>1</sup>A recreation visit, visitor-day, and recreation-day are all terms referring to the same thing. They are defined as any portion of a day (24 hours) of recreational use at any of the recreation sites by one individual.

*Types of Sites*

- 1 — All streams and rivers under 15 c.f.s. average minimum flow (August-October).
- 2 — All streams and rivers 15 c.f.s. or more average minimum flow (August-October).
- 3 — All lakes and reservoirs with less than 500 total visits in 1970.
- 4 — All lakes and reservoirs with 500 or more total visits in 1970.
- 5 — All surveyed springs.
- 6 — All city and county parks as of 1970.
- 7 — All state parks as of 1970.
- 8 — All other unclassified parks and campgrounds.
- 9 — All Forest Service and Bureau of Land Management campgrounds as of 1970.
- 10 — All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
- 11 — All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

## LAND AND WATER USE FOR OUTDOOR RECREATION

Acres of land, acres of water, miles of stream and other information regarding consumptive and nonconsumptive use of water were obtained for each site enumerated (Recreation Data Supplement). With regard to land and water needs for improved parks and campgrounds, this information is essential for planning purposes. For undeveloped sites, such as streams and springs, acres of land do not apply and consumptive water needs were not considered because the water in the streams can be used for fish habitat without being actually consumed.

The following tables summarize the land and water acreages and consumptive water use at the 1,209 sites enumerated. Table 15 summarizes each type of site for the entire state while Table 16 summarizes each county and Table 17 summarizes for the hydrographic regions.

The acres of water in streams and rivers (site types 1 and 2) were not determined although it is recognized that there is surface water acreage involved with these sites. This was not attempted because large portions of the streams are on both private and public land which would involve a separate study to distinguish amounts of each. Also, streams and rivers vary tremendously in width along their courses and by season.

Lakes had almost 375,000 acres of water surface which is 99.7 percent of all surface water at the recreation sites. Consumptive water use (See p.12) was greatest for city and county parks, unclassified parks, at large reservoirs, and Forest Service and Bureau of Land Management campgrounds in that order.

Evaporation from lakes and reservoirs was not considered as a consumptive use of water for recreational purposes. However, this use of water is significant in an arid state such as Nevada. The following tabulation shows net evaporation (total evaporation less annual rainfall), lake surface elevation and surface area for some major recreational lakes in Nevada. For reservoirs these figures are at maximum storage capacity, a level which is usually reached only during the spring. Lake Mead almost never reaches capacity.

Lake or reservoir	Surface elevation (ft.)	Surface area (acres)	Annual net evaporation (AF)
Lahontan Res.	4162	12,100	50,000
Lake Mead	1221	164,000	1,000,000

Pyramid Lake	3794	110,000	385,000
Rye Patch Res.	4134	11,400	41,000
Lake Tahoe	6229	124,000	130,000
Walker Lake	3970	38,000	183,000
Wildhorse Res.	6205	2,800	7,300

For Lake Mead and Lake Tahoe, the entire lake is included.

The main reasons evaporation from lakes and water required for minimum flows in rivers and streams were not considered as consumptive use is because in most cases the lakes and streams are used as storage or transportation of water for other purposes such as irrigation. Thus, recreational use, in these cases, is a secondary use which does not create losses of water beyond that which is used for the primary purposes. Pyramid and Walker Lakes, the marsh areas and some streams are exceptions, where recreation and fish and wildlife are the primary uses of the water. In these cases, evaporation losses and minimum flows might be considered consumptive water uses but have not been considered in this study.

Washoe County has the greatest number of acres of water surface area with 128,892 acres, coming mainly from Pyramid Lake and the Washoe County portion of Lake Tahoe. Clark County with Lakes Mead and Mohave, is second with over 87,000 acres followed by Mineral and Churchill Counties with 39,000 and 31,000 acres of water, respectively. Esmeralda has the least surface water acreage with only two acres.

In terms of land area associated with public water-related recreational facilities, Clark County has by far the greatest area with over 2,065,000 acres. This is due primarily to the large size of the Desert National Wildlife Range, with 1,588,000 acres and the Lake Mead National Recreation Area with 440,000 acres of land in Clark County. In second place is Churchill County with 206,897 acres (primarily in the Stillwater Wildlife Management Area) followed by Elko County with 25,492 acres (mainly Ruby Lake National Wildlife Refuge). Lincoln County led all others in consumptive water used in 1970 with over two billion gallons of water used. Most of this water is pumped from wells to irrigate waterfowl habitat and maintain nesting areas at the Pahrnagat National Wildlife Refuge and the Nevada Fish and Game Key Pittman Wildlife Area. Clark County was next with just over a billion gallons, used primarily for the maintenance of parks and golf courses while Elko and Washoe Counties were distant third and fourth place users of water with just over 400 million gallons of water used for rec-

Lake Mead



reational purposes. Stillwater, Mason Valley, Fernley and Ruby Lakes Wildlife Areas do consumptively use large amounts of water, but their quantities were not estimated.

The Hydrographic Regions were also analyzed with respect to acres of water, land and consumptive water use. The Colorado River Basin which contains portions of both Lincoln and Clark Counties accounted for nearly 73 percent of the total 4,668 million gallons of water used by all regions.

The Truckee River Basin consumes 402 million gallons, which includes all of Pyramid Lake and Lake Tahoe, that has the greatest water area with 151,429 surface acres, followed by the Colorado River Basin with 90,445 and the Carson and the Walker River Basins with 39,478 and 39,096, respectively. The Colorado River Basin had the greatest land area specifically designated as recreational land with almost 2,074,000 acres, again mostly from the Desert National Wildlife Range. The Carson River Basin was next with 207,000 acres.

### **PROJECTED USE OF NEVADA'S PUBLIC RECREATIONAL RESOURCES**

Approximately 87 percent of its land is in public ownership with a large percentage available for use by the general public for outdoor recreation purposes. On the other hand, much of the right for use of water resources are held by private interest because the availability of water made it possible for the land to be of economic use. Even so, a fairly large portion of the surface water resources are accessible to the public, and access to additional areas is continually being sought by various public agencies. In this section, the future use of Nevada's recreational resources is projected. Needs in terms of land and water to satisfy the future use are also determined where possible.

#### ***Projected Visitor-Days Recreation Use in Nevada***

Nevada's population has increased at a growth rate averaging over five percent per year for the past twenty years [51]. This is considerably greater than the United States average of nearly two percent per year. With modern population control methods, it has been projected that Nevada's population will reach zero growth by the year 2020 [51]. In the meantime, Nevada's population will grow at a considerable rate and so will resident recreational use. Additionally, out-of-state use of

Nevada's recreational resources will also grow as U. S. population grows and people increase their recreational activity due to increases in income, mobility and leisure time.

It appears that the largest water-related recreational increases will occur in those counties and hydrographic regions containing or adjacent to the two main population centers in Nevada and in those areas with abundant resources which have experienced little use before now. The type of sites that will have the most effect upon this increase will be city and county parks, unclassified parks and campgrounds, and Forest Service and Bureau of Land Management campgrounds.

Future use of Nevada's water-based and water-related areas was estimated by two methods. The first was based upon estimates of future use made by agency personnel interviewed concerning each site and the second is based upon population projections.

### **PROJECTIONS BASED ON AGENCY ESTIMATES OF FUTURE USE**

Estimates of use trends over the past five years and expected for the next five years were made by agency personnel or others most familiar with each of the individual sites. All of the areas were grouped by type of site, by county and by hydrographic region, and a weighted yearly percent increase was determined for each type of site, by each county and hydrographic region. Using this average annual yearly percent increase, future attendance was projected to each of the target years, 1980, 2000 and 2020.

The results of these projections are presented in Table 18 for counties and Table 19 for hydrographic regions. It is interesting to note that in some counties visitor-use is expected to increase faster than others. For example, Elko County's visitor-use is projected to increase nearly 900 percent over the next 50 years while White Pine County will increase 666 percent. This is largely due to the fact that these areas contain some of the best outdoor recreation sites in Nevada and are currently being used at a very low rate. With increased population and mobility, the use at these areas will increase rapidly. Present and future attendance at recreation sites is broken down by county in Table 18, and by hydrographic region in Table 19. The projected total is presented graphically in Figure 2.

**TABLE 15**  
**TOTAL ACRES AND CONSUMPTIVE USE OF WATER FOR OUTDOOR RECREATION IN 1970**  
**BY TYPE OF SITE, STATE OF NEVADA<sup>1</sup>**

Place	Type of Site	Acres Water	Acres Land	Total Acres	Thousand Gallons	Acre-Feet	Number of Sites
State	1	0	9	9	0	0	654
	2	0	0	0	0	0	30
	3	20,272	0	20,272	5,256	16	141
	4	351,890	679,297	1,031,187	964,040	2,960	72
	5	2	0	2	0	0	60
	6	66	5,026	5,092	1,748,403	5,367	155
	7	84	45,233	45,317	3,753	11	7
	8	0	1,589,007	1,589,007	14,239	44	26
	9	13	1,222	1,235	295,284	906	59
	10	0	0	0	0	0	0
	11	1,000	5,325	6,325	1,637,053	5,026	5
Grand total		373,328	2,325,119	2,698,447	4,668,028	14,330	1,209

<sup>1</sup>The type of site numbers refer to the following descriptions:

- 1 — All streams and rivers under 15 c.f.s. average minimum flow (August-October).
- 2 — All streams and rivers 15 c.f.s. or more average minimum flow (August-October).
- 3 — All lakes and reservoirs with less than 500 total visits in 1970.
- 4 — All lakes and reservoirs with 500 or more total visits in 1970.
- 5 — All surveyed springs.
- 6 — All county and city parks as of 1970.
- 7 — All state parks as of 1970.
- 8 — All other unclassified parks and campgrounds.
- 9 — All Forest Service and Bureau of Land Management campgrounds as of 1970.
- 10 — All other developed and undeveloped recreation areas with less than 500 total visits in 1970.
- 11 — All other developed and undeveloped recreation areas with 500 or more total visits in 1970.

### **PROJECTIONS BASED UPON FUTURE POPULATION**

Resident use of public water-related sites averaged 29.6 days per resident in 1970. The population of the State has been projected by the Division of Water Resources to increase by 6.5 percent between 1970 and 1980 (Table 20). It was assumed that recreational use by residents would continue at its current rate per capita and that nonresident use would continue in the same ratio to resident use as it did in 1970. Using this technique, it was found that resident use would increase from over 14 million visitor-days in 1970 to over 53 million days in 2020, and nonresident use would increase from 6.7 million days in 1970 to 24.8 million visitor-days in 2020. A total increase of 57 million visitor-days is

projected by this method (Table 20). These figures are presented graphically in Figure 2.

Because of rapidly increasing per capita use rates with more leisure time and affluence, it is felt that the higher projections as shown in Tables 18 and 19 should be used for planning purposes.

**TABLE 16**  
**TOTAL ACRES AND CONSUMPTIVE USE OF WATER FOR OUTDOOR RECREATION IN 1970**  
**BY COUNTY FOR THE STATE OF NEVADA**

County	Acres Water	Acres Land	Total Acres	Thousand Gallons	Acre-Feet	Number of Sites
Carson City	7,582	99	7,681	49,466	152	18
Churchill	31,436	206,897	238,333	24,602	76	35
Clark	87,687	2,065,386	2,153,073	1,012,521	3,108	72
Douglas	17,733	70	17,803	7,092	22	41
Elko	21,136	25,492	46,628	414,304	1,272	348
Esmeralda	2	15	17	0	0	15
Eureka	27	3	30	895	3	35
Humboldt	5,096	803	5,899	61,358	188	124
Lander	1,059	56	1,115	246	1	39
Lincoln	2,110	8,488	10,598	2,397,277	7,360	37
Lyon	6,780	6	6,786	1,049	3	25
Mineral	38,951	34	38,985	4,218	13	15
Nye	746	186	932	82,818	254	82
Pershing	23,742	39	23,781	3,011	9	42
Storey	34	0	34	0	0	6
Washoe	128,892	16,965	145,857	405,079	1,243	119
White Pine	315	500	895	204,093	626	156
<b>Total</b>	<b>373,328</b>	<b>2,325,119</b>	<b>2,698,447</b>	<b>4,668,029</b>	<b>14,330</b>	<b>1,209</b>

**TABLE 17**  
**TOTAL ACRES AND CONSUMPTIVE USE OF WATER IN OUTDOOR RECREATION IN 1970**  
**BY HYDROGRAPHIC REGION, STATE OF NEVADA**

Hydrographic Region	Acres Water	Acres Land	Total Acres	Thousand Gallons	Acre-Feet	Number of Sites
Northwest	3,646	32	3,678	0	0	48
Black Rock Desert	2,481	580	3,061	0	0	74
Snake River	6,330	321	6,651	197,847	607	159
Humboldt River	26,845	842	27,687	262,460	806	236
West Central	372	0	372	0	0	10
Truckee River	151,429	16,919	168,348	402,417	1,235	115
Western	0	6	6	4,236	13	1
Carson River	39,478	207,004	246,482	79,555	244	73
Walker River	39,096	40	39,136	5,267	16	34
Central	9,429	25,387	34,816	274,370	842	299
Great Salt Lake	3,777	77	3,854	17,317	53	52
Escalante Desert	0	0	0	0	0	0
Colorado River	90,445	2,073,787	2,164,232	3,405,130	10,454	103
Death Valley	0	124	124	19,430	60	5
<b>Total</b>	<b>373,328</b>	<b>2,325,119</b>	<b>2,698,447</b>	<b>4,668,029</b>	<b>14,330</b>	<b>1,209</b>

**TABLE 18**  
**OUTDOOR RECREATION ATTENDANCE AT NEVADA WATER-BASED RECREATION**  
**SITES BY COUNTIES FOR 1970 AND PROJECTED**  
**TO 1980, 2000, AND 2020**

County	1970	1980	2000	2020
	User-Days			
Carson City	623,427	932,404	1,550,358	2,168,312
Churchill	288,712	513,665	963,571	1,413,477
Clark	6,433,480	10,869,215	19,740,686	28,612,156
Douglas	2,048,030	2,832,635	4,401,847	5,971,059
Elko	465,898	1,193,421	2,648,480	4,103,506
Esmeralda	22,156	33,090	54,957	76,824
Eureka	30,325	42,073	65,565	89,058
Humboldt	152,516	379,855	834,532	1,289,209
Lander	67,675	83,773	115,967	148,163
Lincoln	185,173	382,034	781,065	1,180,097
Lyon	211,843	405,419	792,572	1,179,724
Mineral	133,746	219,561	391,189	562,818
Nye	125,224	553,849	1,411,241	2,268,633
Pershing	151,110	291,518	572,336	853,154
Storey	3,824	3,824	3,824	3,824
Washoe	9,742,464	19,628,568	41,374,082	62,461,829
White Pine	498,446	1,062,777	2,191,447	3,320,116
<b>Total</b>	<b>21,184,049</b>	<b>39,427,681</b>	<b>77,893,719</b>	<b>115,701,959</b>

**TABLE 19**  
**OUTDOOR RECREATION ATTENDANCE AT NEVADA WATER-BASED RECREATION**  
**SITES BY HYDROGRAPHIC REGIONS FOR 1970 AND**  
**PROJECTED TO 1980, 2000, AND 2020**

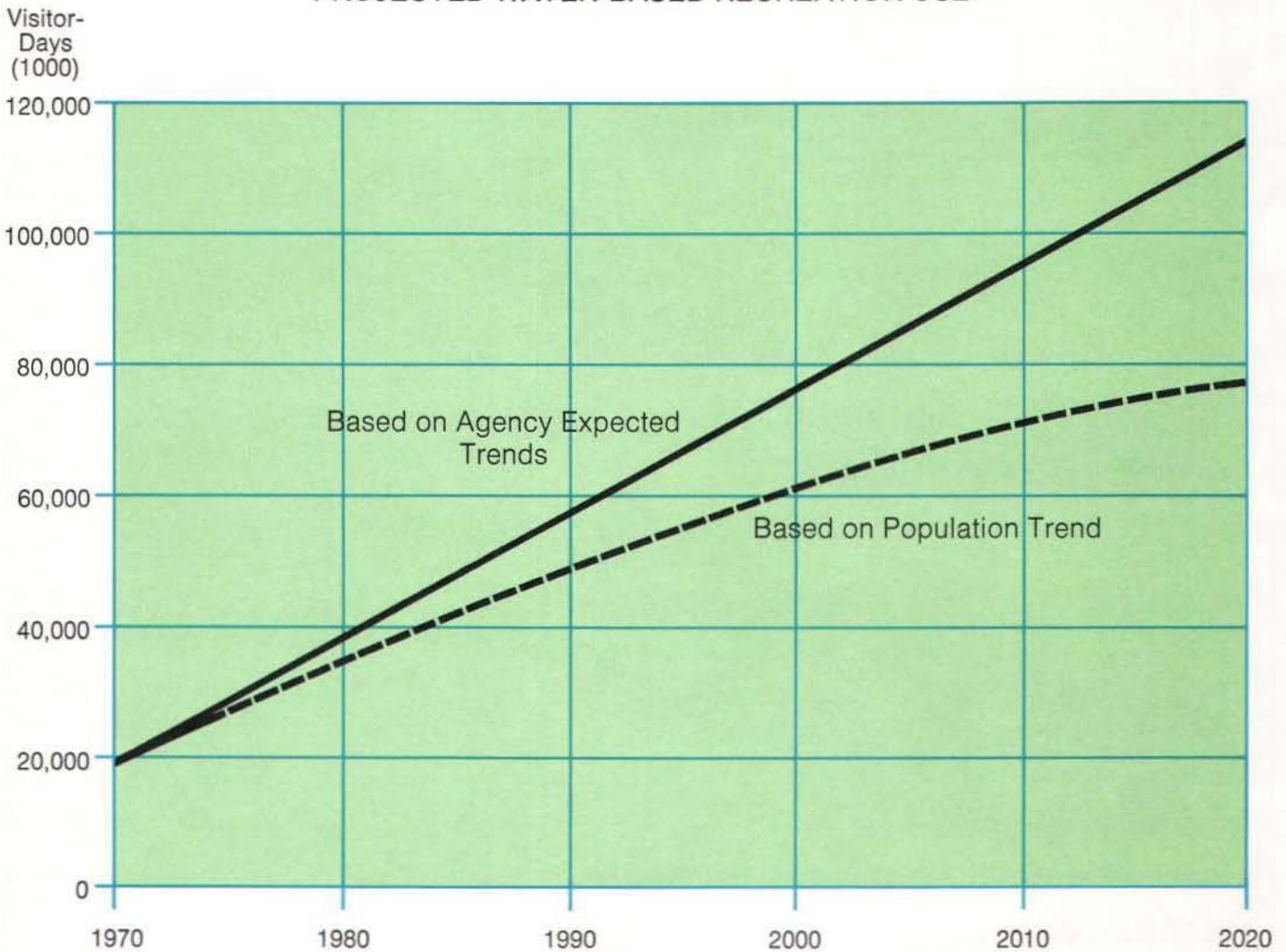
Hydrographic Regions	1970	1980	2000	2020
	User-Days			
Northwest	14,172	36,400	80,852	125,306
Black Rock	32,502	48,582	80,741	112,901
Snake River	142,162	517,979	1,269,608	2,021,239
Humboldt River	573,292	1,273,859	2,675,011	4,076,128
West Central	4,280	5,982	9,386	12,790
Truckee River	12,064,394	22,754,769	46,108,830	68,805,122
Western	5,000	5,000	5,000	5,000
Carson River	659,060	1,144,942	2,116,705	3,088,468
Walker River	263,319	506,492	992,837	1,479,182
Central	906,749	2,182,844	4,735,040	7,287,236
Great Salt Lake	70,280	161,869	345,048	528,227
Escalante Desert	0	0	0	0
Colorado River	6,427,238	10,745,848	19,388,518	28,031,189
Death Valley	21,601	43,115	86,143	129,171
<b>Total</b>	<b>21,184,049</b>	<b>39,427,681</b>	<b>77,893,719</b>	<b>115,701,959</b>

**TABLE 20**  
**PROJECTED FUTURE RECREATION USE BASED UPON**  
**POPULATION PROJECTIONS AND CURRENT USE**

Year	Population <sup>1</sup>	Recreation Use			Average Annual Percent Increase
		Resident	Nonresident	Total	
1970	488,738	14,477,915	6,706,134	21,184,049	
1980	806,500	23,888,559	11,065,121	34,953,680	6.50
1990	1,155,200	34,208,416	15,845,253	50,053,669	4.32
2000	1,438,500	42,589,478	19,727,340	62,316,818	2.45
2010	1,655,100	49,020,489	22,706,168	71,726,657	1.51
2020	1,805,400	53,481,353	24,772,429	78,253,782	.91

<sup>1</sup>The high population projection of the Nevada Division of Water Resources, "Forecast for the Future — Population", 1973.

**FIGURE 2**  
**PROJECTED WATER-BASED RECREATION USE**



## FUTURE LAND AND WATER NEEDS FOR WATER-RELATED OUTDOOR RECREATION

Nevada currently has the largest percentage of land area in public ownership of any state but Alaska. Much of this land can be, and is, used for outdoor recreation purposes. But, the lack of water on most of this land precludes intensive use of these resources. The capacity of Nevada's land and water resources for recreation needs is better measured by water supply than acreage. For some activities, such as swimming, a relatively small area can accommodate a large number of people. Other activities, such as boating and water skiing require large expanses of water. Some activities, such as stream fishing, could use additional rivers and streams to increase supply to meet demands. But, supply could also be increased by increased stocking of existing streams, and by better access.

The determination of needed land and water to meet projected future recreational requirements for these resources will involve meeting the demand for the most popular activities. If the demand can be met for these activities, then it will also meet the demands for the less popular activities unless they are incompatible.

One factor appears certain, people tend to use facilities most that are near to their area of residence. Another factor is that as facilities become available, they will be used. In Nevada more recreation takes place upon the few acres of city parks and on the few surface acres of municipal swimming pools than on most of the millions of acres of public domain. This is because the facilities are near the residences of the users and take little in the way of preparation time or money for their use. On the other hand, recreational uses of more extensive areas of public domain normally require more time and equipment to take advantage of their recreational potential, thus reducing their use on a per acre basis.

### PROJECTED LAND AND WATER NEEDS

#### *City and County Parks*

The main consumptive recreational use of water in Nevada is for the irrigation of parks and golf courses. Use of streams, lakes and reservoirs usually require water only in a nonconsumptive manner. Evaporation

from lakes and reservoirs was not considered as a recreational water use in this study; even though, arguments for maintaining surface levels of terminal lakes are often couched in terms of maintaining or enhancing recreational use. Needs for acreages of parks, golf courses, and water areas to the year 2020 were estimated. Additionally, estimates were made of the consumptive water needs that will be required to maintain these parks and golf courses.

Estimated park land needs, by county, are presented in Table 24. The general standard of a minimum of ten acres of parks per 1,000 population was used to predict needed acres and deficiencies. This is a minimum figure recommended by the National Recreation and Parks Association for local city and county parks [3]. Using this standard, there will be a need for approximately 18,054 acres of local park and recreation lands by the year 2020 based on a predicted population of 1,805,400 people [51]. Using the standard above, there was a state-wide deficit of 2,203 acres in 1970. Most of this deficit was in Clark County, as shown in Table 21. An additional 14,535 acres will be needed by the year 2020.

It should be noted that even though no deficiency in terms of acreage is shown for a county, there may still exist a definite need for certain types of facilities or parks in more local areas. An excess of park area or other facilities in one town may hide the need for facilities in another city within the same county or hydrographic region.

Table 22 shows the estimated water required to irrigate and maintain these parks. Average gallons per acre per day were calculated for the turf areas of parks in the northern and southern portions of the State. This was possible for those sites where an accurate measure of water consumed was available. These average figures were then applied to the other areas in the region. Based on measured data it was estimated that for those areas north of Tonopah, the average was about 3,800 gallons per acre of turf per day for the number of days irrigated. In Southern Nevada, this average increased to 5,200 gallons per acre per day for parks [15]. It was estimated that approximately 60 percent of park areas are in turf and this would be the only portion to be irrigated.

The current use of water for park irrigation is estimated to be 2,121 acre-feet per year excluding golf courses. This will have to be increased to approximately 41,000 acre-feet by the year 2020 if park land areas are increased to meet projected needs. Of this total about 36,000 acre-feet will be needed in Clark County.

Tables 23 and 24 show land and water needs for city and county parks, broken down by the 14 Hydrographic Regions. The greatest need for public parks and water to irrigate them is in the Colorado River Region which includes the Las Vegas area. The difference reported in new acres needed between the county and Hydrographic Region projections is due to the different areas included within their boundaries. The population and 1970 park acreage figures will total the same statewide but will be different between the counties and Hydrographic Regions.

### **Golf Courses**

The estimated needs for public golf courses, by county, are shown in Table 25. The 1970 data represent existing facilities. Where existing acreages of developed golf courses were different from the standard developed by the National Recreation and Parks Association, (75 acres for a 9-hole course and 150 acres for an 18-hole course) these same acreages were carried into the future. When it was anticipated that a new golf course would be built, the above standards were applied. Golf course needs, as related to population, were based on criteria developed by the Nevada State Parks Department in their *Comprehensive Outdoor Recreation Plan, Part III, February, 1971*.

The land and water needs estimated here are only for publicly owned golf courses. In some cases a portion of this demand may be met by existing or proposed private facilities. This is particularly true when golf courses are constructed in conjunction with resort or housing developments. There remains, however, a definite need for public courses to meet the growing demand from the average resident of the area. In Clark County, there are very limited public golfing facilities at this time.

Complete survey data was not developed for privately owned recreation facilities in Nevada, as a part of this report. However, because of the large land and water requirements associated with private golf courses in the state, Tables 29 and 30 have been provided to show the land and water used by these areas. Some of these courses are open to the general public on a fee basis while others are limited to members and their guests. Water use at these private golf courses was derived primarily from data provided by the Nevada Division of Water Resources and estimates based on other courses in the area.

The water needs estimated in Table 26 for public golf

courses are based on an average of 3,800 gallons per acre per day in the north and 5,200 gallons per acre per day in the south.

It was assumed that existing watering practices on current courses would be continued. If the estimated need for golf courses in Clark County is met by the year 2020, over 19,000 acre-feet of water will be needed to irrigate them. This will be true even if a portion of this demand is met by private facilities.

The estimated land and water needs for public golf courses, by Hydrographic Region, are shown in Tables 27 and 28. There are six regions where, even by 2020, the population is expected to be less than the 5,000 minimum to require one 9-hole course. On the other hand there will be the need for as many as 26 golf courses in the Colorado River Region of Southern Nevada.

### **Lakes and Reservoirs**

The use of lakes and reservoirs for recreation is second only to local parks in number of recreation-days use per season. These areas support a variety of water-based recreation activities from fishing to water skiing. Most of these activities can take place at the same time in close proximity to each other on the same water. Boating, however, is the one activity that requires the largest amount of surface water area. Therefore, boating needs were used to estimate the surface water requirements for recreation. It is assumed that if the boating requirements are met there will be sufficient water area for other water-related recreation activities. The total estimated use and needs for water surface acres are shown in Tables 31 and 32. The surface areas needed differ slightly because of the difference in population distribution between county areas and hydrographic regions.

The total area of boating waters shown for the State is about 17,000 acres less than the total surface acres of water shown in Tables 16 and 17. This is due to the exclusion of some waters as unsuitable for boating due to their small size, inaccessibility, or shallow depth. Generally, these areas also receive limited use from other types of water-related recreation.

Two large lakes in Western Nevada are presently decreasing in size and deteriorating in quality because of insufficient inflows to maintain their present levels; Pyramid Lake in the Truckee River Hydrographic Region of Washoe County and Walker Lake in the Walker River Hydrographic Region of Mineral County. The deteriora-

These figures were then used to determine the total capacity in boat-days per acre for each county and Hydrographic Region by the following formula:

$$\frac{\text{number of boating days in season} \times 1.5 \text{ turnover rate}}{\text{minimum number of acres per boat}} = \text{total capacity in boat-days per acre}$$

Although the formula estimates a capacity generally far in excess of present and estimated future demands, it must be remembered that this implies maximum utilization of all water areas during the entire boating season. This would require use at a much higher density than at present which may be objectionable to many people. Also, many of Nevada's water areas are distant from any population center and are consequently used very little. The greatest demand for water recreation areas is within an hours drive of the users and in these areas, some deficiencies may develop. These can best be met by multi-purpose reservoirs of medium size near population centers where boating is possible but water surface is not wasted. Additionally, further improvements and an increase of access points to present water areas would serve to spread the use over more of the existing water surface and avoid the crowding that often occurs around limited launching and beach areas.

#### **Proposed Reservoirs**

The ten proposed reservoirs are shown in Tables 33 and 34. In order to better understand the impact of new reservoirs preliminary estimates of their future recreation use were made.

It was assumed, in making these projections, that all of the projects would be constructed by 1980 so that a normal recreation pattern of use would be established by 1985.

Since use at a lake or reservoir is related to its size, use trends and the number of visits per acre were determined at existing lakes and reservoirs that were in the vicinity, and were similar to the proposed sites. These existing lakes and reservoirs are shown in Table 35. It is expected that new reservoirs will be used in a pattern similar to existing facilities in the same area. The three proposed reservoirs in Elko County were studied by Beeler [1], in 1972, and the use estimates from his study are incorporated in these projections. He compared the proposed Elko reservoirs to Wilson and Wildhorse reservoirs in Elko County in determining use for 1985.

tion in quality is not projected to have a significant impact on the projected boating needs for water surface area as illustrated in Tables 31 and 32.

A maximum density of boats per surface acre of water was assumed. This represents the maximum number of boats that should be on the water at any one time (according to Bureau of Outdoor Recreation recommendations). For most waters of the state, this was set at one boat per four acres for general multipurpose boating. On Pyramid and Walker Lakes and Lake Tahoe the maximum density was lowered to one boat per 15 surface acres. This is due to the large size of these lakes and the little use that will be made of the middle portions of the lakes. On Lake Mead the maximum density was determined to be one boat per ten acres because of the abundance of more sheltered waters on a large lake. For Clark County the boating season was 210 days while for the rest of the state a 120 day season was used.

**TABLE 21**  
**ESTIMATES OF CURRENT AND PROJECTED LAND NEEDS AND DEFICIENCIES**  
**FOR CITY AND COUNTY PARKS BY COUNTY, NEVADA**

County	1970			1980			2000			2020		
	Population <sup>1</sup>	Acres Parks <sup>2</sup>	Deficiencies in 1970	Projected Pop.	Acres Needed	New Acres Needed	Projected Pop.	Acres Needed	New Acres Needed	Projected Pop.	Acres Needed	New Acres Needed
Carson City	15,468	43	112	31,000	310	267	54,000	540	497	64,000	640	597
Churchill	10,513	9	96	13,000	130	121	16,000	160	151	18,000	180	171
Clark	273,288	1,019	1,714	500,000	5,000	3,981	1,000,000	10,000	8,981	1,300,000	13,000	11,981
Douglas	6,882	6	62	13,000	130	124	20,000	200	194	23,000	230	224
Elko	13,958	271	—	22,000	220	—	32,000	320	49	35,000	350	79
Esmeralda	629	0	6	700	7	7	800	8	8	900	9	9
Eureka	948	1	8	1,100	11	10	1,300	13	12	1,500	15	14
Humboldt	6,375	207	—	7,200	72	—	8,600	86	—	9,200	92	—
Lander	2,666	0	26	3,200	32	32	3,800	38	38	3,900	39	39
Lincoln	2,557	34	—	2,700	27	—	2,900	29	—	3,000	30	—
Lyon	8,221	1	81	11,000	110	109	15,500	155	154	18,500	185	184
Mineral	7,051	4	67	8,000	80	76	9,000	90	86	9,500	95	91
Nye	5,599	150	—	7,000	70	—	10,000	100	—	12,000	120	—
Pershing	2,670	2	24	3,300	33	31	3,900	39	37	4,000	40	38
Storey	695	0	7	800	8	8	900	9	9	1,000	10	10
Washoe	121,068	1,854	—	172,000	1,720	—	249,000	2,490	678	291,000	2,910	1,098
White Pine	10,150	204	—	10,500	105	—	10,800	108	—	10,900	109	—
<b>Total</b>	<b>488,738</b>	<b>3,805</b>	<b>2,203</b>	<b>806,500</b>	<b>8,065</b>	<b>4,734</b>	<b>1,438,500</b>	<b>14,385</b>	<b>10,894</b>	<b>1,805,400</b>	<b>18,054</b>	<b>14,535</b>

<sup>1</sup>Population projections provided by Victor R. Hill, Division of Water Resources, State of Nevada, November 1, 1971.

<sup>2</sup>Does not include acres developed as public golf courses. These amount to the following: Carson City, 30 acres; Churchill, 30 acres; Clark, 208 acres; Elko, 466 acres; Humboldt, 60 acres; Washoe, 373 acres; and White Pine, 120 acres.

**TABLE 22**  
**ESTIMATES OF CURRENT AND PROJECTED CONSUMPTIVE WATER NEEDS**  
**FOR CITY AND COUNTY PARKS BY COUNTY, NEVADA**

County	1970		1980		2000		2020	
	Acres Parks <sup>1</sup>	Acre-Feet of Water	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed
Carson City	43	46	310	314	540	534	640	633
Churchill	9	7	130	132	160	158	180	178
Clark	1,019	1,063	5,000	13,662	10,000	27,324	13,000	35,522
Douglas	6	12	130	132	200	198	230	227
Elko	271	189	220	223	320	316	350	346
Esmeralda	0	0	7	19	8	22	9	25
Eureka	1	2	11	11	13	13	15	15
Humboldt	207	35	72	71	86	85	92	91
Lander	0	0	32	32	38	38	39	39
Lincoln	34	89	27	74	29	79	30	82
Lyon	1	2	110	109	155	153	185	183
Mineral	4	9	80	79	90	89	95	94
Nye	150	165	70	191	100	273	120	328
Pershing	2	5	33	33	39	39	40	40
Storey	0	0	8	8	9	9	10	10
Washoe	1,854	433	1,720	1,701	2,490	2,462	2,910	2,877
White Pine	204	64	105	104	108	107	109	108
<b>Total</b>	<b>3,805</b>	<b>2,121</b>	<b>8,065</b>	<b>16,895</b>	<b>14,385</b>	<b>31,899</b>	<b>18,054</b>	<b>40,798</b>

<sup>1</sup>Does not include acres developed as public golf courses. These amount to the following: Carson City, 30 acres; Churchill, 30 acres; Clark, 208 acres; Elko, 466 acres; Humboldt, 60 acres; Washoe, 373 acres; and White Pine, 120 acres.

**TABLE 23**  
**ESTIMATES OF CURRENT AND PROJECTED LAND NEEDS AND DEFICIENCIES**  
**FOR CITY AND COUNTY PARKS BY HYDROGRAPHIC REGION, NEVADA**

Hydrographic Region	1970			1980			2000			2020		
	Population <sup>1</sup>	Acres Parks <sup>2</sup>	Deficiencies in 1970	Projected Population	Acres Needed	New Acres Needed	Projected Population	Acres Needed	New Acres Needed	Projected Population	Acres Needed	New Acres Needed
Northwest	155	32	—	165	2	—	185	2	—	195	2	—
Black Rock Desert	1,800	100	—	1,900	19	—	2,150	22	—	2,200	22	—
Snake River	1,700	8	9	1,800	18	10	2,050	21	13	2,200	22	14
Humboldt River	22,500	440	—	31,800	318	—	44,000	440	—	47,500	475	35
West Central	1,950	0	20	2,450	25	25	3,150	32	32	3,600	36	36
Truckee River	122,500	1,748	—	174,500	1,745	—	253,000	2,530	782	296,000	2,960	1,212
Western	4,800	6	42	8,200	82	76	13,400	134	128	14,900	149	143
Carson River	30,500	58	247	51,000	510	452	80,000	800	742	93,000	930	872
Walker River	12,500	5	120	15,000	150	145	19,500	195	190	21,900	219	214
Central	17,200	241	—	18,800	188	—	22,200	222	—	24,400	244	3
Great Salt Lake	495	0	5	535	5	5	585	6	6	605	6	6
Escalante Desert	0	0	—	0	0	—	0	0	—	0	0	—
Colorado River	271,600	1,043	1,673	493,300	4,933	3,890	991,500	9,915	8,872	1,288,000	12,880	11,837
Death Valley	1,300	124	—	1,550	16	—	2,280	23	—	2,500	25	—
<b>Total</b>	<b>489,000</b>	<b>3,805</b>	<b>2,116</b>	<b>801,000</b>	<b>8,011</b>	<b>4,603</b>	<b>1,438,500</b>	<b>14,342</b>	<b>10,765</b>	<b>1,805,400</b>	<b>17,970</b>	<b>14,372</b>

<sup>1</sup>Population projections provided by Victor R. Hill, Division of Water Resources, State of Nevada, November 1, 1971. Regional totals: add to within 1% of state total but are not Exact due to rounding.

<sup>2</sup>Does not include acres developed as golf courses. These amount to the following: Snake River 240 acres; Humboldt River, 286 acres; Truckee River, 373 acres; Carson River, 60 acres; Central Region, 120 acres; and Colorado River, 208 acres.

**TABLE 24**  
**ESTIMATES OF CURRENT AND PROJECTED CONSUMPTIVE WATER NEEDS FOR CITY AND COUNTY PARKS BY HYDROGRAPHIC REGION, NEVADA**

Hydrographic Region	1970		1980		2000		2020	
	Acres Parks <sup>1</sup>	Acre-Feet of Water	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed
Northwest	32	0	2	2	2	2	2	2
Black Rock Des.	100	0	19	19	22	22	22	22
Snake River	8	1	18	18	21	21	22	22
Humboldt River	440	229	318	322	440	445	475	480
West Central	0	0	25	25	32	32	36	36
Truckee River	1,784	420	1,745	1,765	2,530	2,559	2,960	2,994
Western	6	13	82	83	134	136	149	151
Carson River	58	65	510	516	800	809	930	941
Walker River	5	10	150	152	195	197	219	222
Central	241	202	188	190	222	225	244	247
Great Salt Lake	0	0	5	5	6	6	6	6
Escalante Desert	0	0	0	0	0	0	0	0
Colorado River	1,043	1,123	4,933	13,794	9,915	27,724	12,880	36,015
Death Valley	124	60	16	45	23	64	25	70
<b>Total</b>	<b>3,805</b>	<b>2,123</b>	<b>8,011</b>	<b>16,936</b>	<b>14,342</b>	<b>32,242</b>	<b>17,970</b>	<b>41,208</b>

<sup>1</sup>Does not include acres developed as public golf courses. These amount to the following: Snake River, 240 acres; Humboldt River, 286 acres; Truckee River, 373 acres; Carson River, 60 acres; Central Region, 120 acres; and Colorado River, 208 acres.

**TABLE 25**  
**ESTIMATES OF CURRENT AND PROJECTED LAND NEEDS FOR PUBLICLY OWNED GOLF COURSES BY COUNTY, NEVADA**

County	1970 <sup>1</sup>			1980				2000				2020			
	Courses	Holes	Acres	Courses	Holes <sup>2</sup>	Total Acres Needed	New Acres Needed	Courses	Holes	Total Acres Needed	New Acres Needed	Courses	Holes	Total Acres Needed	New Acres Needed
Carson City	1	9	30	1	9	30	0	1	18	150	120	2	27	225	195
Churchill	1	9	30	1	9	30	0	1	18	150	120	1	18	150	120
Clark	1	18	208	10	180	1,500	1,292	20	360	3,000	2,792	26	468	3,900	3,692
Douglas	0	0	0	1	9	75	75	1	18	150	150	1	18	150	150
Elko	2	18	466	2	27	466	0	2	36	466	0	2	36	466	0
Esmeralda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eureka	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Humboldt	1	9	60	1	9	60	0	1	9	60	0	1	9	60	0
Lander	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lincoln	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lyon	0	0	0	1	9	75	75	1	18	150	150	1	18	150	150
Mineral	0	0	0	1	9	75	75	1	9	75	75	1	9	75	75
Nye	0	0	0	1	9	75	75	1	9	75	75	2	18	150	150
Pershing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Storey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Washoe	3	45	373	4	63	525	152	6	90	750	377	7	108	900	527
White Pine	1	9	120	1	9	120	0	1	9	120	0	1	9	120	0
<b>Total</b>	<b>10</b>	<b>117</b>	<b>1,287</b>	<b>24</b>	<b>342</b>	<b>3,031</b>	<b>1,744</b>	<b>36</b>	<b>594</b>	<b>5,146</b>	<b>3,859</b>	<b>45</b>	<b>738</b>	<b>6,346</b>	<b>5,059</b>

<sup>1</sup>1970 represents existing publicly owned facilities.

<sup>2</sup>Needs based on one golf hole per 1,000 population in rural areas (minimum population, 5,000); and one 9-hole course per 25,000 population in urban areas. Recommendations based on Nevada State Parks *Comprehensive Outdoor Recreation Plan*, February 1971.

<sup>3</sup>Based on a standard of 75 acres for a 9-hole course and 150 acres for an 18-hole course, except for existing facility. From the *National Park, Recreation and Open Space Standards* by the National Recreation and Park Association.

**TABLE 26**  
**ESTIMATES OF CURRENT AND PROJECTED CONSUMPTIVE WATER NEEDS FOR**  
**PUBLICLY OWNED GOLF COURSES BY COUNTY, NEVADA**

County	1970 <sup>1</sup>		1980		2000		2020	
	Acres of Courses	Acre-Feet of Water	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed
Carson City	30	78	30	78	150	271	225	407
Churchill	30	68	30	68	150	271	150	271
Clark	208	832	1,500	7,490	3,000	14,980	3,900	19,474
Douglas	0	0	75	136	150	271	150	271
Elko	466	926	466	926	466	926	466	926
Esmeralda	0	0	0	0	0	0	0	0
Eureka	0	0	0	0	0	0	0	0
Humboldt	60	122	60	122	60	122	60	122
Lander	0	0	0	0	0	0	0	0
Lincoln	0	0	0	0	0	0	0	0
Lyon	0	0	75	136	150	271	150	271
Mineral	0	0	75	136	75	136	75	136
Nye	0	0	75	374	75	374	150	749
Pershing	0	0	0	0	0	0	0	0
Storey	0	0	0	0	0	0	0	0
Washoe	373	801	525	949	750	1,355	900	1,626
White Pine	120	419	120	419	120	419	120	419
<b>Total</b>	<b>1,287</b>	<b>3,246</b>	<b>3,031</b>	<b>10,834</b>	<b>5,146</b>	<b>19,396</b>	<b>6,346</b>	<b>24,672</b>

<sup>1</sup>1970 represents existing publicly owned facilities.

**TABLE 27**  
**ESTIMATES OF CURRENT AND PROJECTED LAND NEEDS**  
**FOR PUBLICLY OWNED GOLF COURSES BY HYDROGRAPHIC REGION, NEVADA**

Hydrographic Region	1970 <sup>1</sup>			1980				2000				2020			
	Courses	Holes	Acres	Courses	Holes <sup>2</sup>	Total Acres <sup>3</sup> Needed	New Acres Needed	Courses	Holes	Total Acres Needed	New Acres Needed	Courses	Holes	Total Acres Needed	New Acres Needed
Northwest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black Rock Desert	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Snake River	1	9	240	1	9	240	0	1	9	240	0	1	9	240	0
Humboldt River	2	18	286	2	18	286	0	2	27	286	0	2	36	300	14
West Central	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Truckee River	3	45	373	4	63	525	152	6	90	750	377	7	108	900	527
Western	0	0	0	1	9	75	75	1	9	75	75	1	9	75	75
Carson River	2	18	60	2	27	180	120	3	36	300	240	4	63	525	465
Walker River	0	0	0	1	9	75	75	2	18	150	150	2	18	150	150
Central	1	9	120	1	9	120	0	2	18	195	75	2	18	195	75
Great Salt Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escalante Desert	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colorado River	1	18	208	10	180	1,500	1,292	20	360	3,000	2,792	26	459	3,825	3,617
Death Valley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>10</b>	<b>117</b>	<b>1,287</b>	<b>22</b>	<b>324</b>	<b>3,001</b>	<b>1,714</b>	<b>37</b>	<b>567</b>	<b>4,996</b>	<b>3,709</b>	<b>45</b>	<b>720</b>	<b>6,210</b>	<b>4,923</b>

<sup>1</sup>1970 represents existing publicly owned facilities.

<sup>2</sup>Needs based on one golf hole per 1,000 population in rural areas (minimum population, 5,000); and one 9-hole course per 25,000 population in urban areas. Recommendations based on Nevada State Parks *Comprehensive Outdoor Recreation Plan*, February 1971.

<sup>3</sup>Based on a standard of 75 acres for a 9-hole course and 150 acres for 18-hole course. From the *National Park, Recreation and Open Space Standards* by the National Recreation and Park Association.

**TABLE 28**  
**ESTIMATES OF CURRENT AND PROJECTED CONSUMPTIVE WATER NEEDS FOR**  
**PUBLICLY OWNED GOLF COURSES BY HYDROGRAPHIC REGION, NEVADA**

Hydrographic Region	1970 <sup>1</sup>		1980		2000		2020	
	Acres of Courses	Acre-Feet of Water	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed	Total Acres Needed	Total Acre-Feet Needed
Northwest	0	0	0	0	0	0	0	0
Black Rock Des.	0	0	0	0	0	0	0	0
Snake River	240	528	240	528	240	528	240	528
Humboldt River	286	520	286	520	286	520	300	542
West Central	0	0	0	0	0	0	0	0
Truckee River	373	801	525	949	750	1,355	900	1,626
Western	0	0	75	136	75	136	75	136
Carson River	60	146	180	325	300	542	525	949
Walker River	0	0	75	136	150	271	150	271
Central	120	419	120	419	195	352	195	352
Great Salt Lake	0	0	0	0	0	0	0	0
Escalante Desert	0	0	0	0	0	0	0	0
Colorado River	208	832	1,500	7,490	3,000	14,980	3,825	19,099
Death Valley	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1,287</b>	<b>3,246</b>	<b>3,001</b>	<b>10,503</b>	<b>4,996</b>	<b>18,684</b>	<b>6,210</b>	<b>23,503</b>

<sup>1</sup>1970 represents existing publicly owned facilities.

**TABLE 29**  
**PRIVATELY OWNED GOLF COURSES IN NEVADA, BY COUNTY, 1970<sup>1</sup>**

County <sup>2</sup>	Course Name	Number of Holes	Size (Acres)	Source of Irrigation Water	1970 Water Use (Acre-Feet)
Clark	Aladdin Country Club (par 3)	9	20	Municipal <sup>3</sup>	91 <sup>4</sup>
	Black Mountain Golf and Country Club	18	125	Municipal <sup>3</sup>	522
	Bonanza Country Club	18	155	Wells	903
	Craig Ranch Country Club	18	69	Wells	300
	Desert Inn Country Club	18	131	Wells	663
	Dunes Country Club	18	127	Wells	673
	Hacienda (Par 3)	9	20	Wells	420 <sup>3</sup>
	Louis Prima's Fairway to the Stars	18	54	Wells	294
	Nellis Air Force Base	18	75	Effluent	300
	Paradise Valley	18	127	Effluent	542
	Sahara-Nevada Country Club	18	129	Wells	630
	Tropicana Country Club	18	89	Wells	253
	Winterwood Golf Course	18	148	Effluent	584
Douglas	Carson Valley Country Club	9	40	Wells	100
	Edgewood Tahoe	18	150	Surface	360 <sup>4</sup>
	Glenbrook Golf Course	9	24	Surface	120
Lyon	Mason Valley Country Club	9	50	Wells	135
	Penrose Estates Country Club	9	50	Wells	135
Mineral	Walker Lake Country Club	9	75	Surface/wells	135 <sup>4</sup>
Nye	Sandy Bottom Golf Club	9	50	No water used	
Washoe	Hidden Valley Country Club	18	258	Surface	330
	Incline Village Golf Course	18	82	Surface	340
	Lake Ridge Golf Course	18	143	Surface	350
State Total		342	2,191		8,180

<sup>1</sup>Source: Department of Conservation and Natural Resources, Division of Water Resources, State of Nevada, unless otherwise noted.

<sup>2</sup>Counties not listed do not have private golf courses.

<sup>3</sup>Cochran, G.F., D. R. Fitzsimmons, J. R. Garrett, and G. S. Watson. *Quality of Water Considerations in Arid Area Water Management*, Center for Water Resources Research, Desert Research Institute, Technical Report Series HW, Hydrology and Water Resources Publication No. 14 February 1972.

<sup>4</sup>Exact water use data was unavailable at these sites. Water use was estimated at an average rate of 4.55 acre-feet per acre for Clark County and 1.8 acre-foot per acre for the rest of the State.

**TABLE 30**  
**PRIVATE GOLF COURSES IN NEVADA, BY HYDROGRAPHIC REGION, 1970<sup>1</sup>**

Region <sup>2</sup>	Course Name	Number Holes	Size (Acres)	Source of Irrigation Water	1970 Water Use (Acre-Feet)
Truckee River	Edgewood Tahoe	18	150	Surface	360 <sup>3</sup>
	Glenbrook Golf Course	9	24	Surface	120
	Hidden Valley Country Club	18	258	Surface	330
	Incline Village Golf Course	18	82	Surface	340
	Lake Ridge Golf Course	18	143	Surface	350
Carson River	Carson Valley Country Club	9	40	Wells	100
Walker River	Mason Valley Country Club	9	50	Wells	135
	Penrose Estates Country Club	9	50	Wells	135
	Walker Lake Country Club	9	75	Surface/wells	135 <sup>3</sup>
Central	Sandy Bottom Golf Club	9	50	No water used	
Colorado River	Aladdin Country Club (Par 3)	9	20	Municipal <sup>4</sup>	91
	Black Mountain Golf and Country Club	18	125	Municipal <sup>4</sup>	522
	Bonanza Country Club	18	155	Wells	903
	Craig Ranch Country Club	18	69	Wells	300
	Desert Inn Country Club	18	131	Wells	663
	Dunes Country Club	18	127	Wells	673
	Hacienda (Par 3)	9	20	Wells	420 <sup>4</sup>
	Louis Prima's Fairway to the Stars	18	54	Wells	294
	Nellis Air Force Base	18	75	Effluent	300
	Paradise Valley	18	127	Effluent	542
	Sahara-Nevada Country Club	18	129	Wells	630
	Tropicana Country Club	18	89	Wells	253
	Winterwood Golf Course	18	148	Effluent	584
	State Total		342	2,191	

<sup>1</sup>Source: Department of Conservation and Natural Resources, Division of Water Resources, State of Nevada, unless otherwise noted.

<sup>2</sup>Hydrographic regions not listed do not have private golf courses.

<sup>3</sup>Exact water use data was unavailable at these sites. Water use was estimated at an average rate of 4.55 acre-feet per acre for the Colorado River Region and 1.8 acre-foot per acre for the rest of the State.

<sup>4</sup>Cochran, G. F., D. R. Fitzsimmons, J. R. Garrett, and G. S. Watson. *Quality of Water Considerations in Arid Area Water Management*, Center for Water Resources Research, Desert Research Institute, Technical Report Series HW, Hydrology and Water Resources Publication No. 14, February 1972.

**TABLE 31**  
**ESTIMATES OF TOTAL CURRENT AND PROJECTED USE AND WATER SURFACE ACRES**  
**NEEDED FOR BOATING, BY COUNTY, NEVADA**

County	1970		1980			2000			2020		
	Acres of Boating Water	Recreation Capacity (Boat-Days) <sup>1</sup>	Estimated Use (Boat-Days) <sup>2</sup>	Estimated Use (Boat-Days) <sup>3</sup>	Total Surface Acres Needed	Estimated Use (Boat-Days)	Total Surface Acres Needed	New Surface Acres Needed	Estimated Use (Boat-Days)	Total Surface Acres Needed	New Surface Acres Needed
Carson City	7,582	90,984	8,414	16,778	1,398	33,513	2,793	0	50,248	4,187	0
Churchill	28,606	1,287,270	20,799	41,473	922	82,842	1,841	0	124,212	2,760	0
Clark	87,665	2,769,244	246,697	491,914	15,616	982,594	31,193	0	1,473,274	46,771	0
Douglas	17,732	273,801	20,527	40,931	3,066	81,759	6,124	0	122,587	9,182	0
Elko	18,188	818,460	14,502	28,917	643	57,761	1,284	0	86,606	1,925	0
Esmeralda	0	0	0	0	0	0	0	0	0	0	0
Eureka	20	900	0	0	0	0	0	0	0	0	0
Humboldt	3,033	136,485	5,000	9,970	222	19,915	443	0	29,860	664	0
Lander	26	1,170	100	199	4	398	9	0	597	13	0
Lincoln	1,032	46,440	3,140	6,261	139	12,507	278	0	18,752	417	0
Lyon	8,650	389,250	8,604	17,156	381	34,270	762	0	51,383	1,142	0
Mineral	38,950	498,750	3,227	6,435	460	12,853	918	0	19,272	1,377	0
Nye	792	35,640	1,000	1,994	44	3,983	89	0	5,972	133	0
Pershing	16,040	721,800	3,049	6,080	135	12,144	270	0	18,209	405	0
Storey	50	2,250	0	0	0	0	0	0	0	0	0
Washoe	128,063	1,758,384	57,869	115,391	9,298	230,492	18,574	0	345,594	27,849	0
White Pine	229	10,305	4,450	8,873	197	17,724	394	165	26,575	591	362
<b>Total</b>	<b>356,658</b>	<b>8,841,133</b>	<b>397,378</b>	<b>792,372</b>	<b>32,525</b>	<b>1,582,755</b>	<b>64,972</b>	<b>165</b>	<b>2,373,141</b>	<b>97,416</b>	<b>362</b>

<sup>1</sup>1. Northern Nevada has a 120-day boating season; Southern Nevada (Clark County) has a 210-day season. A boat-day is any part of one day that a boat is used in the water.

<sup>2</sup>2. Assume a maximum density of one boat per four acres for general boating. On Pyramid and Walker Lakes and Lake Tahoe, assume a density of one boat per 15 acres and for Lake Mead, one boat per ten acres of surface water.

<sup>3</sup>3. 
$$\frac{\text{Number of boating days in season} \times 1.5 \text{ turnover rate}}{\text{Minimum number of acres per boat}} = \text{Total capacity in boat-days per acre}$$

<sup>2</sup>From *The Development and Application of Methodology to Determine Marine Fuel Taxes Paid by Boaters in Nevada*, by Richard Fanucchi, University of Nevada, Reno, Nevada, 1972, Unpublished Master's Thesis.

<sup>3</sup>Based on a boat population of 31,379 in 1980, 62,670 in 2000 and 93,961 in 2020. Derived from the following equation:

$$\hat{Y} = -3066410 + 1564.54 (X_1)$$

where:  $\hat{Y}$  = total number of registered boats

$X_1$  = year of registration

Source: *The Development and Application of Methodology to Determine Marine Fuel Taxes Paid by Boaters in Nevada*, by John G. McNeely, Jr. and Richard Fanucchi, Agricultural Experiment Station Bulletin No. 115, University of Nevada, Reno, Nevada, July 1972. Use may shift from one area to another as new facilities are developed. Includes resident and non-resident demands.

<sup>4</sup>Deficiencies do not occur in the year 1980.

**TABLE 32**  
**ESTIMATES OF TOTAL CURRENT AND PROJECTED USE AND WATER SURFACE ACRES NEEDED FOR BOATING,**  
**BY HYDROGRAPHIC REGION, NEVADA<sup>1</sup>**

Hydrographic Region	1970			1980		2000		2020	
	Acres of Boating Water	Recreation Capacity (Boat-Days) <sup>2</sup>	Estimated Use (Boat-Days) <sup>3</sup>	Estimated Use (Boat-Days) <sup>4</sup>	Total Surface Acres Needed <sup>5</sup>	Estimated Use (Boat-Days)	Total Surface Acres Needed	Estimated Use (Boat-Days)	Total Surface Acres Needed
Northwest	1,667	75,015	150	299	7	597	14	896	20
Black Rock Desert	1,662	74,790	50	100	3	199	5	299	7
Snake River	6,479	291,555	4,766	9,503	212	18,983	422	28,463	633
Humboldt River	17,887	804,915	5,049	10,068	224	20,110	447	30,153	670
West Central	371	16,695	500	997	23	1,992	45	2,986	67
Truckee River	151,351	2,031,999	84,846	169,183	12,346	337,942	27,522	506,700	41,265
Western	0	0	0	0	0	0	0	0	0
Carson River	36,648	1,649,160	33,403	66,606	1,481	133,044	2,957	199,483	4,433
Walker River	40,967	589,515	9,149	18,243	1,246	36,440	2,487	54,638	3,729
Central	9,232	415,440	8,736	17,420	388	34,795	774	52,171	1,160
Great Salt Lake	905	40,725	200	399	9	797	18	1,194	27
Escalante Desert	0	0	0	0	0	0	0	0	0
Colorado River	89,489	2,851,324	250,530	499,557	15,745	997,861	31,450	1,496,165	47,155
Death Valley	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>356,658</b>	<b>8,841,133</b>	<b>397,379</b>	<b>792,375</b>	<b>31,684</b>	<b>1,582,760</b>	<b>66,141</b>	<b>2,373,148</b>	<b>99,167</b>

<sup>1</sup>There are no water deficient Hydrographic Regions for recreation use through the year 2020. Because of the large size of some regions, however, there may be some deficiencies in local areas of the State.

<sup>2</sup>1. Northern Nevada has a 120-day boating season; Southern Nevada (Clark County) has a 210-day season. A boat-day is any part of one day that a boat is used in the water.

2. Assume a maximum density of one boat per four acres for general boating. On Pyramid and Walker Lakes and Lake Tahoe, assume a density of one boat per 15 acres and for Lake Mead, one boat per ten acres of surface water.

3.  $\frac{\text{Number of boating days in season} \times 1.5 \text{ turnover rate}}{\text{Minimum number of acres per boat}} = \text{Total capacity in boat-days per acre}$

<sup>3</sup>From *The Development and Application of Methodology to Determine Marine Fuel Taxes Paid by Boaters in Nevada*, by Richard Fanucchi, University of Nevada, Reno, Nevada, 1972, Unpublished Master's Thesis.

<sup>4</sup>Based on a boat population of 31,379 in 1980, 62,670 in 2000, and 93,961 in 2020. Derived from the following equation:

$$\hat{Y} = -3066410 + 1564.54 (X_1)$$

where:  $\hat{Y}$  = total number of registered boats

$X_1$  = year of registration

Source: *The Development and Application of Methodology to Determine Marine Fuel Taxes Paid by Boaters in Nevada*, by John G. McNeely, Jr. and Richard Fanucchi, Agricultural Experiment Station bulletin No. 115, University of Nevada, Reno, Nevada, July 1972. Use may shift from one area to another as new facilities are developed. Includes resident and non-resident demands.

<sup>5</sup>Totals differ somewhat from County estimates due to conversion of County data to hydrographic region estimates.

**TABLE 33**  
**ESTIMATED RECREATION USE AT SELECTED PROPOSED RESERVOIR SITES, BY COUNTY, NEVADA**

County	Name of Reservoir	Location (Township and Range)	Maximum Surface Area (Acres)	Minimum Recreation Surface Area (Acres)	Estimated Recreation Use (Visitor-Days)		
					1985	2000	2020
Douglas	Watasheamu Reservoir	T10N-R20E	1,300	530	63,000	111,000	175,000
Elko	Devil's Gate Reservoir	T38N-R57E	1,640	440	47,900	71,800	167,600
	Hylton Reservoir	T32N-R55E	3,750	700	127,600	191,400	446,600
	Vista Reservoir	T39N-R60E	1,650	540	16,100	24,100	56,300
Eureka	Roberts Creek Reservoir	T22N-R50E	16	16	2,000	3,200	4,800
Humboldt	McDermitt Creek Reservoir	T47N-R37E	1,760	327	39,000	69,000	108,000
Lander	Birch Creek Reservoir	T18N-R44E	10	10	800	1,400	2,100
	Rock Creek Reservoir	T35N-R47E	3,500	1,180	30,000	47,000	71,000
Lyon	Hudson Reservoir	T11N-R24E	800	320	8,000	13,000	19,000
Washoe	Tuledad Reservoir	T36N-R18E	630	500	9,000	13,000	18,000

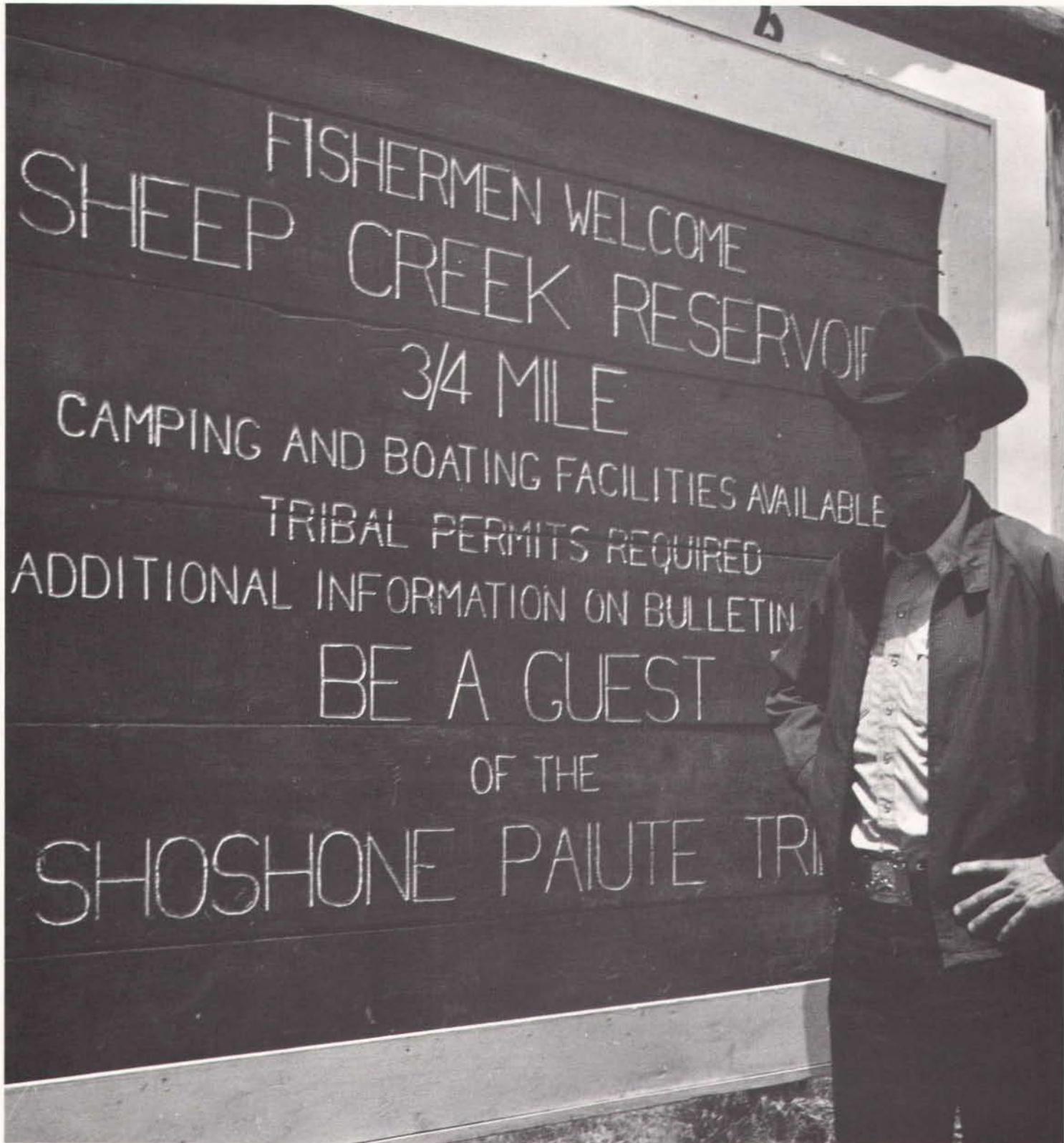
**TABLE 34**  
**ESTIMATED RECREATION USE AT SELECTED PROPOSED RESERVOIR SITES, BY HYDROGRAPHIC REGION, NEVADA**

Hydrographic Region	Name of Reservoir	Location (Township and Range)	Maximum Surface Area (Acres)	Minimum Recreation Surface Area (Acres)	Estimated Recreation Use (Visitor-Days)		
					1985	2000	2020
Northwest	Tuledad Reservoir	T36N-R18E	630	500	9,000	13,000	18,000
Black Rock Desert	McDermitt Creek Reservoir	T47N-R37E	1,760	327	39,000	69,000	108,000
Humboldt River	Devil's Gate Reservoir	T38N-R57E	1,640	440	47,900	71,800	167,600
	Hylton Reservoir	T32N-R55E	3,750	700	127,600	191,400	446,600
	Rock Creek Reservoir	T35N-R47E	3,500	1,180	30,000	47,000	71,000
	Vista Reservoir	T39N-R60E	1,650	540	16,100	24,100	56,300
Carson River	Watasheamu Reservoir	T10N-R20E	1,300	530	63,000	111,000	175,000
Walker River	Hudson Reservoir	T11N-R24E	800	320	8,000	13,000	19,000
Central	Birch Creek Reservoir	T18N-R44E	10	10	800	1,400	2,100
	Roberts Creek Reservoir	T22N-R50E	16	16	2,000	3,200	4,860

**TABLE 35**  
**EXISTING RESERVOIRS USED IN PROJECTION OF USE AT PROPOSED RESERVOIR SITES**

County	Name of Reservoir	Size (Acres)	1970 Estimated Use (Visitor-Days)	1970 Visits Per Acre	Percent Increase Per Year Past Five Years	Percent Increase Per Year Next Five Years
Douglas	Topaz Lake	2,400	50,000	21	20	20
Eureka	Ardan's Reservoir	1	44	44	1	1
	Tonkin Reservoir	4	1,505	376	15	15
Humboldt	Bilk Creek Reservoir	110	115	1	50	50
	Knott Creek Reservoir	98	3,200	33	40	40
	Onion Valley Reservoir	101	500	5	100	100
Lander	Grove Lake	16	324	20	20	20
	Willow Creek Reservoir	1	950	950	10	5
Lyon	Fort Churchill Ponds	200	1,614	8	50	10
	Hunewill Reservoir	12	400	33	0	0
	Lahontan Reservoir	10,000	125,000	13	10	10
Washoe	Red Mountain Reservoir	30	100	3	0	0
	Squaw Creek Reservoir	48	500	10	2	1
	Wall Canyon Reservoir	133	100	1	0	20

Duck Valley Indian Reservation, Sheep Creek Reservoir



## PROBLEM AREAS

In spite of the high percentage of public lands in Nevada, there exist many problems involving the maintenance of quality waters for recreation. Problems exist concerning access to public water sources and public lands, and proper planning and zoning for outdoor recreation. Water rights for fish and wildlife and for other outdoor recreation areas are also an important problem. These and other difficulties will be discussed in the following sections.

### WATER QUALITY

The quality of Nevada's waters for outdoor recreation purposes was estimated on a scale of 1 to 4, with 1 equal to excellent for recreation and 4 equal to poor. These ratings are shown in Appendix C, with a detailed description of the rating system used.

The quality of some of Nevada's major recreation waters presents a serious problem. Lake Tahoe, on the Nevada-California border, is world renowned for its purity and clarity. However, with the large population increases of the last few years in the Tahoe Basin the potential for water quality degradation has increased. The erosion of soil into the lake from land developments and the problem of sewage disposal are but two of the problems facing land planners of the Tahoe basin. With the creation of a regional planning agency and other measures to bring management of the two-state area under one authority, progress is being made toward the preservation of the quality of Lake Tahoe's waters.

Equally important are the terminal lakes in Nevada, especially Pyramid and Walker. With much of the natural flow into these lakes diverted for upstream uses, the surface areas have been steadily decreasing. With a further decrease in the size of these lakes, their salt concentrations will increase to the point where fish will no longer be able to live. This will be a serious loss in terms of the quality of recreational activity as these lakes support the Lahonton Cutthroat Trout which grows to a large size.

Walker Lake is projected to be unable to support fish life by approximately the year 1990 if existing trends in increasing salinity continue. Pyramid Lake, on the other hand, due to a slower rate of decline, is not projected to reach critical salinity levels until well beyond the study period. While it may not be possible to maintain these

lakes at present levels, and still provide needed water for upstream uses there might be sufficient water to maintain these lakes at a somewhat lower level while still maintaining adequate water to support the fishery. If the quality of these lakes decreases, with a drop in quantity, to a point where it is no longer possible to maintain fish, water-related recreation such as swimming, boating and water skiing would still be available. Much of the lost fishing water could be compensated for by increased use in other water areas. It would be extremely difficult however, to replace the quality fishing these two lakes currently provide.

Overgrazing of watersheds, fire and other problems have often led to serious erosion of streambeds. This will result in a loss in recreational value from a visual aspect as well as often seriously destroying the habitat for fish and wildlife.

Pollution from mining, agricultural, municipal, and industrial wastes and from sewage treatment plants can be serious problems. Much has been done to eliminate these pollution sources but there are still many problems. Notably Las Vegas Wash, the Lake Tahoe area, and the Truckee River downstream from Reno and Sparks have sewage and municipal and industrial waste problems. Even with secondary treatment of sewage effluent, the amount of dissolved phosphates and other nutrients is often still high. This can lead to rapid growth of algae the resultant loss of water quality and aesthetics.

### ACCESS TO LAKES, STREAMS AND RIVERS

Access to many of the rivers, streams and lakes in Nevada is controlled by private owners. In many cases, the landowner does not post his land and thus gives a form of approval to the recreationist. Alternatively, other landowners post their lands and in so doing, restrict public access to public lakes and streams. The recreationist is often faced with the alternative of trespassing on private land to reach a water body or not utilizing that body of water.

Landowners often have good reason for restricting recreationists from crossing their land. A small minority of recreationists are often guilty of littering, vandalism, leaving gates open for stock to wander, and even verbal abuse of the landowner or his family. For these reasons, many lands which were previously not posted are currently posted. A large recreation benefit could be realized by acquiring access to the limited water bodies in Nevada while protecting or reimbursing the landowner

for the use of his property.

There are several alternatives available to government and private groups and agencies concerned with outdoor public recreation. These include outright purchase of access property, acquiring easements for access and leasing of property for access. Another method would be to allow for deferred or reduced taxes for access to land for recreational use.

### **ACCESS TO PUBLIC LANDS**

A problem also exists with respect to gaining access to public lands through private land. Landowners are restricting access across their property because of past misuse by recreationists. As a result, some of the public domain is unavailable to recreationists. Solutions similar to those for access to water resources appear to be the most feasible.

### **SUBDIVISION PLANNING FOR OUTDOOR RECREATION**

In much of Nevada's urban areas, there is a void of neighborhood recreational facilities. The State Legislature recently passed a bill which is designed to provide areas for recreational use in each new subdivision above a certain size.

### **WILD AND SCENIC STREAMS AND RIVERS**

Nevada has several streams and a few rivers which are particularly scenic and beautiful in their present condition. There is some concern about preserving these streams in their natural state even if it means precluding other uses. The Truckee River is a very scenic river although it has been altered considerably by diversionary structures. These structures divert water for irrigation and hydroelectric power generation which causes the river to fluctuate considerably in water volume over much of its length.

The desire to preserve the wild and scenic qualities of these areas is strong in most Nevadans, but it is not practical to restore a developed stream such as the Truckee to its original state. A better solution might be to try and preserve a selected few streams which are currently unspoiled, and, wherever feasible, try to reclaim and enhance streams such as the Truckee.

### **FLOODPLAIN ZONING**

Another problem regarding mainly streams and rivers is one of floodplain zoning. The major problem is one of allowing unrestricted building of residential and industrial developments in the area adjacent to streams and rivers resulting in a loss of potentially desirable recreational areas for the general public.

A possible solution to this problem would be to zone the floodplain immediately adjacent to rivers and large streams as green belt or extensive use areas for such things as agriculture, recreation and fish and wildlife. Recreational activities could include boating, fishing, riding, hiking and bicycle trails, swimming and outdoor sports. This belt might range from 100 feet wide to any width deemed feasible.

### **NEEDS FOR RECREATIONAL FACILITIES IN URBAN AREAS**

The demand for outdoor recreation is inversely related to distance. The greatest need for recreational facilities is generally in the urban areas close to the users. For the general well-being of its citizens, urban areas should strive to provide adequate outdoor recreational facilities.

Much of the public domain surrounding or interspersed in the larger cities in Nevada should be retained for urban recreational use except where such a policy restricts the orderly development of the city. Part of Nevada's heritage is the open spaces even near its towns and cities which provide the urban dwellers an opportunity to engage in recreational activities which require large areas at a reasonable distance from his residence.

Most primary and secondary schools have reasonable areas for playgrounds, ballfields and other recreational areas. With proper planning, these areas could be enlarged and incorporated into recreational complexes for the community at large. This would result in a benefit to the school and the community. An example might be placement of swimming pools or gymnasiums in public schools. The school children could use it during the regular school term and the community could use it during evenings and nonschool periods.

### **WATER RIGHTS FOR WILDLIFE**

Most of Nevada's wildlife are well suited to Nevada's dry climate. Traditionally, these birds and animals have watered at the many streams, springs and seeps that

occur at random intervals across the State. The problem which often occurs especially regarding springs and seeps is that the waters from these sources are appropriated for other uses and is either diverted to other areas or developed in such a way that wildlife can no longer utilize it. The water requirements of wildlife are often ignored and many times they are forced to abandon the area.

Wildlife in most cases do not require a great quantity of water. Therefore, a possible solution to the problem might be for legislation requiring a small amount of water be provided for the wildlife at its source. Better cooperation with appropriators and water users might also help this problem. This is not to preclude development for other beneficial uses, but to provide water for wildlife as well.

### **WATER RIGHTS FOR OUTDOOR RECREATION AREAS**

Many outdoor recreation sites do not use water consumptively, but are quite dependent upon a water source for the esthetic value of the site. The beaches at Lake Mead, Tahoe and Mohave are all in this category as are campsites along a stream. Without water, these sites would have much less recreational appeal. The question of water rights for these areas is similar in scope to the question of minimum flow for fishing streams discussed in the following section. Additionally there is the problem of determining the incidence of costs and benefits associated with reallocation of water.

### **MINIMUM FLOWS AND MINIMUM POOLS FOR STREAMS AND LAKES**

Streams and lakes used for recreational purposes should be protected against being dried up from full use of their waters for non-recreational uses. A minimum flow or minimum pool concept should be established to maintain the stream or lake at a level sufficient for recreational purposes. Some form of legal framework which would allow new water rights for minimum flows and pools could be established to protect those lakes and streams not already fully appropriated. In some cases maintenance of minimum pools and minimum flows are often conflicting goals.

Pyramid Lake



APPENDIX

Survey No. \_\_\_\_\_

RECREATIONAL WATER USE SURVEY  
 DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS  
 UNIVERSITY OF NEVADA, RENO  
 CONFIDENTIAL

Survey By \_\_\_\_\_

Submitted By \_\_\_\_\_  
 Name Agency and Address Date

DO NOT WRITE  
 IN THIS SPACE

1. Name of Area \_\_\_\_\_ [ ] Improved for Recreation  
 [ ] Unimproved for Recreation

2. Location:

Twp. \_\_\_\_\_ Range \_\_\_\_\_ Sec. \_\_\_\_\_ Hydrographic Area \_\_\_\_\_

County \_\_\_\_\_ Hydrographic Region \_\_\_\_\_

City (if in city or town) \_\_\_\_\_

Distance \_\_\_\_\_ Direction \_\_\_\_\_ From Nearest Town \_\_\_\_\_

3. Administering Agency \_\_\_\_\_

4. Ownership:

[ ] Federal \_\_\_\_\_ [ ] County \_\_\_\_\_ [ ] Private \_\_\_\_\_

[ ] State \_\_\_\_\_ [ ] City \_\_\_\_\_ [ ] Other \_\_\_\_\_

5. Size:

Acres of Water \_\_\_\_\_ Total Acres \_\_\_\_\_ Miles of Stream \_\_\_\_\_ Size of Spring \_\_\_\_\_

Acres of Land \_\_\_\_\_

6. Access to Area \_\_\_\_\_ Distance from Highway No. \_\_\_\_\_

[ ] Road [ ] Water [ ] Trail \_\_\_\_\_ Miles, \_\_\_\_\_ Direction

7. Total Number of Visitors (Visitor-Days)\*

Year	Day Visits (Number)	Overnight Visits (Number)
------	---------------------	---------------------------

_____ Non-resident	_____ Non-resident
--------------------	--------------------

_____ Resident	_____ Resident
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_____ Total	_____ Total
-------------	-------------

[ ] Count	[ ] Count
-----------	-----------

[ ] Estimate	[ ] Estimate
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Comments \_\_\_\_\_

8. Percent of Attendance Each Season (% of yearly visits)

Summer (J, J, A)

Winter (D, J, F)

\_\_\_\_\_ Resident  
 \_\_\_\_\_ Non-resident  
 \_\_\_\_\_ % of Capacity

\_\_\_\_\_ Resident  
 \_\_\_\_\_ Non-resident  
 \_\_\_\_\_ % of Capacity

Fall (S, O, N)

Spring (M, A, M)

\_\_\_\_\_ Resident  
 \_\_\_\_\_ Non-resident  
 \_\_\_\_\_ % of Capacity

\_\_\_\_\_ Resident  
 \_\_\_\_\_ Non-resident  
 \_\_\_\_\_ % of Capacity

\*Day Visits - Count each person who visits or uses area for any length of time during day but does not stay overnight.

Overnight Visits - Count each person who stays overnight, one night - a three night stay counts as three overnight visits.



13. Recreation Activities (Rank 1, 2, 3, and check all others existing - check water use group.)

DO NOT WRITE  
IN THIS SPACE

	Rank	Consump. Use	Non-Consump. Use	No Use
Driving for Pleasure	_____	_____	_____	_____
Swimming	_____	_____	_____	_____
Water Skiing	_____	_____	_____	_____
Skin Diving	_____	_____	_____	_____
Fishing	_____	_____	_____	_____
Boating (motor)	_____	_____	_____	_____
Boating (no motor)	_____	_____	_____	_____
Picnicking	_____	_____	_____	_____
Camping (tent)	_____	_____	_____	_____
Camping (trailer)	_____	_____	_____	_____
Camping (group)	_____	_____	_____	_____
Nature Study	_____	_____	_____	_____
Golf	_____	_____	_____	_____
Bicycling	_____	_____	_____	_____
Horseback Riding	_____	_____	_____	_____
Hiking & Walking	_____	_____	_____	_____
Mountain Climbing	_____	_____	_____	_____
Relaxing Outdoors	_____	_____	_____	_____
Hunting (big game)	_____	_____	_____	_____
Hunting (small game & waterfowl)	_____	_____	_____	_____
Ice Skating	_____	_____	_____	_____
Snow Skiing	_____	_____	_____	_____
Snow Play (sledding etc.)	_____	_____	_____	_____
Playing Games	_____	_____	_____	_____
Viewing Outdoor Sports	_____	_____	_____	_____
Drama & Concerts	_____	_____	_____	_____
Other (specify)	_____	_____	_____	_____
Other (specify)	_____	_____	_____	_____

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14. Use Trends

Annual use during the last 5 years has:

Increased     Decreased

Approximately \_\_\_\_\_ percent per year.

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15. Changes in area during last 5 years:

Improved     Declined     Same

What changes have occurred? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

---

16. Anticipated future use:

Increase     Decrease     Same

Approximately \_\_\_\_\_ percent per year.

What is the basis for this projection? \_\_\_\_\_

\_\_\_\_\_

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17. Developed Recreation Facilities in Area

DO NOT WRITE  
IN THIS SPACE

Recreation Facility	Area		Units of Measurement	Number of Units
	Area	Number of Sites		
Swimming Beach	Ac. & Lgth.	_____		_____
		_____		_____
Swimming Pool	sq. ft.	_____		_____
Picnic	Acres	_____	Tables	_____
Boat Access	Acres	_____	Parking Sp./Ramps	_____
Marina	Acres	_____	slips & moorings	_____
Tent Camp	Acres	_____	tent spaces	_____
Trailer Camp	Acres	_____	trailer spaces	_____
Drinking Water		_____	outlets	_____
Parking Facil.	Acres	_____	parking spaces	_____
Group Camping	Acres	_____	number of persons	_____
Ice Skating	Acres	_____		_____
Ski Slope	Acres	_____	lift capacity/hour	_____
Snow Play	Acres	_____		_____
Golf Course	Acres	_____	number of holes	_____
Designated Trails	Miles	_____		_____
Nature Centers		_____		_____
Other (Specify)		_____		_____
Other (Specify)		_____		_____

18. What are the plans for future development? \_\_\_\_\_

[ ] Positive    [ ] Tentative    [ ] Projected  
By what year? \_\_\_\_\_

19. Comments (Indicate item number for clarification)

## BIBLIOGRAPHY

1. Beeler, Donald H. *Recreation Use of the Proposed Upper Humboldt Reservoirs*. Report to the Elko County Recreation Board, Reno: University of Nevada, Reno, College of Agriculture, Division of Agriculture and Resource Economics, June 1972.
2. Brewer, Durward and Glenn A. Gillespie. *Socio-economic Factors Affecting Participation in Water-Oriented Outdoor Recreation*. Washington, D. C.: U. S. Department of Agriculture, 1969.
3. Buechner, Robert D. *National Park Recreation and Open Space Standards*. Washington, D. C.: National Recreation and Park Association, 1970.
4. California Region Framework Study Committee for Pacific Southwest Interagency Committee, Water Resources Council. *Comprehensive Framework Study California Region, Appendix XII, Recreation*. 1970.
5. Clawson, Marion. "The Crisis in Outdoor Recreation." Reprinted from *American Forests*. 1959.
6. Clawson, Marion and Jack L. Knetsch. *Economics of Outdoor Recreation*. Baltimore: The Johns Hopkins Press, 1966.
7. Cochran, G. F., D. R. Fitzsimmons, J. R. Garrett and G. S. Watson. *Quality of Water Consideration in Arid Area Water Management*. Center for Water Resource Research, Desert Research Institute, Technical Report Series HW, Hydrology and Water Resources Publication 14, February 1972.
8. Crapo, Douglas and Michael Chubb. *Recreation Area Day-Use Investigation Techniques: Part I A Study of Survey Methodology*. East Lansing, Michigan: Michigan State University, 1969.
9. Department of the Army. *Estimating Initial Reservoir Use*. Washington, D. C.: U. S. Army Engineer District, 1969.
10. Dyer, A. Allen and R. S. Whaley. *Predicting Use of Recreation Sites*. Logan, Utah: Utah State University, 1969.
11. *Evaluation Standards for Primary Outdoor Recreation Benefits*. Washington, D. C.: Ad Hoc Water Resources Council, 1964.
12. Fanucchi, Richard. *The Development and Application of Methodology to Determine Marine Fuel Taxes Paid by Boaters in Nevada*. Masters' Thesis. Reno: University of Nevada, Reno, 1972.
13. *Federal Register*. Vol. 36, No. 245. December 21, 1971.
14. Fight, Roger. *Techniques for Estimating Recreation Demand*. University of Wisconsin: Center for Resource Policy Studies and Programs, School of Natural Resources, College of Agricultural and Life Sciences, 1969.
15. Fitzsimmons, David R. "The Price Elasticity of Water and the Uses and Values of Effluent Water in the Las Vegas Valley." Unpublished Masters' Thesis. Reno: University of Nevada, Reno, 1972.
16. Frantz, Theodore C. and Donald J. King. *Stream and Lake Survey Completion Report*. Reno: Nevada Fish and Game Commission, 1958.
17. Gillespie, Glenn A. *Water-Oriented Outdoor Recreation*. Columbia; U. S. Department of Agriculture, 1967.
18. Gillespie, Glenn A. and Durward Brewer. *An Econometric Model for Predicting Water-Oriented Outdoor Recreation Demand*. Washington, D. C.: U. S. Department of Agriculture, 1969.
19. Hofe, G. Douglas, Jr. *The 1970 Survey of Outdoor Recreation Activities Preliminary Report*. Washington, D. C.: Bureau of Outdoor Recreation, Department of the Interior, 1972.
20. Kalter, Robert J. and Lois E. Gosse. *Outdoor Recreation in New York State: Projections of Demand, Economic Value and Pricing Effects for the Period 1970-1985*. Cornell University: New York State College of Agriculture, 1969.
21. Lower Colorado Region State-Federal Interagency Group for the Pacific Southwest Interagency Committee. *Lower Colorado Region Comprehensive Framework Study, Appendix XII, Recreation*. 1970.
22. McCurdy, Dwight R. *A Manual for Measuring Public Use on Wildlands — Parks, Forests and Wildlife Refuges*. Carbondale, Illinois: School of Agriculture, Southern Illinois University, 1970.
23. McNeely, John G., Jr. *Economic and Institutional Aspects of Water Transfers in Northwestern Nevada*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1971.
24. McNeely, John G., Jr. and Richard Fanucchi. *The Development and Application of Methodology to Determine Marine Fuel Taxes Paid by Boaters in Nevada*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1972.

25. Myles, George A. *Effect of Quality Factors on Water-Based Recreation in Western Nevada*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1970.
26. Myles, George A. *Participation in Water-Based Recreation by Nevada Residents and Tourists*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1969.
27. Myles, George A. *Statistical Appendix*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1968.
28. Myles, George A. *Water-Based Recreation in Nevada, Mead and Mohave*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1966.
29. Myles, George A. *Water-Based Recreation in Nevada, Tahoe*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1966.
30. Myles, George A. *Water-Based Recreation in Nevada, Western Desert and Northern Lakes*. Reno: Agricultural Experiment Station, Max C. Fleischmann College of Agriculture, University of Nevada, Reno, 1967.
31. Nevada Department of Conservation and Natural Resources, Nevada State Parks System. *Boating in Nevada*, 1968.
32. Nevada Department of Fish and Game. *Angler's Guide to Eastern Nevada*, 1969.
33. Nevada Department of Fish and Game. *Angler's Guide to Northeast Nevada*, 1969.
34. *One-Third of the Nation's Land — A Report to the President and to the Congress by the Public Land Law Review Commission*. Washington, D. C.: Superintendent of Documents, U. S. Government Printing Office, 1970.
35. *Outdoor Recreation for America — A Report to the President and to the Congress by the Outdoor Recreation Resources Review Commission*. Washington, D. C.: Superintendent of Documents, U. S. Government Printing Office, 1962.
36. *Outdoor Recreation — Water-Based Recreation*. Washington, D.C.: National Association of Counties' Research Foundation.
37. Pacific Northwest River Basins Commission, Columbia-North Pacific Region. *Recreation, Appendix XIII*, June 1971.
38. Pacific Southwest Inter-Agency Committee, Water Resources Council. *General Program and Alternatives, Appendix XVIII, Great Basin Region Comprehensive Framework Study*, 1971.
39. Pacific Southwest Inter-Agency Committee, Water Resources Council. *Land Resources and Use, Appendix VI, Great Basin Region Comprehensive Framework Study*, 1971.
40. Pacific Southwest Inter-Agency Committee, Water Resources Council. *Recreation, Appendix XII, Great Basin Region Comprehensive Framework Study*, 1971.
41. Report to the Outdoor Recreation Resources Review Commission by Commission Staff. "Prospective Demand for Outdoor Recreation." 1962.
42. Report to the Outdoor Recreation Resources Review Commission by Commission Staff. "Public Outdoor Recreation Areas — Acreage, Use, Potential." 1962.
43. State of Nevada, Department of Conservation and Natural Resources. *Directory of Federal and State Agencies Operating in the Field of Water and Related Land Resources*. July 1967.
44. State of Nevada, Department of Conservation and Natural Resources. *Inventory of Printed Information and Data Pertaining to Water and Related Resources of Nevada*, October 1967.
45. State of Nevada, Department of Conservation and Natural Resources. *Recreation in Nevada, Part I*, 1965.
46. State of Nevada, Department of Conservation and Natural Resources. *Recreation in Nevada, Part II*, 1965.
47. State of Nevada, Department of Conservation and Natural Resources, Division of Water Resources. *Estimated Water Use in Nevada, 1950-56*. 1968.
48. State of Nevada, Department of Conservation and Natural Resources, Division of Water Resources. *Estimated Water Use in Nevada, Planning Report No. 2*, 1971.
49. State of Nevada, Department of Conservation and Natural Resources, Division of Water Resources. *Guidelines for Nevada Water Planning, Planning Report No. 1*, 1971.

50. State of Nevada, Department of Conservation and Natural Resources, Division of Water Resources. *Nevada's Water Resources, Planning Report No. 3, 1971.*
51. State of Nevada, Department of Conservation and Natural Resources, Division of Water Resources. *Population Projections, 1971.*
52. State of Nevada, Department of Conservation and Natural Resources, Division of State Parks. *Recreation in Nevada, Part III, 1971.*
53. State of Nevada, Department of Fish and Game. *Fish and Game Angler Pressure, 1971.*
54. State of Nevada, Department of Highways, Planning Survey Division. *1970 Annual Traffic Report — Nevada Highways, 1970.*
55. State of Nevada, Department of Highways, Planning Survey Division, Cartographic Section. *Directory of Geographic Names, 1971.*
56. State of Nevada, State Engineer's Office. *Common Methods of Measuring Water as Practiced in Western States, 1965.*
57. Steel, Robert G. D. and James H. Torrie. *Principles and Procedures of Statistics with Special Reference to the Biological Sciences*, New York, Toronto and London: McGraw-Hill Book Company, Inc., 1960.
58. Thiem, Warren. *Wildhorse Reservoir General Recreation Site Development*, Reno: University of Nevada, Reno, 1970.
59. U. S. Department of Agriculture, Forest Service. *A Model for the Determination of Wildland Resource Values*, Washington, D. C., June 1971.
60. U. S. Department of the Interior, Bureau of Land Management, Nevada State Office. *1971 Nevada Land Statistics, 1971.*
61. U. S. Department of the Interior, Bureau of Outdoor Recreation. *Developing America's Outdoor Recreation Opportunities: Campgrounds, 1972.*
62. U. S. Department of the Interior, Bureau of Outdoor Recreation. *Outdoor Recreation Space Standards, 1967.*
63. U. S. Department of the Interior, Bureau of Outdoor Recreation. *Selected Outdoor Recreation Statistics 1971, 1971.*
64. U. S. Department of the Interior, Bureau of Outdoor Recreation. *Sources of Assistance for Developing: Boating Facilities, 1972.*
65. U. S. Department of the Interior, Bureau of Outdoor Recreation. *The 1965 Survey of Outdoor Recreation Activities, 1972.*
66. U. S. Department of the Interior, Geological Survey in cooperation with the State of Nevada. *1970 Water Resources Data for Nevada, Parts I and II, 1971.*
67. U. S. Senate. *Policies, Standards, and Procedures in the Formulation, Evaluation, and Review of Plans for Use and Development of Water and Related Land Resources.* Senate Document No. 97, 87th Congress, 2d Session, May 29, 1962.
68. U. S. Water Resources Council. *Evaluation Standards for Primary Outdoor Recreation Benefits.* Supplement No. 1 to Senate Document No. 97, 87th Congress, June 4, 1964.
69. U. S. Water Resources Council. *Procedures for Evaluation of Water and Related Land Resource Projects*, Report to the Water Resources Council by the Special Task Force, June 1969.
70. U. S. Water Resources Council. *Standards for Planning Water and Land Resources*, Report to the Water Resource Council by the Special Task Force, June 1970.
71. U. S. Water Resources Council. *Guidelines for Implementing Principles and Standards for Multiobjective Planning of Water Resources*, Review Draft, December 1972.
72. Woody, Jack B. *Recreational Use of Isolated Rangelands in Northwestern Nevada*, Masters' Thesis, Reno: University of Nevada, Reno, 1968.

Liberty Lake, Ruby Mountains



