

CHAPTER 2. BACKGROUND INFORMATION

Environmental data, current use levels, projections for future Canyon use levels, carrying capacities, and suitability analysis provided a foundation for this planning process. This information is briefly summarized in this chapter. More detailed information is compiled in documents listed on page 12 and available at the County Planning Division.

ENVIRONMENTAL INFORMATION

The following basic canyon environmental characteristics are displayed on maps available for inspection at the Salt Lake County Planning Division. These characteristics affect the suitability of terrain for different uses.

HYDROLOGY AND WATER QUALITY - The Wasatch mountains serve as a high quality, dependable water source for the Salt Lake Valley, thus establishing water quality as a dominant planning consideration. A Canyon hydrologic data map delineates all drainages in the plan area, water bodies, and springs. Water quality in the Wasatch canyons, with the exception of Emigration Canyon is excellent, well above State and Federal standards. Coliform bacteria is often used for a broad water quality parameter for planning purposes. In general, coliform levels have undergone notable year-to-year fluctuations making the establishment of a trend difficult. Recent changes in the Federal Clean Water Act and Safe Drinking Water Act, and their implementation at the local level, may bring additional controls over sources of water quality degradation.

All segments of streams in the Plan area have been designated by the State under the Clean Water Act for antidegradation, which means Canyon policies must prevent any water quality degradation.

SOIL DATA - Soil is a restrictive physical element in determining land-use potential from an engineering standpoint and in achieving watershed protection. Soil conditions considered for use suitability included: water table, rock outcrop, bedrock depths, soil shrink and swell, erosion potential, salt or alkali affect, soil permeability, water runoff potential, and susceptibility to hillside slippage.

SLOPE DATA - Slope is an important consideration in canyon planning for both mitigation of erosion from development and determining suitability for recreation uses. A canyons slope map delineates slope categories at 10 percent intervals, correlating to development restrictions and avalanche considerations. Under the provisions of the Salt Lake County Hillside Protection Zone and Forestry Zones, only areas with slopes less than 30 percent are considered as having development potential.

LANDSLIDE DATA - Due to the steepness of terrain, distribution of sensitive soils and relatively high rates of precipitation, the Wasatch Canyons experience landslide events including rock falls, slides, slips, and debris flows. The Landslide Data map delineates known paths of historic slides and best estimated run-out paths.

SEISMIC SLOPE STABILITY - Most of the Plan area is east of the active fault lines of the Wasatch Fault system. Because seismic slope stability data is not available for about 70 percent of the plan area, this factor was not included in planning suitability analysis.

AVALANCHE DATA - Avalanches in the Wasatch Canyons pose a great threat to life and property, and are an important Canyon planning consideration. Avalanches affect day-to-day winter road operations and restrict areas suitable for backcountry winter recreation. The Avalanche Data map delineates known avalanche paths. Although factors other than those reflected on the map play a part in avalanche forecasting, it was beyond the scope of this plan to implement a more complex avalanche model.

CLIMATIC DATA - Utah's climate is determined by its distance from the equator, its elevation above sea level, the location of the state with respect to the average air flow paths from the principal moisture sources of the area, namely, the Pacific Ocean and the Gulf of Mexico, and the mountain ranges in the western United States, particularly the Sierra Nevada, Cascades and the Rocky Mountains. As moist air is forced to rise over these high mountains, a large portion of the original moisture falls as precipitation. Thus the prevailing westerly air currents reaching Utah are dry, resulting in light precipitation over most of the state. The Great Salt Lake has a modifying effect on Wasatch storms, increasing precipitation intensity. Annual precipitation ranges from 14 inches annually in the valley up to 42 inches in the high mountains.

VEGETATION DATA - Vegetation distribution in the Wasatch Canyons follows belts or life zones which correlate to slope, elevation and soil types. A number of studies have been completed for individual canyons within the study area.

The Wasatch Canyons Characteristics document briefly describes vegetation distributions for the individual zone communities.

WILDLIFE DATA - Effects of human encroachment on wildlife habitat through development and recreation use is an important consideration in the planning process. The Utah Division of Wildlife Resources provided data on critical wildlife habitats in the Wasatch Canyons. Wildlife habitats for mammals are generally based on seasonal climate, range conditions for browse production, and areas suitable for protecting new born of the various species.

Habitat for birds is constrained mostly by the availability of nesting areas. The Wildlife Data map delineates wildlife habitats for elk, mule deer, moose, mountain goat, mink, marten, California quail, chukar, waterfowl, blue grouse, ruffed grouse, beaver, muskrat, raptors, and Utah cutthroat trout.

USER DATA AND PROJECTIONS

Current Canyon Use Data

Because of the variety of recreational opportunities which the Canyons afford and their proximity to a major urban area, canyon recreational use is high. To appropriately analyze canyon recreation use, a historical data base of available user data was developed for the time period 1970-1987. For alpine skiing and dwelling units, data was used for the tri-canyon area of Mill Creek, Big Cottonwood and Little Cottonwood Canyons. Other use data reflects the area within the Salt Lake District of the Wasatch-Cache National Forest. (Data for some uses is available for a longer period and for other uses it is shorter and nonexistent for even others.) The data is summarized in Appendices 3 and 4.

This user data base indicates that alpine skiing is the largest use of the canyons with 1.3 million skier visits in the 1986-1987 ski season. This translates to 650,000 recreation visitor days (RVD's). (A recreation visitor day - RVD - is the Forest Service's unit of measurement and consists of one 12-hour visit or twelve one-hour visits or any combination thereof.) The next highest use is picnicking with approximately 160,000 RVD's in 1987. Following picnicking are hiking (140,000 RVDs), camping (125,000 RVDs), cross-country skiing (60,000 RVDs), snowmobiling (15,000 RVDs) and hunting (13,000 RVDs).¹

Also shown in the tables are the number of dwelling units in the tri-canyon area: 680 units currently. An additional 305 dwelling units are located in Emigration Canyon, and 90 dwelling units are located in Parleys Canyon.

¹ U.S. Forest Service Recreation Information Management System data. Cross-country skiing figures include nordic track. See Analysis of Demand document for more complete discussion.

Projections of User Data

As Salt Lake County's population continues to grow and for a number of other reasons, the demand for canyon recreational resources increases. To make wise public decisions about the future of the Wasatch Front Canyons, decisionmakers need projections of the future demand for recreational activities in the Canyons. The following is a summary of the demand analysis and accompanying demand projections for recreational uses in the Wasatch Front Canyons. A complete analysis of these demand projections is available in the technical report, Analysis of Demand for Recreation Uses in the Wasatch Front Canyons.

Despite the importance of projections, they are only informed guesses about the future based on current and past trends. Since the future is inherently uncertain, projections cannot reflect precisely what the future will entail. Instead, projections provide a sketch of what is possible and, perhaps, most likely to occur.

Many times, and in the case of this Plan, projections come in the form of a "baseline" projection. In this context, the term "baseline" refers to the future based on the existing economic and demographic trends of Salt Lake County, the Wasatch Canyons, and Utah. The baseline is not a prediction or forecast of the future but rather an attempt to depict the direction current trends are likely to take without major changes. The baseline takes into account normal economic and population growth nationally, in Utah and primarily along the Wasatch Front. These economic and demographic projections are utilized, along with other factors, to make projections of growth in Canyon uses. Critical to the development of a baseline future is the analysis of the long-term history of Wasatch Front growth and Canyon use.

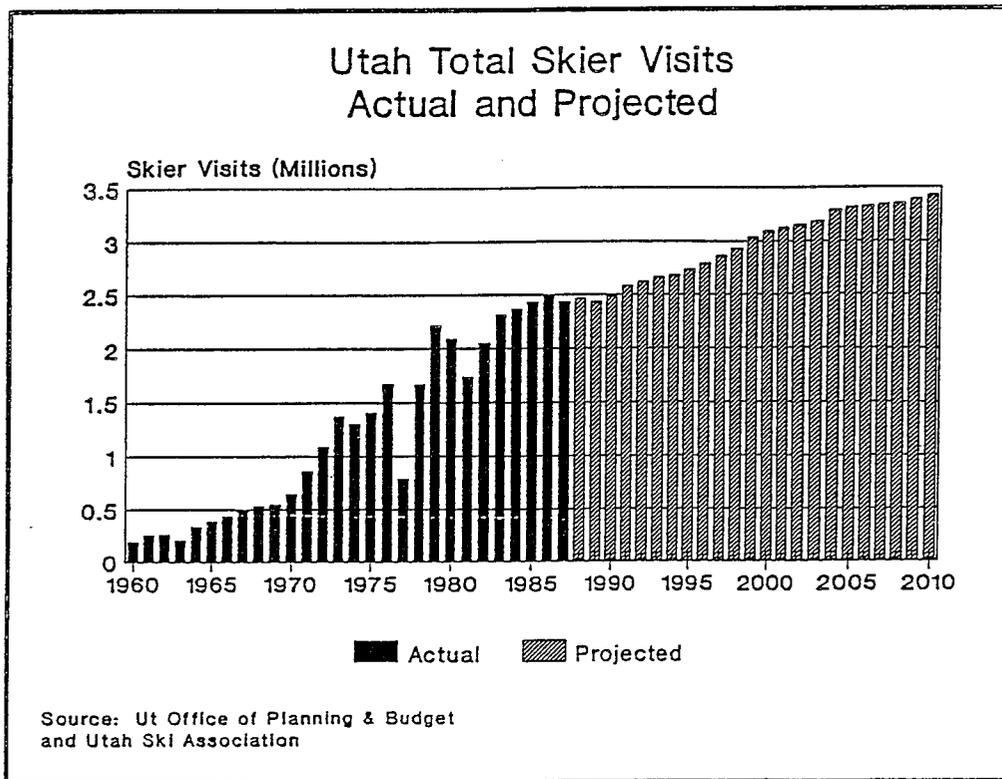
Although the baseline projections may be viewed as the most likely future because they are based on current and past trends, they are not the only reasonable projections which can be made. For example, depending on the successes of Utah's ski marketing campaigns, the accuracy of assumptions about changes at ski resorts, snow conditions, the public's preferences, and external variables such as air transportation costs and other recreation opportunities outside the canyons, these baseline projections may deviate significantly.

These user demand projections were made using linear regression modeling techniques. Many different models were tested for validity and fit, and the best models were selected. A review of past projections of recreational activities which used similar techniques showed acceptable results over time.

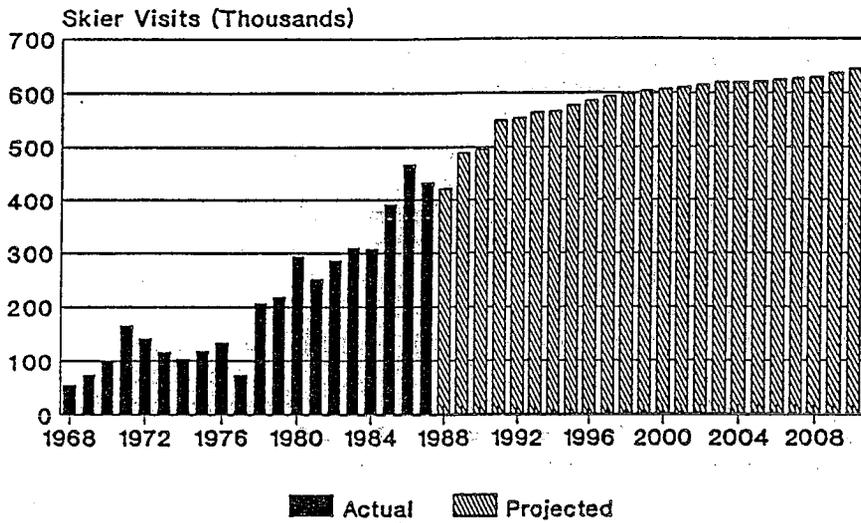
Alpine Skiing Baseline Projections

In analysis for this Plan, Skier visits in the canyons are projected to increase more rapidly than in the state as a whole. Skier visits for Big Cottonwood Canyon are projected to increase by 2.6 percent per year from 1987 to 2000 and 1.7 percent per year from 1987 to 2010. Little Cottonwood Canyon skier visits are projected to increase by an average 1.8 percent per year from 1987 to 2000 and 1.4 percent per year from 1987 to 2010. The higher rate of growth in the canyons occurs because of the close accessibility and popularity of the canyon resorts. These projections would indicate that an additional 5.4 million vertical transport feet per hour (VTF/hr.) will be installed in Big Cottonwood Canyon, and 3.8 million VTF/hr. in Little Cottonwood Canyon over the next two decades. This expansion is consistent with the development limits established in the Wasatch-Cache National Forest Land and Resources Management Plan. Appendix 4 shows these projections.

These baseline projections assume: constant relationships between the independent variables (snow conditions, ski age population, income, prices, and capacity) and skier visits; average snow conditions in the future; constant "real" lift ticket prices; and no dramatic changes from the past in relative levels of external variables (all variables not included in the model such as relative levels of ski advertising, air transport costs, lodging prices).

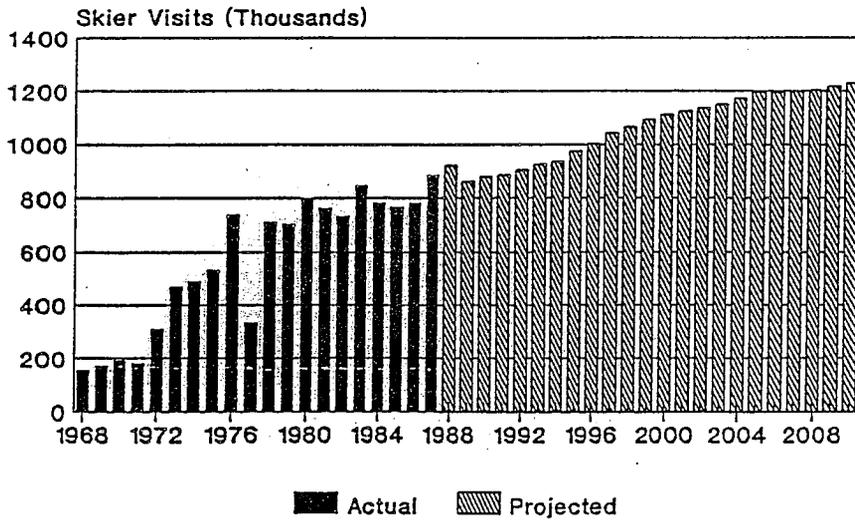


Big Cottonwood Skier Visits Actual and Projected



Sources: U.S. Forest Service
and Ut Office of Planning and Budget

Little Cottonwood Skier Visits Actual and Projected

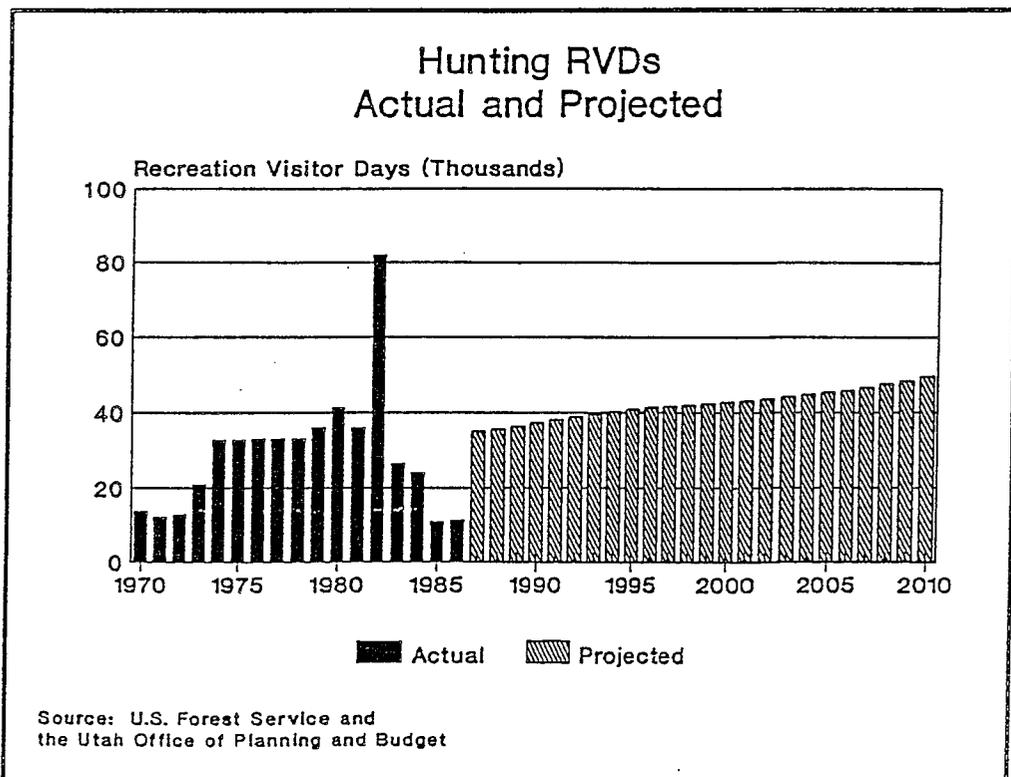


Sources: U.S. Forest Service
and Ut Office of Planning and Budget

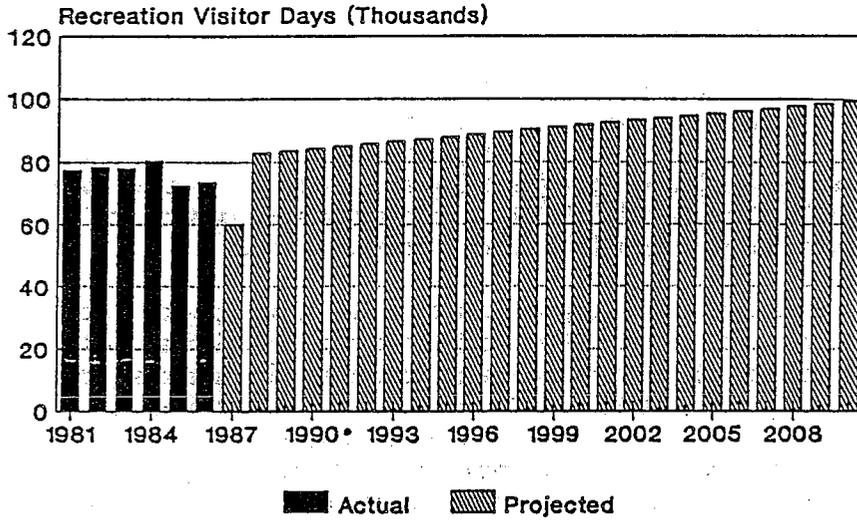
Dispersed Recreation-Baseline Projections

For dispersed recreation in the Canyons, the consultant team utilized two modeling approaches: a linear regression and a participation rate method. The linear regression approach utilized the Wasatch Front population and weather conditions as explanatory variables. The participation rate method used the entire Wasatch Front multi-county district's current and projected population as a base for establishing projections. Projections were made for recreational visitor days (RVDs) for cross-country skiing, hiking, picnicking, camping, hunting and snowmobiling.

The projections indicate that all dispersed recreation uses will experience healthy rates of growth in RVDs. Cross-country skiing projections show an average annual increase of 3.3 percent from 1987 to the year 2000. (This is a projection of total cross-country ski RVDs. It was impossible to make independent projections for the various components of cross-country skiing such as nordic track skiing.) For the period of 1987-2000, hiking is projected to grow at 1.5 percent per year, camping 1.2 percent, picnicking 1.5 percent, hunting 1.5 percent, and snowmobiling 1.5 percent. For the years 1987 to 2010, cross-country skiing is projected to increase by an average of 2.2 percent, hiking 1.5 percent, camping 1.2 percent, picnicking 1.5 percent, hunting 1.5 percent, and snowmobiling 1.5 percent. Appendix 3 provides the dispersed recreation projections.

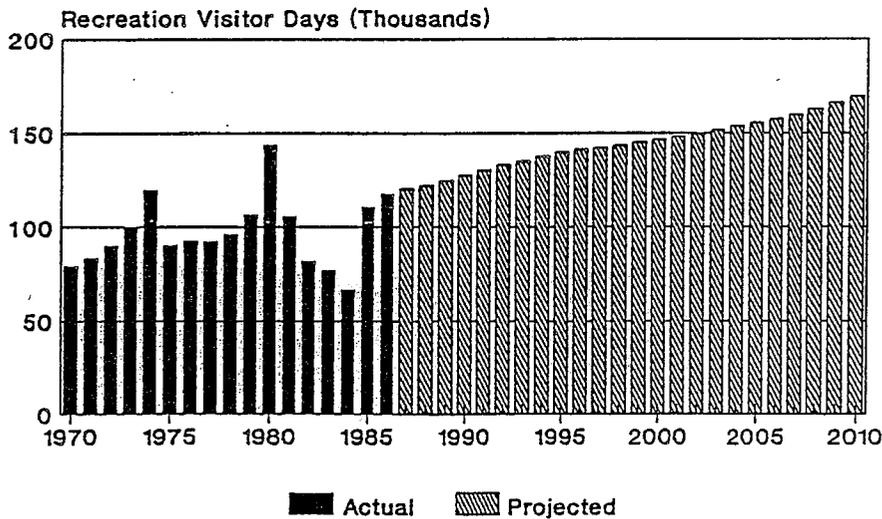


Cross-Country Skiing RVDs Actual and Projected



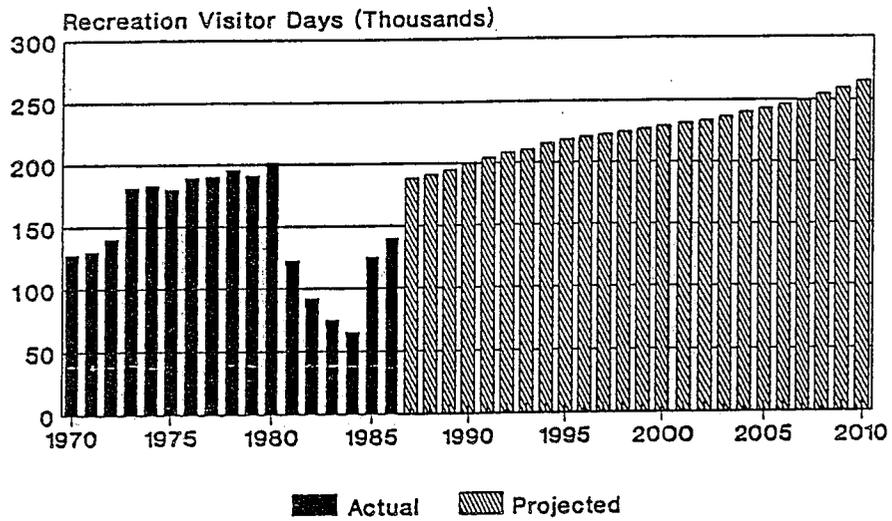
Source: U.S. Forest Service
and Utah Office of Planning and Budget

Hiking RVDs Actual and Projected



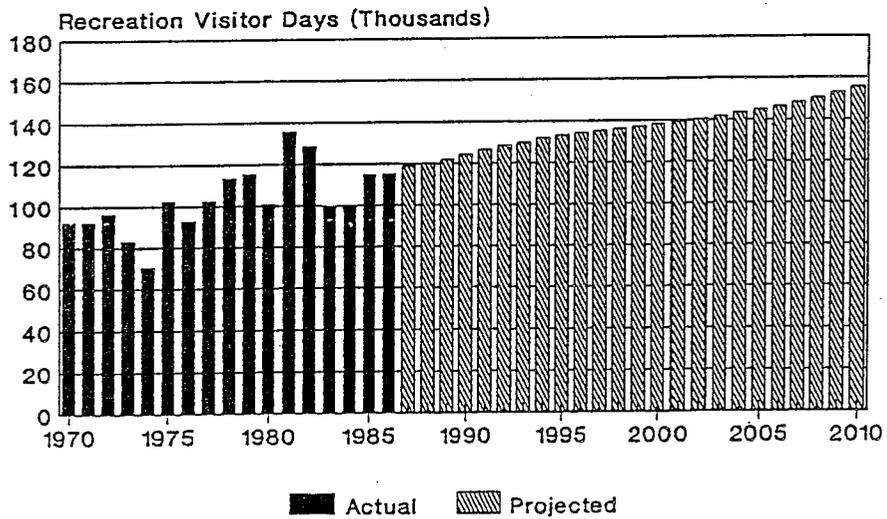
Source: U.S. Forest Service and
the Utah Office of Planning and Budget

Picnicking RVDs Actual and Projected



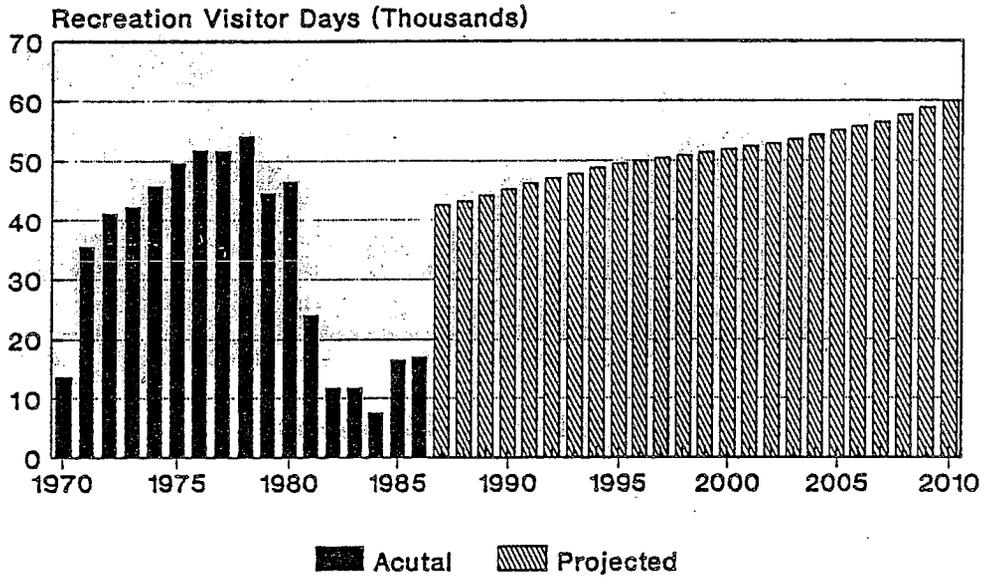
Source: U.S. Forest Service and
the Utah Office of Planning and Budget

Camping RVDs Actual and Projected



Source: U.S. Forest Service and
the Utah Office of Planning and Budget

Snowmobiling RVDs Actual and Projected



Source: U.S. Forest Service and
Utah Office of Planning and Budget

Conversions to Land Use Allocations

Once projections of future use were developed, they were converted to allocations of additional land use for the various uses. This information was then incorporated into computer mapping. The Analysis of Demand document provides more detail on methodology used in converting the projection data to acres needed to accommodate a projected future use level.

CARRYING CAPACITY OF CANYONS

Carrying capacity analysis was conducted to understand how existing canyons facilities and features are accommodating use, and where future user demands may be affected. Additional information is provided in separate documents available at the County Planning Division. Transportation carrying capacities in Big and Little Cottonwood Canyons are summarized in Salt Lake County Canyons Master Plan Analysis of Transportation Facilities for the Cottonwood Canyons. Other carrying capacity analysis is discussed in Wasatch Canyon Characteristics, Data, and Analysis.

A carrying capacity analysis rests on the relationship between human activity and the assimilative capacity of physical, cultural and environmental systems. A carrying capacity identifies system limitations and the amount of human activity that can be sustained without exceeding limitations. The consultant team established a list of "systems" which would require carrying capacity analysis. Initially, from the summary of public comments, topics and resources requiring carrying capacity analysis were defined. Many of these "systems" have established thresholds based on either an implicit system capacity or an official policy such as a public law, ordinance, or plan. The responsible agency or source for the established threshold was referenced in the analysis.

Some carrying capacity thresholds are quantitative, and others are qualitative. Quantitative thresholds express physical limits of a tangible measurement such as Average Daily Traffic (ADT) on a highway. Qualitative thresholds explain those elements which rest on human emotions and social values.

The carrying capacity analysis found that thresholds for four systems would be absolute for certain future use levels: National Forest Lands Visual Quality Objectives; water quality constraints; soil erosion potential; and limitations on water availability. For other systems, there can be more flexibility in environmental or institutional restraints.

SUITABILITY ANALYSIS

To establish parameters for the canyons' ability to absorb additional use, an evaluation of canyon terrain was made to determine where major existing canyon uses could be reasonably accommodated in the future. Through this rough determination of canyons' suitability for different uses, general areas were identified that are potentially acceptable for new uses.

Data analysis and on-site inspections were conducted to determine which areas in the Canyons may be suitable for various canyon uses including alpine skiing, nordic track skiing, backcountry skiing, residential and commercial development, developed picnic and camp sites, and parking for dispersed recreational use.

For each category of use, the kinds of factors which need to be considered to determine the suitability of a site were determined. Factors varied for different uses. Some factors absolutely control suitability; for example, elevations of less than 6,500 feet are not suitable for alpine skiing. Descriptive factors may influence the degree of suitability, but are not absolute; for example, road location is an important influence in potential future nordic track development, so roads are displayed on nordic track suitability maps.

These factors for each use were then plotted on computerized maps to graphically display which areas within the canyons were highly suitable or suitable for that use. Geographic Information System (GIS) technology, a computer information system, was used to input, manipulate and analyze geographically referenced data. For example, GIS was used to determine areas suitable for picnicking based on the suitability criteria information fed into the system and the environmental and carrying capacity data previously discussed. The acreage was calculated and use densities were determined based on established policies.

Inevitably, the scale of information addressed in these computer mapping exercises may result in site-specific errors. However, on balance, the process of overlaying factors that affect the suitability of an area for a use provides a general understanding of where and how much terrain may be suitable.

Appendix 5 provides an example (residential/commercial development) of how factors were considered in the suitability analysis. Descriptions of the suitability analysis for each major use are available for review at the Salt Lake County Planning Division.