The Value and Use of Wilderness Lands: Are They Small or Large at the Margin?

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ARE THEY SMALL OR LARGE AT THE MARGIN?

By

E. Bruce Godfrey

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ABSTRACT

Recreational use data for lands administered by the Forest Service indicate that use rates per acre declined during the decade of the 1980s from the relatively high rates of use that occurred in the 1970s. Use data for Utah are used to suggest which wilderness areas are likely to have relatively high (low) recreational use and preservation values. Economic evaluations that are based on average rather than marginal use rates and values are likely to be unduly optimistic.

INTRODUCTION

The decision to designate an area as part of the National Wilderness Preservation System (NWPS) has historically been associated with controversy (Roth 1988). Legislation introduced to designate Bureau of Land Management (BLM) lands in Utah as part of the NWPS illustrate the differences of opinion that exists. Congressman Owens' bill would designate in excess of 5 million additional acres, while Congressman Hansen's bill suggests designation of just over 1 million acres. A five-fold difference of opinion is not uncommon between those who support and oppose designation of additional lands in the NWPS. One reason for differences of opinion stems from the lack of empirical data concerning the benefits and costs of designating areas as wilderness. Therefore, these decisions will always be subjective to some degree.

Much has been written concerning the benefits of wilderness but much less has been written concerning the economic tradeoffs that may be involved in these decisions. This paper raises "some flags" that must be considered in evaluating the benefits of designations. 1

WILDERNESS DESIGNATION: THE FRAMEWORK

The basic methodology needed to evaluate the decision to include an area as part of the NWPS has been developed for some period of time and will not be discussed in this paper. Interested readers should consult one of the many references that are available (Krutilla and Fisher 1985; Hufschmidt and others 1983; Smith 1988; Bowles and Krutilla 1989; Freeman 1979). The basic methodology suggests that one must determine the benefits and costs with versus without the action proposed (designation in this case). For example, Walsh and Loomis indicated in their 1989 article (page 183) that "while society as a whole values wilderness (according to information from opinion surveys), the U.S. Congress does not debate whether to have wilderness or not but rather how many areas and where . . . . The issue is not whether to have natural areas or not but what are the [net] benefits of more or less." These evaluations require estimates of the marginal benefits and costs of adding a site(s) or amount of acreage to the NWPS.

WILDERNESS RECREATIONAL USE: AN HISTORICAL PERSPECTIVE

While the Forest Service (FS) only manages about one-third of the total NWPS lands, it manages more than 80 percent of the NWPS lands in the "lower 48." It is also the primary agency that has consistent data on recreational use over time. 2 The FS employs recreational visitor days (RVDs) as the variable that measures use. An RVD represents one person for 12 hours or an equivalent combination such as two people for six hours.

National Use Data

Data concerning recreational use 3 of FS lands

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1 The authors are Associate Professor and former graduate Research Assistant in the Department of Economics at Utah State University.
(wilderness and nonwilderness) indicates that use increased from 160 million RVDs in 1965 to more than 242 million in 1988. Most of the rapid increase in total recreational use occurred during the 1970s while use in the 1980s has been relatively stable. Similar data for wilderness lands show a more dramatic increase. Wilderness use increased from nearly 4.5 million RVDs in 1965 to 11.7 million in 1988. This increase suggests that recreational use of wilderness lands has increased. Some wilderness proponents have used this large increase in recreational use as a primary reason for justifying the designation of more areas. However, during this same period, the number of acres designated as part of the NWPS was not stable--NWPS lands administered by the FS increased from nearly 14.8 million acres in 1965 to 33.7 million in 1990. These data indicate that the percentage of land administered by the FS, that was part of the NWPS, increased more rapidly than recreational use (Figure 1)--use increased from 2 to 5 percent of total recreational use while the percentage of land increased from 8 to 18 percent. It is, therefore, necessary to account for any change in acreage when evaluating changes in wilderness recreational use over time. Evaluation of use on a per-acre basis illustrates the effect of these changes. FS data show that use of wilderness areas on a per-acre basis increased until the late 1970s and has declined since that time (Figure 2). This is one reason why some have suggested that wilderness use is declining.

While the decision to include an area(s) as part of the NWPS must be done from a national perspective, large differences in use patterns in specific areas are common. Data available for Utah illustrate some of these differences.

**Utah Use Data**

While the national data noted above suggest some interesting trends, the data for Utah provide some additional insights. Recreational use of the fifteen wilderness areas in Utah are separated into five groups: High Uintahs, Lone Peak, Wasatch Front, Cache Valley, and Southern Utah. Lone Peak was the first area officially designated as a wilderness in Utah in 1978. The High Uintahs were not (de jure) part of the NWPS until 1984 when the other areas were included in the system. But the High Uintahs have always been managed as if they were part of the system (de facto).

The recreational use data for NWPS lands in Utah shows the same general pattern (Figure 3) as that for the nation with three exceptions. First, the general level of use is greater on a per-acre basis. Second, use per acre peaked somewhat later than it did nationally. Third, there is somewhat less evidence of a decline in use--especially the last five years. There are at least two reasons that may be given for these differences. First, Utah's population has the youngest age structure of any state in the nation. As a result, a large portion of Utah's population is of an age class expected to be actively involved in strenuous outdoor activities. Second, a large portion of these areas are close to most residents of the state. This is one of the primary reasons why some areas are intensively used. For example, use of Lone Peak, which is near the world famous ski resorts Alta and Brighton, has continued to increase while use of the more remote areas has been essentially stable (Figure 4).

**DECLINING USE OF WILDERNESS?**

A combination of factors may cause the declines in use rates per acre shown in Figures 2 and 3. The following possible causes are discussed below: 1) low use rates for new/additional areas, 2) redistribution of use, and 3) declining demand.

If the use rates of newly added acres were less than those previously in the NWPS, use rates per acre would decline. Data are not readily available for all areas in the NWPS, but some indication of the possible use pattern(s) exists for the wilderness areas in Utah. The use rates per acre for areas that were added to the system in 1984 were generally less than they were for areas (Lone Peak and High Uintahs) that were already in the system. Some of the areas near the Wasatch Front had relatively high rates of use while the areas in the southern part of Utah had use rates much lower than other areas.

If use of existing wilderness areas declines when other areas are added to the system, and if the rate of use for the new areas is less than the decline in the old areas, the overall use rate per acre will decline. Lucas and Stankey (1989) have shown that total use of the original or "instant" wilderness areas (designated in 1964) increased from 1971 to 1979 but declined during the decade of the 1980s. Thus, some evidence suggests that additions to the NWPS may not result in increased total use but results in a shifting of use between areas. Data for Utah show a somewhat different pattern. When areas were added to the NWPS, use of Lone Peak did not decline but use of the High Uintahs did decline. However, recreational use of the High Uintahs was declining before the new areas were added to the system. This suggests a possible decline in demand for some existing areas (e.g., High Uintahs) that may be independent of new additions to the NWPS.

Several authors have suggested that the demand for wilderness use is declining or at least stabilizing (e.g.,
that an evaluation of wilderness designation must also consider how use in one area may affect the use of other areas. For example, Walsh and Gilliam (1982) suggest that if use in one wilderness area is occurring to the degree that this area is becoming congested, adding a new wilderness area may reduce congestion in the first area if people use the new area and reduce use of the congested area(s). If congestion is not occurring and if designation of one area results in decreased use in another area, the net increase or decrease in use [increased use of one area minus the decreased use of another area(s)] must be estimated. Obviously, if the addition of a new area(s) does not relieve congestion (reduce use) in an existing area, the additional benefits suggested by Walsh and Gilliam would not be valid. For example, data for Utah suggests that the addition of new areas has not relieved congestion of existing areas such as Lone Peak. If the addition of the new area did not increase total use, then no additional recreation benefits would occur because only a shift in use between areas occurred.

While Walsh and Gilliam (1982) emphasized how additions to the NWPS may reduce congestion in existing wilderness areas, this is only part of the recreational use interactions that one must evaluate. One must also evaluate how designation may affect nonwilderness areas. If designation of an area as a wilderness results in increased use and congestion of nonwilderness areas, the benefits of wilderness designation will be less than an evaluation based on wilderness areas alone. This suggests that wilderness planning should not consider only wilderness use and values. It also suggests that more research is needed that estimates how use may change between areas. Probable changes in use also suggest that it is essential that substitute areas must be included in valuation studies (e.g., travel cost and contingent valuation).

WILDERNESS USERS

The above discussion emphasized wilderness recreational use data, but data concerning wilderness users is also important in making management decisions. Several recent articles (see the excellent summaries by Roggenbuck and Lucas (1987); Roggenbuck (1988); Lucas (1988); Hendee, Stankey, and Lucas (1990)) have summarized the characteristics of wilderness users. These summaries suggest that most use is by people living in urban areas near their place of residence. This trend is apparently true of recreational use in Utah. Areas near the Wasatch Front are used much more heavily than are the more remote sites (Figure 4). Furthermore, use is increasing in these areas while use in the more remote sites is low and probably stable. This would suggest that areas near urban centers probably have high value for recreation at the margin.
while these values are probably low in more remote areas. However, one must remember that recreation is only one of several uses associated with wilderness lands.

**IMPLICATIONS FOR ECONOMIC EVALUATIONS**

Walsh, Loomis, and Gillman (hereafter referred to as WLG) published one of the first applications of economics to the problem of designating an area(s) as part of the NWPS. The basic results of this article are summarized in Table 1 (see also the later study by Walsh and Loomis (1989) which summarizes later work in this area).

At the time WLG was published, it was not clear that nonuse values (option, existence, and bequest) were to be included in the analysis. That question is no longer a major issue in making these kinds of decisions. However, even if the basic methodology has now been generally agreed upon, the application of this methodology is fraught with pitfalls. It is also an area where the amount of information available for these evaluations is constantly changing. While WLG provided the general framework for evaluating the benefits and costs of designating an area as wilderness, several modifications need to be made in the analysis in light of the data that are now available. The following discussion uses the same general benefits suggested by WLG—recreational use and preservation values.

**Recreational Use Values**

The estimation of recreational use values involves estimating marginal values for both the rate of use (RVDs) and the value of this use ($ per RVD). Before one can determine what modifications need to be made in the analysis outlined by WLG, one must first understand how the benefits (RVDs and $ per RVD) were estimated. Dividing the 13.2 million dollars shown for the 1.2 million acre scenario by $14 yields 943 thousand visitor days or .7857 visitor days per acre ($13.2 million/$14)/1.2 = .7857 RVDs per acre). Similar data for the other acreages are .5759, .4729, and .4157 RVDs per acre for the 2.6, 5.0, and 10.0 million acre scenarios. These data suggest a declining use rate per acre for the areas being added to the system, but the rate of decline is not nearly as fast as the decline in use rates for the nation (Figure 2) or Utah (Figure 3). It should also be noted that the use rates per acre used by WLG are higher than they are for the nation as a whole. Not once in the 26-year period (1964 to 1988) did the use rates per acre for the nation get as high as .57 RVDs per acre. But, the data for Utah shows that use rates per acre for some areas (e.g., Lone Peak) may be much higher than the average, while use rates in remote areas tend to be low (e.g., the Southern Utah wilderness areas). One must, therefore, carefully evaluate what level of use is likely to occur in the area(s) being considered for designation before the marginal benefits of recreation can be determined. If the areas being considered for designation are "remote," use rates are likely to be relatively small. As a result, aggregate recreational benefits are likely to be small, unless the value of an RVD of use in remote areas is higher than it is for other areas.

Two other use-related considerations must be included in the above analysis before one can determine the marginal recreational benefits of designation. Some recreation will likely occur in most areas being considered for designation even if the area is not designated as part of the NWPS. One must determine what difference in recreation use would occur (with versus without designation) before the marginal recreational benefits can be determined. In addition, the impact of designation on the recreational use of other areas (wilderness and nonwilderness) must be estimated because designation decisions are to be made from a national perspective. These considerations suggest that there is potential to significantly overestimate the recreational benefits of wilderness designations unless these use relationships are specifically evaluated for each area being considered even if one has a "good" estimate of the value of use.

Some studies that have estimated wilderness recreational use values ($ per RVD) have based these estimates on a sampling of residents in a state or area. It is likely that this would underestimate the potential benefits if a large portion of the visitors were from areas not included in the sample. However, as the surveys of wilderness users have shown, most users are from the local area. As a result, surveys that include only locals (residents) may not be as biased downward as some have suspected.

While it is beyond the scope of this paper, one must use care in evaluating the values placed on RVDs of recreation. Some (most?) of the studies that have been conducted in the past using travel cost as well as contingent valuation methods result in average, not marginal, values (this issue is discussed in Schuster and Jones (1982); Smith and Desvousges (1986)). Even if a marginal value is estimated using one of these methods, this estimate is often based on the value of existing wilderness areas and not on the value of additional acreages. Because the marginal value of an RVD is not commonly available for these types of analysis, an average value such as $14 is used. One should recognize that the use of average values will commonly result in inflated benefit estimations because values...
per RVD will generally decline at the margin as the supply is increased—especially if the demand for wilderness recreation is declining. Thus, if one uses average use rates and average values per RVD, the recreational benefits are likely to be larger than if one properly used marginal values. But, one must also recognize that recreational use of wilderness lands is only one reason why lands may be included in the NWPS.

Preservation Values

There seems to be little, if any, doubt that preservation values exist with respect to many goods and services (these need not just be natural resources). Literature has shown that preservation values depend on either demand and/or supply uncertainty (Bishop (1982), Weisbrod (1964), Krutilla (1967)). This literature has also shown (e.g., Freeman (1985), Schmalenese (1972), and Bishop (1988)) that these values can be positive, negative, or indeterminate. But, most empirical studies have shown that option value is positive15 and that these values can be fairly large. This consensus does not, however, answer the question about what these values may be at the margin. A recent article by Smith (1984) provides a bound for these values. He concludes that "unique, widely recognized environments must be treated differently from more commonplace resources." When the good in question is not unique and is replaceable, the option value will be bounded by zero (does not exist). As a result, the degree of demand uncertainty and the uniqueness of the good are the key ingredients in determining the magnitude of option value . . . ." The degree of "uniqueness," like beauty, will generally be judged "in the eyes of the beholder," but the degree of uniqueness will decline as the number of substitutes increases. One would, therefore, expect "locals" to have a higher option value for a particular wilderness area than would "nonlocals." This is one of the probable reasons why Barrick (1986) found that option values for a particular wilderness declined as one moved farther from the area where the resource was located.

The existence of other (substitute) areas is one of the reasons why preservation values decline at the margin. For example, the study by WLG indicated that preservation values (Willingness to Pay [WTP]) declined at the margin in a linear fashion (total WTP = 9.17 + 4.1854 Q - 0.1919 Q^2 or marginal WTP = 4.1854 - 0.3838 Q) as acreage (Q) increased. This rate of decline is, however, subject to some question. The study by Pope and Jones (1987) for Utah, for example, suggests a faster rate of decline.16 If preservation values decline more rapidly than the linear function suggested by WLG, preservation values would not be as high for large acreages as this linear function would suggest.

Supply uncertainty is probably the major reason why lands are included in the NWPS and why option values exist for these lands. However, there is presently an assured supply of lands that have been designated as wilderness even if no additional lands were to be designated. One would expect, therefore, that the option value would approach zero if there were close substitutes for an area(s) that was being considered for designation. Thus, setting aside some lands as wilderness is essentially analogous to the policy of setting a "safe minimum standard" for flow resources having a critical zone that was advocated by Ciriacy-Wantrup (Chapter 18) nearly 40 years ago. Once a sufficient number of acres have been designated and a supply is assured, the marginal value of additional acres would be expected to drop rapidly. This, however, begs the question of what is to be supplied because the attributes of each wilderness area are not the same. What constitutes a "reasonable" substitute is a research question that has not be determined.

All wilderness areas are not equal and some may be poor substitutes for other areas. For example, many (most?) of the areas presently designated as part of the NWPS in the west have been high mountain areas that are primarily available for use during the summer. As a result, areas being considered for designation that do not differ significantly from areas that are already in the system would not be expected to have high option values17 because many substitutes probably exist.18 In Utah, the areas that are currently receiving the most attention by wilderness advocates for future inclusion in the NWPS are located in the southern portions of the state. These areas have ecosystems or characteristics that some believe are unique.19 These areas also may provide the opportunity for recreational activities that are different (few substitutes) from other wilderness areas. Moreover, these areas can also be used during periods of the year (fall-winter-spring)20 when most other wilderness areas are not available for use. As a result, some of these lands may have high recreational as well as preservation values at the margin. Once some of these lands have been designated21 it is likely that the benefits of designating additional lands as part of the NWPS will be small at the margin. The first "unique" areas that may be designated are likely to have high preservation values and relatively low recreational use values. The reverse will likely be true for additional acreages near high concentrations of people.
CONCLUSIONS

Numerous polls have indicated that Americans favor adding more areas to the NWPS. Careful use of economic concepts can be used to evaluate these decisions. However, as the above data clearly show, these evaluations must be made on a case-by-case basis and the analyses must emphasize the use of marginal not average use rates as well as marginal recreation and preservation values. This analysis also suggests that preservation values are likely to be high for the first areas that are designated as part of the NWPS. As more areas are added to the system, recreational values will likely increase in relative importance, especially if the areas are close to a metropolitan area. Areas that are remote are not likely to have high recreational values but their preservation value may be high if the area(s) in question is "unique."

ENDNOTES

1. This conference, as well as most of the literature, emphasizes the benefits of wilderness. Much less has been written concerning costs (e.g., see the studies by Jones; Livingston and others; Leaming 1988, 1989, 1990). While this paper provides some "red flags" concerning the estimation of benefits, similar "red flags" need to be used in estimating costs. There is as much need for research that would improve cost estimates as there is in measuring the benefits of wilderness.

2. Other agencies have use data, but data have generally not been kept for wilderness (actual or potential) lands. The Forest Service RIM data has been criticized as being unreliable. Lucas and McCool probably summarized the use of this data best when they indicated that the data were "... probably adequate for a look at overall trends," and they are "... the only game in town."

3. Recreational use data used in this paper were obtained from files maintained at the FS offices in Ogden, Utah. Differences exist in the data set for wilderness use in 1971--8.103 million versus 6.703 million RVD's. The 8 million RVD figure appears to be "out of line" with data for other years. Therefore, the smaller figure is used throughout this paper. The data for "wilderness lands" used in this paper includes both wilderness and primitive area lands.
4. The total number of acres of land administered by the FS was essentially stable during this 26-year period. Total acreage increased nearly 5 million acres between 1965 and 1990, but this is less than a 3 percent change.

5. No surveys of wilderness users have been made and published that are specific to Utah, but it is not expected that the characteristics of wilderness users in Utah are different from users in other areas that have been surveyed.

6. BLM data for potential wilderness areas in Utah are not available over time. The Utah BLM draft wilderness Environmental Impact Statement indicates that most wilderness study areas receive less than 1,000 total RVDs of use in a year. There are some areas (e.g., North Fork of the Virgin River which borders Zions National Park) where the use rate is at least as high as those areas near the Wasatch Front.

7. The evidence for this is not strong. However, the basic principle alluded to must be considered by recreation planners. Agencies such as the FS must plan using a national perspective. As a result, the benefits of adding a recreation area is not simply the additional RVDs that may occur in that area if this action results in reduced use of other areas. One must estimate what the net increase in use is when evaluating an action from a national perspective. One should note that one of the benefits of an action in one area may be reductions in use in another area which, in turn, could yield positive quality (reduced congestion) as opposed to quantity (more RVDs) benefits.

8. A reviewer suggested that these data need to be subjected to a Dickey-Fuller test (see the discussion by Maddala (1988)). This recently developed test must be used whenever time-series data are involved in a statistical analysis.

9. Data are not available to directly test this hypothesis. If the demand has not shifted for either use (only a shift in use), then no gain in total use is evident. However, if the demand for either type of use(s) has not shifted and an increase in the supply of wilderness (decrease in nonwilderness) would reduce the value of wilderness lands relative to nonwilderness lands at the margin.
10. Conferences such as this are a common source of information. Data in this paper, as well as other papers that are presented, will probably affect decisions that are being evaluated at the present time. This information will probably also affect the research done in the future.

11. The discussion that follows should not be interpreted as a criticism of the original WLG article. The authors would probably make changes if the article were to be rewritten today. It is also highly probable that the discussion in this paper will need to be modified when other information is made available, including papers that are presented at this conference.

12. Most of the areas suggested for inclusion in the NWPS in Utah are found in the southern part of the state (Utah Wilderness Coalition). Furthermore, Congressman Owens has indicated that the designation of additional areas is the "only realistic hope to revitalize Southern Utah" (Deseret News, October 11, 1989). The low and apparently stable use rates in this part of the state, where other types of recreation (e.g., use of the national parks) are increasing, suggests that the suggested boost to Southern Utah economies is not likely. In addition, access to many of these areas is very limited, and the availability of water (the surveys of wilderness users indicate that areas near water are used most heavily while areas having limited water receive limited use) is even more limited.

13. The authors have found no studies in the literature that have made this determination for an evaluation of recreation-oriented decisions involving wilderness lands. All of the studies reviewed used the expected number of RVDs that would occur not the expected net number of RVDs.

14. The value an RVD of recreation may be more than the average for some areas, but these values would generally be expected to decline at the margin.

15. These values have been estimated using the methods of contingent valuation (Cummings and others 1988, Mitchell and Carson 1989). All of the studies reviewed that have estimated wilderness values using this methodology have been designed to elicit positive responses. It is, therefore, not surprising that the values derived have been positive.
16. While an equation was not estimated by Pope and Jones, a log linear model is suggested.

17. This is an empirical question that has not been tested. It also represents a question that can only be solved empirically.

18. Those individuals who seek to visit all sites that may be designated as a wilderness may have option values for particular sites that may have many close substitutes. The number of these individuals in society is probably not large. This is, however, a hypothesis that has not been tested.

19. The book published by the Utah Wilderness Coalition suggests that many of the areas being considered are unique. This opinion is, however, not shared by everyone.

20. While these areas may be most suitable for use during these periods (summer use will be low in many of these areas because water and shade is not generally available and it is relatively hot in these areas), people commonly take vacation periods during the summer season.

21. It should be noted that some of the "most outstanding" scenic spots have been made part of the national parks in Utah. These areas may be "good" substitutes for BLM administered areas that have been proposed for designation. It should, also, be noted that areas that have been proposed for wilderness designation by the BLM and Park Service are being managed (de facto) as if they were part of the NWPS (de jure). It is also likely that many (most?) of the proposed areas will remain as wilderness even if they are not designated unless the demand for other uses increases in the future.
REFERENCES


RVDs of use on wilderness lands
administered by the FS, 1967-1990.
RVDs per acre by type of land administered by the FS, 1967-1990.

- ■ non-wilderness
- + wilderness
Figure 3. Wilderness RVDs per acre for FS lands in Utah, 1967-1989.
RVDs of use on the Lone Peak wilderness in Utah, 1978-1990.
RVDs of use on "instant" wilderness areas administered by FS, 1971-1986.
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