



A systematic review of visitor preferences concerning recreation allocation

William L. Rice¹ · Kelsey E. Phillips¹ · Christopher A. Armatas² · Nicholas A. Pitas³ · Suiwen Sharon Zou³ · Abigail Fuesler¹

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Abstract

The process of fairly allocating limited recreation opportunities across, and within, a broad range of user groups presents a challenging task to recreation managers, planners, and policy makers. The practice of recreation allocation can be controversial. Recreationists share deep values toward access to high-quality recreation opportunities, and recreationists tend to examine decisions of recreation allocation with a serious level of scrutiny when a use limit is implemented. Despite the controversy that recreation allocation decisions can generate, research-based guidance to inform decisions of recreation allocation is limited and has not been summarized to date. To support recreation allocation decision-making, as well as future research on the topic, we conducted a systematic review of visitor perceptions, preferences, and behaviors related to recreation allocation, including both allotment (allocation between groups) and rationing (allocation within groups). Using a PRISMA framework and a population, intervention, comparison, and outcomes search strategy, this review includes a systematic search of the recreation research literature and an analysis of fifty-two research items meeting the search criteria. Primary conclusions of this review include: (1) certain rationing strategies tend to favor certain groups, (2) preferences are often heterogeneous across user groups, (3) perspectives on rationing mechanisms are strongly influenced by perceived fairness—regardless of the mechanism, (4) willingness to accept a rationing strategy is contingent on the perceived chance of successfully accessing the resource, and (5) much of the research on recreation allocation is significantly dated relative to advancements in technology and recreation participation.

Keywords Outdoor recreation · Allocation · Rationing · Systematic review · PRISMA

1 Introduction

Global interest in recreation allocation has reached a renewed level of intensity in recent years. News outlets around the world have reported on the struggles to fairly and efficiently allocate non-market recreation experiences such as hiking in Italy's Vesuvius National Park (Rosalsky 2023), camping in Western Australia's parks (Greatrex 2024), and

entry into the USA's Glacier National Park (Kwak-Hefferan 2023). In the USA, various state laws (Cal. Public Resources Code § 5010.1.5 2023; Mont. Code Ann. § 23-1-129 2023) and proposed federal laws (e.g., RESERVE Federal Land Act 2024) are focused on changing recreation allocation to improve visitor experience and guide agencies to more equitable allocation outcomes. As demand for outdoor recreation increases globally, the issue of equitably distributing limited "high-quality" recreation opportunities will doubtlessly increase in prominence. Thus, it is critically important that recreation and tourism managers, planners, and policy makers understand the state of the research concerning recreation allocation.

✉ William L. Rice
william.rice@umontana.edu

¹ Department of Society and Conservation, University of Montana, Missoula, MT, USA

² Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA Forest Service, Missoula, MT, USA

³ Department of Recreation, Sport and Tourism, University of Illinois Urbana-Champaign, Champaign, IL, USA

1.1 Background information on recreation allocation

Recreation allocation is the process of distributing limited, often scarce, public recreation opportunities (e.g., permits, campsites, reservations, parking spots, etc.) among individuals or groups (McCool and Utter 1981b, p. 431). Often this occurs in response to the implementation of a use limit, but it can also occur organically through the design of a campground or the size of a parking area. Additionally, some policies require land management agencies to establish visitor “capacities” and, thus, require allocation of use when demand exceeds these capacities. There are two steps in recreation allocation: allotment and rationing (McCool and Utter 1981b, p. 431). The first step, allotment, requires managers and planners to decide how limited recreation opportunities should be divided *between* groups. Common questions of allotment include how permits should be split between resident and non-resident hunters or between commercial and non-commercial rafters, how campsites should be split between recreational vehicles and tent campers, or how wilderness campsites should be split between guided and non-guided groups. McCool and Utter (1981a, p. 68–69) identify eleven different techniques for allotment, ranging in complexity from “even split”—wherein each group is allotted an even percentage of the opportunities—to visitor impact—wherein the amount allotted is determined by the group’s per visitor impact on the resource such that “the higher the impact, the smaller the allotment” (p. 68). Additional techniques include public opinion poll, historical use, spatial or temporal zoning, and outfitter significance, among others (see McCool and Utter 1981a, p. 68–69). Allotment decisions are often hotly contested and inherently political (Lucas 1977, p. 418; McCool and Ashor 1984, p. 3). As demand for limited opportunities increases, the political environment becomes increasingly charged and demand for administrative accountability heightens (Schreyer 1977, p. 46). Thus, allotment decisions increasingly need to rely on large-scale public participation processes and data-driven decision-making (Phillips 2023, p.18).

The second step in allocation, rationing, generally receives more political, research, and public interest than allotment in the present day. Rationing is the process of distributing limited recreation opportunities within groups (McCool and Utter 1981b, p. 431). This process has long-puzzled recreation planners and scientists, alike, as the rationing of public recreation opportunities (or goods) is largely a non-market exercise—meaning that demand cannot be curbed by increasing prices due to concerns and mandates related to the public nature of these goods. Generally, non-market recreation rationing techniques consist of reservation, lottery, first-come first-served, and merit-based

systems (Manning 2004, p. 275–276); for an overview of these strategies and their characteristics, see Phillips et al. (2024, p. 2). Pricing (i.e., use of the market) is also used to ration (Manning 2004, p. 276); however, it is generally regarded to have low political (Willis et al. 1975, p. 109), administrative (Utter 1979, p. 63–64), and public support (Fleming and Manning 2015, p. 1011; Rice et al. 2024, p. 4; Shoji et al. 2021, p. 8). In recent years, recreation rationing has returned to the global spotlight, with odds for obtaining a permit to boat the famed Selway River (Idaho, USA) being 0.2% in 2021 and odds for securing a campsite in a popular federally administered US campground being as low as 0.3% (Recreation.gov 2021). These low success rates have led many to question the status quo for how recreation resources are rationed and, specifically, how some individuals or groups may be advantaged by the present systems—perhaps by faster internet speeds, ability to plan further in advance, and the ability to pay for third-party apps to help secure reservations (see Levy 2022; Rosalsky 2023; Sundog 2023).

With the notable exception of Phillips et al. (2024), most of the guidance currently available to managers concerning recreation allocation is not only dated, but also based on suppositions concerning visitor perspectives, preferences, and presumed behaviors regarding allocation. For instance, the conclusions of Stankey and Baden (1977) concerning the acceptability of varying rationing mechanisms and who benefits and is adversely affected by the implementation of these mechanisms were largely formed based on their professional opinions and assumptions. Their preceding review of the literature—which provides limited grounding for their conclusions—is now nearly fifty years old. In this instance, the assumptions made by these authors in 1977 are still often cited today in management guidance, including those provided by the International Union for Conservation of Nature (Leung et al. 2018) and Manning’s most recent edition of *Studies in Outdoor Recreation* (Manning 2022). There is thus the need to summarize the empirical research conducted over the previous fifty years to better inform the recreation management community concerning what is known about visitor perspectives, preferences, and presumed behaviors regarding allocation.

1.2 Study purpose

To date, the recreation allocation research literature has not been systematically, nor formally, reviewed. When combined with recently renewed interest in the topic and surging recreation demand, the lack of a review represents a critical missing element in recreation allocation planning and policy formation. As such, our purpose is to systematically review existing research concerning visitor perspectives, preferences, and presumed behaviors regarding recreation

allocation—and summarize the findings for the recreation management, planning, and policy communities.

2 Methods

Our systematic review followed the methods outlined by Jones and Cawley (2021) for utilizing the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) framework (Page et al. 2021). The systematic review methods of Jones and Cawley (2021) were adapted into a seven-step process: pre-review tasks (i.e., recruit team members, develop research questions, specify eligibility criteria), develop a protocol, conduct literature searches, manage citations, screen citations, extract data, and write the review.

2.1 Research item search protocol

Our review protocol centers upon the following research question: What are the primary findings of research on recreation allocation concerning visitor perspectives, preferences, and behaviors? Using this research question as our frame of reference, we developed a search strategy using the PICO (population/problem, intervention, comparison, outcome) framework (Richardson et al. 1995). This framework is well suited to our study of a management intervention (i.e., allocation) and comparisons across various strategies and their related outcomes. It allowed us to translate our research question into eligibility criteria and a strategy for data extraction (see Table 1).

To this end, our search inclusion criteria required that research items be published in English and range in publication from any previous date until 12/31/2023, including journal articles, conference proceedings, technical reports,

books, book chapters, theses, and dissertations. Those items available only as conference abstracts were excluded. Further, the PICO framework acted as an additional inclusion filter. Recreationists needed to be the population of interest. Recreation allocation needed to be the intervention being researched, and the research needed to focus on visitor preferences, perspectives, and behaviors; thus, a Boolean-based keyword search term was created based on our PICO framework (Table 1) to identify research items pertaining to visitor preferences, perspectives, and behaviors related to recreation allocation and meeting these eligibility criteria. Given these criteria, non-empirical research items (editorials, non-systematic reviews, thought pieces, and commentaries) and non-visitor-focused research items (e.g., research on manager perspectives) were not included.

We opted for a comprehensive approach when creating our search strategy, meaning we included a wide variety of keywords related to our research question and were not strict concerning requirements for a particular word to be present in the title or abstract of the research item. This was intended to result in a wider array of research items being returned in our searches and thus reduce the risk of missing research items on the periphery of the literature. Continuing with the PRISMA framework, we identified five databases for searching: Scopus, ProQuest, USDA Treesearch, HathiTrust, and Web of Science. Additionally, we selected thirteen foundational items for forward and backward searching via Google Scholar (Bultena et al. 1981; Cable and Watson 1998; Ewert and Hollenhorst 1990; Hendee and Lucas 1973; Manning 2004; McCool and Utter 1981b; Shelby 1981; Shelby et al. 1982; 1989a; b; Stankey 1977; 1979; Stankey and Baden 1977). Finally, we identified three prominent scholars in the recreation allocation research literature (Drs. Stephen McCool, Robert Manning, and Bo Shelby) as experts to review our found research item list and identify any missing

Table 1 PICO framework used for developing search strategy

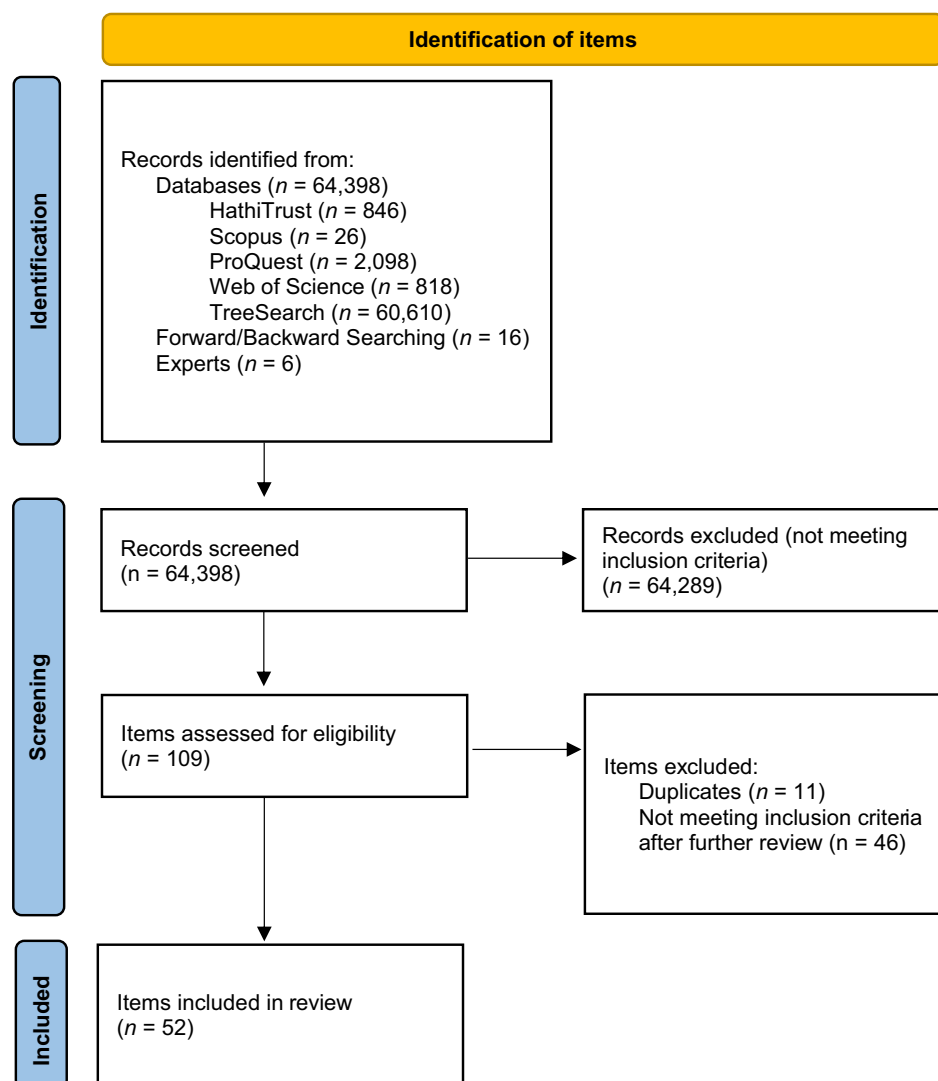
PICO element	Example		Synonyms	Search strategies
P Population	Recreationists	Hikers Rafters Visitors Campers Hunters	Anglers Skiers Boaters Mountaineers Climbers Swimmers	("Recreationists" OR hikers OR rafters OR visitors OR campers OR hunters OR anglers OR skiers OR boaters OR moun- taineers OR climbers OR swimmers)
I Intervention	Recreation allocation (allotment <i>or</i> ration- ing)	Allotment Rationing Permitting		("Allocation" OR allotment OR rationing OR permitting)
C Comparisons	Reservations, lottery, first-come first- served, merit, pricing, fee	Reservations Lottery	First-come first-served Merit	("Reserve" OR reservations OR lottery OR "first come first served" OR merit OR pricing OR fee)
O Outcomes	Perceptions, access, acceptance, behavior	Perceived Access Acceptance	Satisfaction Preference Behavior	("Perceptions" OR perceived OR access OR acceptance OR satisfaction OR pref- erence OR behavior)

items. With the search process for research items complete, a total of 64,398 items were identified for review (see Fig. 1).

2.2 Initial research item screening

When conducting literature searches, articles were screened through a two-tiered approach see Wilkins et al. (2021, p. 122). First, we evaluated the titles of the research items for references to outdoor recreation, tourism, parks, or protected areas. Given our comprehensive search strategy, the vast majority of the research items returned were not related to these broad topics housing our research question ($n=64,289$). For those articles appearing to fall within these topics ($n=109$), abstracts were screened for eligibility using both our PICO framework (Table 1) and our

inclusion criteria. If eligibility was still in question following the review of the item's abstract, the full text was screened. Throughout this screening process, we generally followed the PICO framework in order from population to outcomes. Those not related to our population of interest (i.e., recreationists) were easily discerned as ineligible for inclusion. Those pertaining to this population were then assessed for their focus on our intervention (i.e., recreation allocation). Ultimately, the final criterion for inclusion was the presence of one of our outcomes of interest (i.e., visitor perceptions, preferences, or behaviors related to recreation allocation). This final criterion excluded those research items related to recreation allocation but not including empirical findings related to visitor perceptions, preferences, or behaviors (e.g., manager perceptions, thought pieces, etc.).



Adapted from: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71.

Fig. 1 PRISMA flow diagram for systematic review

2.3 Data extraction and analysis of research items

Those research items appearing to meet our eligibility criteria ($n = 109$) were downloaded into a shared folder for further review and subsequent data extraction. Each study team member was given approximately one-fifth of all articles for further screening (including reading the entire full text) of eligibility ($n = 46$) and removal of duplicates ($n = 11$). Data from the remaining articles ($n = 52$) were recorded in a shared spreadsheet, where they were charted across various fields including title of research, study year, publication, type of study, type(s) of recreationists included in the study, type(s) of allocation included in the study, and research question(s). Quotes from the study findings and conclusions were also extracted into the spreadsheet for subsequent analysis. Following this first stage of data extraction, the findings and conclusions of each research item were summarized by individual team members. Quotes and summaries of the study findings and conclusions were then evaluated through team meetings, followed by revision of summaries. Each team member was then tasked with developing a data narrative for a single type of allocation (e.g., allotment, reservations, lotteries, etc.), including key citations. These narratives were then reviewed by a different team member for evaluation based on the accepted item quotes and summaries, and sent back to the original narrative author for revision. Final data narratives are presented in the results below.

3 Results

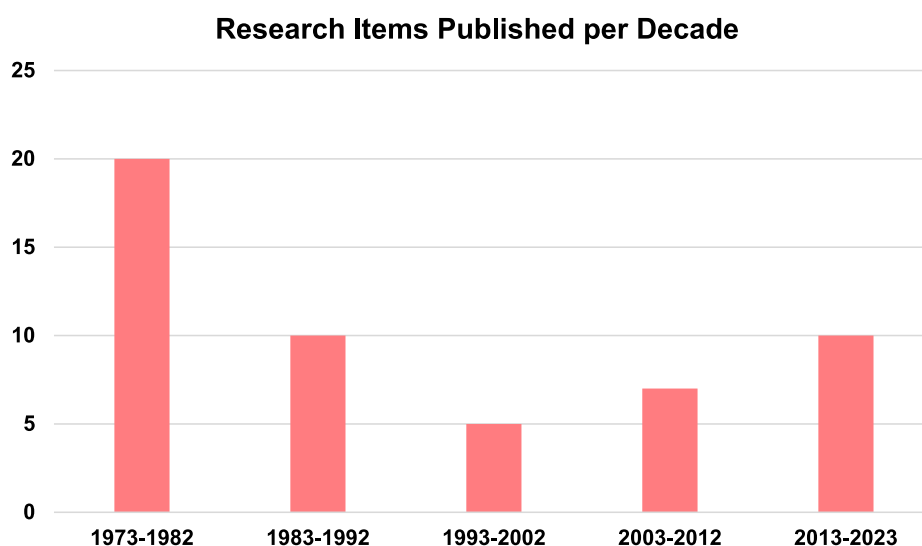
Following the final screening of research items (including the removal of duplicates), 52 items were included in the review (Fig. 1). The first research item included in the review was published in 1973, and the most recent item was

published in 2023. The most prolific decade of publication ranged from 1973 to 1982 (20 research items); from there the rate of publication declined until the mid-2000s when the rate began to increase once more (Fig. 2). The vast majority of research items ($n = 46$) focused on recreationists within the USA, with only six items being focused internationally, including Australia (2), Canada, Greece, Japan, and Scotland. One research item employed qualitative methods alone (case study) (Jenkins et al. 2021), while two items employed both qualitative and quantitative methods (Stankey 1979; Steffe et al. 2005). The remaining items employed only quantitative methods ($n = 49$). The vast majority of research items used visitor surveys to collect data for analysis ($n = 41$), including through mail, mail-back, email, and on-site distribution methods. Other than surveys, the studies utilized secondary data (e.g., permit data or reservation data or cell phone data or user-generated content, $n = 9$), interviews ($n = 1$), and observations ($n = 4$). Most studies opted for field-based data collection methods ($n = 25$), while nineteen utilized non-field-based collection methods and eight engaged in a mix of field-based and non-field-based strategies. Forty research items focused only on rationing, four focused only on allotment, and eight focused on both. Narratives concerning visitor perceptions, preferences, and behaviors concerning allotment and each rationing strategy are included below.

3.1 Allotment findings

Twelve research items included results related to visitor perspectives, preferences, or behaviors concerning allotment of recreation opportunities. The earliest published item was released in 1975, with the most recent published in 2023. Groups researched include river recreationists ($n = 6$), hunters ($n = 2$), backcountry campers ($n = 1$), anglers ($n = 2$),

Fig. 2 Publication decade of research items included in the review



and frontcountry campers ($n=1$). The primary conclusion of this subset of literature, overall, is that preferences for how use should be allotted vary across groups (e.g., commercial and non-commercial, residents and non-residents, successful and unsuccessful hunters, etc.). These differences in preferences are most clearly illustrated by McCool and Utter (1981a; b), Utter (1979, p. 187–188), and Utter et al. (1981, p. 29)—wherein the authors detail differences in preferences between commercial and non-commercial boaters on the Middle Fork of the Salmon River (Idaho, USA). Primary among their findings is that “each group tended to favor those techniques that apparently would provide them with better chances for river floating opportunities or with which they were familiar” (Utter et al. 1981, p. 29). More recent findings by Hogan (2016, p. 40) indicate that non-resident and resident hunters in Colorado (USA) have differential preferences concerning elk hunts—with non-residents preferring hunts that are more likely to lead to “trophy” elk and require a greater number of days and residents preferring hunts that are more likely to lead to successful obtainment of meat and require fewer days. Thus, Hogan (2016) concludes that non-residents should be prioritized in the allotment of longer hunts and residents should be prioritized for shorter hunts. Other observations concerning allotment preferences and behaviors include a wide array of miscellaneous, though interesting, findings. For instance, campers in Pawtuckaway State Park (New Hampshire, USA) changed their campsite choice in response to differential fees based on state residency, intended to allot more desirable campsites to New Hampshire residents, with more residents occupying premium waterfront campsites (LaPage et al. 1975, p.3). And halibut anglers in Alaska (USA) largely rejected a proposal to allow transferring fish quotas between charter, commercial, and non-commercial anglers following allotment (Lew et al. 2016, p. 17).

3.2 Rationing findings

3.2.1 First-come, first-served rationing

Nineteen research items highlight the visitor perspectives on first-come, first-served (FCFS) as a recreation rationing approach. The earliest published items were released in 1973 and 1974, with the most recent published in 2023. Groups researched include river recreationists ($n=10$), wilderness visitors ($n=3$), backcountry campers ($n=3$), frontcountry campers ($n=1$), cave visitors ($n=1$), and hunters ($n=1$). An FCFS approach was preferred by, and found to be more beneficial to, local residents who could more easily access, or wait to access, the recreation resource with limited planning (Behan 1976, p. 24–25; Dimara and Skuras 1998, p. 326), as well as younger people with more flexible schedules (Dimara and Skuras 1998, p. 326). Consistent with this

finding, a study of river users across four states found that an FCFS approach was perceived to affect non-local users most negatively (Wikle 1989, p. 91–92). The potential benefit of FCFS approaches to local populations was reflected in the Grand Canyon National Park (Arizona, USA), where 74% of all backpacking permittees were from the states surrounding the park (Behan 1976, p. 24–25). Research has found that users’ acceptability of an allocation system is correlated with the perceived ability to access the resource (Danley 1980, p. 51–55), and this general finding is evident within the context of research on FCFS approaches. Indeed, Shelby et al. (1989a, p. 141) found that perceived chances of success under an FCFS system were influenced by distance to the Snake River in Idaho (USA), thus reinforcing findings from other research that acceptability of FCFS approaches is influenced by proximity to the resource. While distance to the resource appeared most salient to perceptions of FCFS approaches to recreation allocation, some research items highlighted the potential influence of different types of recreation activities or experiences. For instance, for wilderness users who prefer low-use intensities in sensitive environments, an FCFS option of allocation was among the least popular (Stankey 1973, p. 30), and within the context of the potentially rivalrous activity of goose hunting less than 7% of respondents felt that an FCFS approach was appropriate (Glass and More 1992, p. 276).

3.2.2 Pricing rationing

Eighteen research items address pricing as a means of rationing recreational opportunities. The earliest published items were released in 1974 and 1975, and the most recent was published in 2021. Activities researched include frontcountry camping ($n=6$), river recreation ($n=6$), park visitation in general ($n=4$), caving ($n=1$), hunting ($n=1$), and climbing/mountaineering ($n=1$). Although there was an isolated example of support for pricing as a mechanism (among campers, LaPage et al. 1975, p. 5), pricing-based approaches to rationing—for example, through increasing user fees—were largely unpopular among various recreation groups included in these analyses (e.g., Fleming and Manning 2015, p. 1011). As such, authors cautioned that “new outdoor recreation pricing policies should proceed cautiously and only with appropriate research and monitoring” (Bamford et al. 1988, p. 339), and concluded that in many instances “it is clear that peak pricing is not supported” (Fleming and Manning 2015, p. 995).

Some research indicated that other mechanisms—for example, lottery or FCFS—were preferred to increasing prices (Glass and More 1992, p. 276). An exception to the general dislike of pricing appears to occur when increasing fees is viewed as a means of reducing crowding and achieving preferred social conditions (e.g., Kainzinger et al. 2019,

p. 26; Kotke and Gardner 1975), or to increase quality of services (e.g., Moeller et al. 1974, p. 7). Reactions to pricing as a means of rationing were linked to perceptions of fairness; those who perceive a system as fair are more likely to support its implementation (e.g., Danley 1980, p. 51; Shelby et al. 1989b, p. 68); conversely, respondents were also more likely to support a system regardless of perceptions of fairness if they felt they were likely to succeed (e.g., Danley 1980, p. 51; Shelby et al. 1989b, p. 68). Concerns related to equity were also raised, as rationing via pricing is likely to impact low-income recreationists disproportionately compared to higher-income recreationists (e.g., Bamford et al. 1988, p. 338). Conversely, recreationists with higher disposable incomes were more likely to prefer or benefit from pricing as a means of rationing (e.g., Brokaw and Cole 1977, p. 38; Dimara and Skuras 1998, p. 326; Shelby et al. 1989a, p. 142).

3.2.3 Reservations rationing

Seventeen research items examine preferences, perspectives, or behaviors regarding reservation systems. The earliest published items were released in 1973 and 1975, with the most recent published in 2022. Activities covered included backcountry hiking and camping ($n=6$), river recreation ($n=5$), frontcountry camping ($n=4$), caving ($n=1$), and park visitation in general ($n=1$). Many visitors appear satisfied with, or at least willing to try, reservation systems (Kottke and Gardner 1975, p. 9; Dvorak et al. 2012, p. 14; Jenkins et al. 2021, p. 5). In some cases, reservations were preferred compared to other rationing techniques, including among boaters in Hells Canyon (Idaho, USA; Danley 1980, p. 51), frontcountry campers in California (USA; Magill 1976, p. 10), and commercial boaters on the Middle Fork of the Salmon River (Idaho, USA; McCool and Utter 1981a, b).

Willingness to attempt making a reservation was found to be contingent on the perceived chance of success among Hells Canyon boaters (Shelby et al. 1989a, p. 142), while acceptance of reservations was found to be contingent on the associated fee among backcountry visitors to Yellowstone National Park (Wyoming, USA; Oosterhous 2000, p. 50). Demand for reservations among campers was also found to vary depending on campsite attributes (Rice and Park 2021, p. 7). Important differences in preferences and/or use of reservations were also found based on visitor demographics. Higher-income campers and backpackers (Rice et al. 2022, p. 55; Schwartz et al. 2012, p. 503), more highly educated cave visitors (Dimara and Skuras 1998, p. 326), and more urban backpackers (Schwartz et al. 2012, p. 503) were found to be more willing to pursue, or to prefer, reservations. The opposite trend was found for those unable or unwilling to plan further in advance (Schomaker and Leatherberry 1983,

p. 55–56; Shelby et al. 1989a, p. 141–142) and more local visitors (Dimara and Skuras 1998, p. 326).

3.2.4 Lotteries rationing

Seventeen research items examine preferences, perspectives, or behaviors regarding lotteries as a means of rationing use. The earliest published items were released in 1973 and 1979, with the most recent published in 2023. Activities researched include river recreation ($n=10$), backcountry hiking and camping ($n=4$), and hunting ($n=3$). Preferences for lotteries were dependent on both the activity style being studied and the decade in which the study was conducted. Related, evaluations of lotteries were found to be strongly influenced by ideals of fairness. Willingness to try and acceptability were found to be influenced by perceived fairness and chance of success (Shelby et al. 1989b, p. 68). In some studies, users preferred lotteries over other rationing methods, as in the case of goose hunters in Vermont (USA; Glass and More 1992, p. 276) and both private river recreationists and lottery rejectees on the Middle Fork of the Salmon River in Idaho (McCool and Utter 1981b, p. 434). In a study of the allocation currencies of river runners in Hells Canyon, results suggest that floaters who were able to arrange trips on short notice and those with more river running experience felt that a lottery favored them, where perceived chances of success under a lottery system were influenced by notification lead time (Shelby et al. 1989a, p. 142). Another study found that turkey hunters in Minnesota (USA) preferred a lottery in a few high-demand areas (Schroeder et al. 2018, p. 461). In other cases, lotteries were the least preferred—or among the least preferred—rationing techniques, such as visitors to US wilderness areas in California, Minnesota, Montana, Utah, and Wyoming (Stankey 1973, p. 31; 1980, p. 23). A more recent study on boater satisfaction with various US permitting systems and preferred methods for awarding permits found that a lottery weighted by number of failed attempts was the overwhelming favorite, with only 10% of respondents preferring the equal-odds lottery (Phillips 2023, p. 17).

3.2.5 Merit rationing

Three research items examine preferences, perspectives, or behaviors regarding merit-based systems. Merit-based systems aim to ration use through a system by assessing the worthiness of a user to access the space, through attributes like qualifications and fitness (Danley 1980, p. 24). Each of these items stemmed from research conducted among boaters in Hells Canyon. Acceptance or preference concerning merit-based systems appears to be determinant upon previous experience, perceived chance of success, and perceived fairness (Danley 1980, p. 81; Shelby et al. 1989a, p. 143; 1989b, p. 68). Merit-based systems, in this instance, were

perceived as the least favorable rationing strategy, which may help explain the relatively few research items studying visitor perspectives on merit-based systems.

4 Discussion

Much of the early research on recreation allocation was reactionary in nature, following increased river-based recreation in the 1970s (Nash 1977; 1981). In the subsequent decades, research on the topic was produced at a slower rate and in a greater diversity of contexts beyond river permits. In more recent decades, recreation allocation research has become more global in scale (albeit still limited)—likely as a result of increasing outdoor recreation participation globally. As research expands, a more nuanced understanding of visitor perspectives, preferences, and behaviors related to recreation allocation emerges. We draw five primary conclusions from this review: (1) certain rationing strategies tend to favor certain groups, (2) preferences are often heterogeneous across user groups, (3) perspectives on rationing mechanisms are strongly influenced by perceived fairness—regardless of the mechanism, (4) willingness to accept a rationing strategy is contingent on the chance of success, and (5) much the research on recreation allocation is significantly dated relative to advancements in technology and recreation participation. These five conclusions aim to direct future research, as well as amplify existing guidance for land management agencies as they devise and revise allocation strategies.

4.1 Certain rationing strategies benefit certain groups

Though theorized for some time (e.g., Magill 1976, p. 8; Stankey and Baden 1977, p. 9) and found in isolated studies, our systematic review finds broad support for the assumption that certain groups tend to benefit from certain rationing strategies. FCFS systems were found to benefit locals in multiple studies (e.g., Behan 1976, p. 24–25; Danley 1980, p. 24, 104–105; Dimara and Skuras 1998, p. 326). Pricing was preferred by or found to benefit those with higher household incomes (e.g., Bamford et al. 1988, p. 338; Brokaw and Cole, 1977, p. 38; Dimara and Skuras 1998, p. 326; Shelby et al. 1989a, p. 142). Reservations were found to benefit those with the ability to plan in advance and those with higher incomes (e.g., Rice et al. 2022, p. 55; Schomaker and Leatherberry 1983, p. 55–56; Schwartz et al. 2012, p. 503; Shelby et al. 1989a, p. 142). It should be noted, however, that while these trends appear clear, exceptions were also present. Thus, these trends cannot be generalized to every allocation context. The existence of these trends does suggest, however, that managers may consider implementing multiple rationing strategies in unison for a given recreation opportunity, as

suggested in the Recreation Rationing Spectrum (Rice and Phillips 2023, p. 9)—wherein multiple rationing strategies (e.g., campsites allocated through a combination of reservations and FCFS) and/or booking windows (e.g., river permits made available 6 months and 2 months in advance) are used to ensure that tradeoffs between rationing strategies are recognized and the diversity of visitors' preferences and needs concerning access is recognized.

4.2 Heterogeneous preferences for rationing strategies

Second, we conclude that the preferences and perspectives of recreation user groups are, in part, the products of their prior experience and it is difficult to generalize preferences across outdoor recreationists as a whole. Preference for lotteries (or lack thereof) provides a useful example. River rafters and boaters were found to prefer lotteries (or at least find lotteries to be acceptable) compared to other rationing strategies across multiple studies (e.g., McCool and Utter 1981b, p. 434; McCool and Utter 1982, p. 11; Phillips 2023, p. 13; Shelby et al. 1982, p. 418). As concluded by McCool and Utter (1982), “These ratings indicate that each group ranks highest the rationing system with which it is most familiar” (p. 11). This conclusion is echoed by others (e.g., Danley 1980; Utter et al. 1981, p. 29). Similarly, groups with less experience with lotteries rate them as less preferred or acceptable (e.g., Rice et al. 2024, p. 4; Shelby et al. 1982, p. 418; Stankey 1973, p. 31; 1980, p. 23). Experience appears to play a crucial role in support of acceptance of management actions in recreation settings. For instance, Mace et al. (2013, p. 1280) found that visitors to Zion National Park (Utah, USA) grew more supportive of a shuttle system in the park as their experience with shuttle systems increased over a decade. Therefore, when managers implement an allocation system, they may consider rationing strategies that are already prevalent in the recreation community they are aiming to reach.

4.3 Importance of perceived fairness of rationing strategies

Third, and related, recreationists' inclination toward (or acceptance of) a particular allocation system appears to be mediated by perceptions of fairness. This trend was found across goose hunters and river rafters in their propensities toward a lottery (Glass and More 1992, p. 276; Utter 1979, p. 167). Danley (1980, p. 51) also found this trend to hold true for acceptance (or lack thereof) for all forms of rationing among boaters in Hells Canyon. Shelby et al. (1989b) go on to conclude that “acceptability of a system is strongly determined by whether the system is perceived as fair” (p. 67). Given these results, there is a valuable opportunity for managers to

collect data concerning how their allocation systems perform in terms of fairness so that adjustments to the systems can be made and communicated to the public. For instance, when research found that current booking windows for campsites in Saddlehorn Campground of Colorado National Monument (Colorado, USA) favored those with higher incomes (Rice et al. 2022, p. 55), the park managers adjusted the booking windows to accommodate a wider swath of potential campers and communicated why these changes were being made to the public (National Park Service 2024).

4.4 Importance of perceived chance of success within rationing strategies

Fourth, this review indicates that visitor acceptance or preference for a given rationing system (or willingness to participate in the system) is influenced by the perceived chance of success under the system (e.g., Hultsman et al. 1989, p. 149; Ohler 2009, p. 40–41; Shelby et al. 1989b, p. 68). For example, willingness to attempt making a reservation was found to be contingent on the perceived chance of success among Hells Canyon boaters (Shelby et al. 1989a, p. 142). It indicates an important implication for managers: current rationing mechanisms may benefit from review and revision when the number of applicants or those attempting to reserve limited opportunities increases (i.e., chance of success decreases). As discussed by Phillips (2023, p. 17), acceptance for the current lotteries among boaters in the American west is dropping as odds of obtaining a permit approach zero on many high-demand rivers. In this instance, most boaters would prefer that agencies pivot to weighted lotteries (Phillips 2023, p. 17), wherein additional lottery draws are accrued with each year an entrant is unsuccessful, which are often perceived as more equitable.

4.5 Dated body of allocation literature

Finally, much of the research on this topic is dated. The majority of the literature reviewed here was published prior to the founding of the World Wide Web in 1989. Only fourteen of the 52 articles reviewed here were published after the iPhone debuted in 2007. Perhaps the most influential text on the subject, Stankey and Baden's 1977 *Rationing Wilderness Use: Methods, Problems, and Guidelines* appears to have been published using a typewriter. This is to say that much has changed globally since the majority of the research, including all the foundational research, was conducted on recreation allocation. During this time, recreation allocation has changed significantly. Reservations are made and lotteries are entered via websites and smartphone applications designed for these purposes. Availability of FCFS campsites is often monitored remotely, and in real time, via the internet. Individuals and companies are creating and using scripts or bots to book reservations as soon as they become

available (Blackford 2023, p. 41, 43–45; Sens 2023; 2024). At the same time, leisure time and activity participation have changed globally (Cornwell et al. 2019, p. 305) and, at least in a US context, prized campsite reservations and river permits have become exponentially scarcer (Phillips 2023, p. 11). Thus, the findings and rules of thumb established in the 1970s and 1980s are likely not congruent with present sentiments for high-demand recreation opportunities.

Still, as managers are faced with allocation-related decisions in their respective areas, the findings from these studies remain useful tools for thinking through the nuances of these different rationing and allotment strategies. While present sentiments may ultimately have changed since the early days of allocation research, with the advent of new technology and increasing visitation, the structure of these decisions remains rooted in the literature reviewed in this present study. Understanding the history of the recreation allocation conversation and various perspectives that visitors have held are still important, and this systematic review may allow some context to be gleaned from fifty years of research. Despite the potential change in sentiments over time, managers must continue to consider who is affected by different allocation decisions and how they might mitigate any negative effects in the future.

4.6 Limitations and future research

A number of limitations exist in this systematic review. First, the search of grey literature (e.g., technical reports and conference proceedings) was focused primarily on US sources. It was difficult to account for agency databases globally, and thus, technical reports from other countries were likely overlooked. Second, given the language skills of the research team, non-English-language research items were excluded from this review—thus increasing the likelihood of overlooking grey literature from countries where English is not typically used for government or academic publications. Third, given the relatively small size of this body of literature (52 items) and the prominence of a few authors within this literature (e.g., McCool, Shelby, Stankey, and Wikle), it is possible that the multiple research items stemming from popular research contexts (e.g., rivers in the western USA, wilderness areas in the USA, and campgrounds across the world) may bias the overall trends discussed above.

This review also presents a few areas with the most critical need for future research. Given the managerial importance of, and the public interest in, this topic, it is clear that research production on allocation lagged in relation to the research need over the last half century—as evidenced by numerous calls for additional research (e.g., Cable and Watson 1998, p. 6; Danley 1980, p. 101; Hogan 2016, p. 43) on what Lucas (1977) called a “critical question” (p. 419). Phillips and Rice

(2023) note, “More research is critically needed to include... the current context” (p. 111). To this end, perhaps the greatest among these needs is modern research on recreation allotment. Just twelve of the 52 items reviewed here included analysis of preferences, perceptions, and behaviors related to the allotment of recreation (as opposed to rationing). Given emerging discussions on the topic, primary research questions in this vein may include inquiries concerning the equity of distribution between commercial and non-commercial recreation permits or the distribution of hunting permits between landowner and non-landowners—and perhaps the development of a more comprehensive definition of equity. Similarly, among rationing mechanisms, visitor perspectives on merit-based systems require additional research. Given the findings of a national river recreation survey reported by Phillips (2023, p. 17) concerning recreationists’ propensity toward weighted lotteries, future research may consider seeking visitor preferences and perspectives on merit-based systems in additional contexts. Otherwise, the latest research items on this topic were published in 1989 (Shelby et al. 1989a; b). Additionally, future research may consider seeking more information on recreationist behavior as it relates to allocation. With emerging datasets such as mobile phone location data and digital reservation records becoming increasingly available, it is now easier to directly observe visitor behavior as it relates to allocation—thus providing the opportunity to run allocation experiments or observe natural experiments. Finally, given the dated nature of many of these research items, investigations of trends in sentiments as they relate to changing technology could be useful for managers faced with allocation decisions.

5 Conclusions

Historian Roderick Nash referred to recreation allocation as “emotional dynamite” (1981, p. 21). Perhaps above all, our review confirms Nash’s notion that people feel strongly concerning how recreation opportunities are allocated. After all, strong affinity, values, and dependence on a given recreation area are often the reasons recreation allocation is necessary—as they translate to high demand. The landscapes featured in this review—the walls of Scotland’s Ben Nevis, Lake McKenzie on Australia’s K’gari, the national parks of Japan, the rugged canyons of the western USA—harbor deeply-held values. Thus, it is perhaps not surprising that recreationists feel strongly about how access to these places is allocated. In contrast, it is surprising that such little research is available to guide the allotment and rationing of these high-quality recreation experiences. It is our goal that this review summarizes the findings of this relatively small body of literature and thus informs decision-making in these areas. Hopefully this review also inspires additional researchers to engage in this important work.

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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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William L. Rice is assistant professor of Outdoor Recreation and Wildland Management in the Parks, Tourism, and Recreation Program and Department of Society and Conservation at the University of Montana, where he leads the Wildland & Recreation Management Laboratory. He received his Ph.D. in Human Dimensions of Natural Resources and the Environment and Recreation, Park, and Tourism Management from Pennsylvania State University. His research seeks to provide wild-

land recreation managers with social science to improve the experiences of all visitors while preserving the ecosystems that support those experiences.



Kelsey E. Phillips is a resource assistant with the US Forest Service Wilderness and Wild & Scenic Rivers Washington Office. She received her M.S. in Parks, Tourism & Recreation Management from the University of Montana where her thesis research explored the equitable allocation of river recreation permits to the public from the perspective of river managers across the USA and obstacles to considering equity during these decision-making processes. She continues to work on recreation

allocation in her role as a resource assistant, along with interdisciplinary topics related to wilderness and wild & scenic rivers.



Christopher A. Armatas is a research social scientist with the Aldo Leopold Wilderness Research Institute. His research background focuses on wildlands management and planning through an interdisciplinary, social-ecological systems lens. His research includes qualitative and quantitative approaches to understand how human well-being is supported by the variety of benefits flowing from our public lands, social vulnerability to environmental and land use change, and methods for integrating science into public engagement efforts for large-scale planning processes.



Nicholas A. Pitas is a graduate of the Pennsylvania State University and currently serves as an assistant professor of Park and Recreation Management at the University of Illinois. His scholarship is focused on ensuring that parks, protected areas, and recreation services are available in an equitable fashion now and for future generations. Specifically, he seeks to better understand the impacts of these places and services, and to describe innovative methods for their financing and delivery.



Suiwen Sharon Zou is an assistant professor in the Department of Recreation, Sport and Tourism at the University of Illinois Urbana-Champaign. Her research focuses on the power of marketing and consumer behavior insights to improve financial sustainability in the context of outdoor recreation and tourism. Her research topics include user fees in parks and protected areas, greenspace ballot measure and voter attitudes/behaviors, rural tourism development, and visitor behavior and decision-making.



Abigail Fuesler is a PhD student at the University of Montana, studying in the Forest and Conservation Sciences program. She is a member of the Wildland & Recreation Management Laboratory and has a background in experiential education and gender studies. Abigail's research is focused on undergraduate outdoor academic programs and how advancements in technology impact adventure sport participation.