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A Scoping Literature Review of Fairness and Equity Engagement in US River Recreation Allocation Research

by **KELSEY E. PHILLIPS** and **WILLIAM RICE**

PEER REVIEWED

ABSTRACT River recreation in protected areas throughout the United States is increasing at a rapid pace, thus increasing stresses on river environments and the agencies that manage them. River recreation use allocation systems have been implemented, often in the form of permitting systems, to reduce impacts and distribute use among recreationists. However, these allocation systems are typically studied in the context of user preference, manager preference, and economic and policy considerations, thus it remains unclear to what degree these studies have addressed the concepts of equity and fairness within these systems. This scoping literature review explores how research on river permit allocation systems in the US has engaged with the concepts of equity and fairness to visualize gaps in the literature and identify where future work must be done in order to ensure equitable allocation in these river recreation areas.

Keywords: River recreation, permit, lottery, allocation, equity, fairness, management



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In his influential essay "Shooting the Wild Colorado," then-secretary of interior Stewart Udall began, "Every individual – and every family – should get to know at least one river" (1970, p. 83). Months later, President Lyndon B. Johnson would echo Udall's words in his remarks upon signing the Wild and Scenic Rivers Act of 1968: "Secretary Udall...said that every individual and every family should get to know at least one river. So today we are initiating a new national policy which will enable more Americans to get to know more rivers."

The passage of the Wild and Scenic Rivers Act codified the nation's appreciation of free-flowing rivers and streams, acknowledging the importance of preserving rivers with "scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values" (Wild and Scenic Rivers Act 1968) at a time when rivers were frequently being dammed, polluted, and developed. However, a burgeoning sector of the American public soon followed Udall and Johnson's call to discover their rivers, in this case via recreation. Steps were thus taken to limit use as a means of reducing impacts on visitor experience and the environments that support those experiences. River recreation managers in certain areas began to require use allocation in the early 1970s, when river trips on the Colorado River in the Grand Canyon exploded in use; more than 1,000 people floated the Colorado in 1966, versus 16,000 in 1972 (Nash 1977).

Since the beginning of this early period of federal use allocation, researchers have studied varying techniques along with the recreational user and river manager perceptions of these techniques. The actions falling under the concept of allocation are broken into two components: allotment and rationing (McCool and Utter 1981b). Allotment concerns the distribution of use between private and commercial boaters and apportions size allotments to each group. Common allotment techniques studied are historical use, even-split, even-pool, percentage of disappointment, and treat everyone the same (McCool and Utter 1981b). Rationing is defined as the distribution of individual use opportunities, and frequent rationing techniques studied are lottery, reservation, merit, pricing, and queuing (McCool and Utter

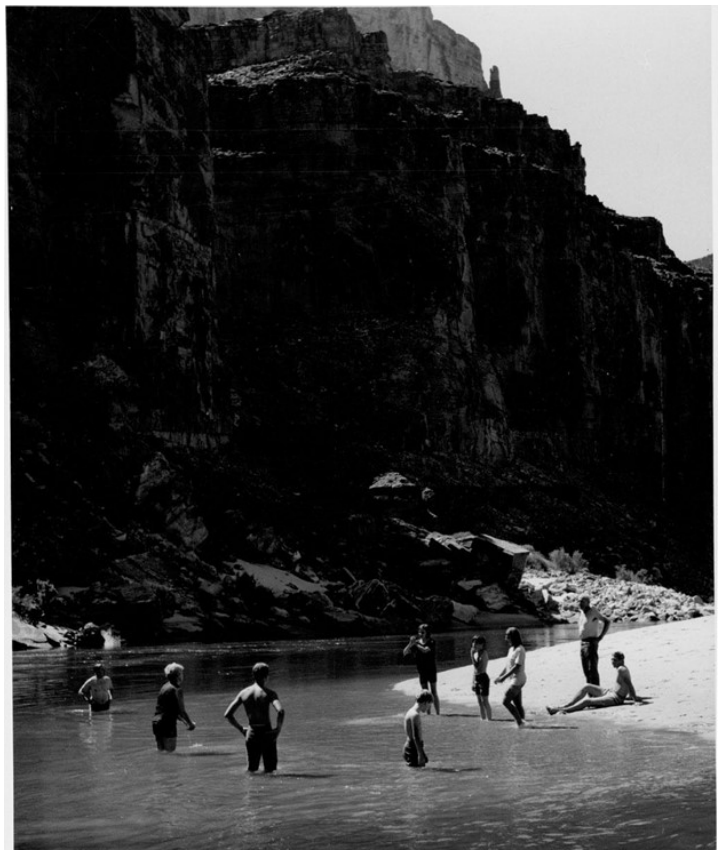


Figure 1 - Stewart Udall's family during a rafting trip down the Grand Canyon of the Colorado River, 1967. It is documented that this trip helped motivate the passage of the Wild and Scenic Rivers Act of 1968. (Grand Canyon National Park Archives)

1981b; Shelby 1981). Importantly, as noted by McCool and Utter (1981b), within the commercial sector, individual use is not rationed by the agency directly but rather is rationed by outfitters who use their allotted permits by selling river trips to commercial boaters (i.e., through a pricing system). In addition to these combinations of allotment and rationing techniques, researchers have addressed a complex multitude of other factors such as legality, public acceptance, and administrative feasibility (Wikle 1991). This particular study suggests that the public acceptance of a river permit rationing system is critical to management policy implementation, and many of the studies in this present scoping review address the issue of public acceptance.

Distributive Justice and Equity

In addition to public acceptance, administrative feasibility, and policy alignment, the issue of distributive justice is a crucial component of this multifaceted recreation issue (Shelby 1981). Distributive justice is defined as an ideal that involves several competing social goals, including equality, equity, need, and efficiency (Homans 1961). In the context of recreation use allocation, studies have discussed this ideal in different ways. For example, one study explored how equality may provide equal shares (or chance to obtain) of a commodity but may not always be “fair” due to some users needing or deserving more, which they define as the concept of equity (Shelby et al. 1989b). Need is then described as recognizing that individuals or groups may have requirements for normal functioning that are indispensable in specific situations, and efficiency is

defined as maximizing a resource by putting it to its most highly valued use. Other studies have discussed this ideal in the context of high-quality outdoor recreation opportunities and how these can be equitably distributed (Floyd and Johnson 2002). The authors note that economic efficiency could potentially be maximized by using one reservation system for all park area access opportunities, but that this would “have clear implications for environmental justice, particularly distributive justice” (Floyd and Johnson 2002, p. 70).

Importantly, the definition of equity in the context of the theory of distributive justice is not necessarily the same as it is utilized in the context of “diversity, equity, and inclusion (DEI).” The differences between equity as defined in the context of DEI and that which we use in this scoping literature review (relying on the definition derived from the distributive justice lens) is a crucial aspect of this conversation that merits future work in this area. In 2021, the federal government prioritized “provid[ing] resources and opportunities to strengthen and advance diversity, equity, inclusion, and accessibility” and called upon executive departments and agencies to “redress inequities in their policies and programs that serve as barriers to equal opportunity” (Executive Order 13985). This charge provides a central motivation for the present research, as many of the river recreation use allocation systems used in the US today were designed decades ago when equity may not have been a decision-making factor. Additionally, the definition of “equity” has changed conceptually since many of these studies were conducted, and therefore

more research is critically needed to include the modern conceptualization of the term in the current context. In relation, our primary research questions: how has river-use allocation research engaged with the concepts of fairness and equity and, subsequently, what actions are needed to inform a decision-making process or framework that incorporates these concepts?

Methods

Scoping studies aim to explore the key concepts within a given research area that have not been previously reviewed in-depth, as opposed to a systematic review – which may be more focused. For the purposes of this river recreation allocation review, we aim to identify research gaps in the existing literature (inclusive of peer-reviewed literature, government reports, conference proceedings, and other “gray” literature), as well as summarize the research findings of the studies included. To do so, we used an established five-step scoping review methodology: (1) identify research question, (2) identify relevant studies, (3) study selection, (4) chart data, and (5) collate, summarize, and publish results (Arksey and O’Malley 2005).

Following the identification of our research question, in our second step, we used a Boolean-based keyword inquiry to search four platforms: Google Scholar, Web of Science, ProQuest, and Ebsco Host. The same Boolean-based keyword inquiries were utilized for each platform (Table 1). Research items (peer-reviewed or published as technical reports) that met this keyword inquiry were included in this scoping literature review if they were based within US river recreation settings, administered by a federal public land management agency, and empirically studied river recreation allocation using quantitative or qualitative methods. Third, if studies met these inclusion criteria, each was coded based on whether the concepts of equity or fairness were engaged in a discussion-based way or engaged within the study design directly. To be considered “engaged” in this review of the literature, the words “equity” or “fairness” had to be used directly and were coded based on where in the study these words were engaged (study design or discussion). “Equity” and “fairness” are defined in this study based on the concept of distributive justice, where “equity” is defined as the balance of an individuals’ contribution to a system with the outcomes for the individual, which parallels with the concept of fairness more generally (Homans 1961). Fourth, studies that met the inclusion criteria were analyzed and coded using a priori coding methodology based on whether equity and fairness were engaged, and if so, if this

<p>“river recreation”</p>	<p>“permit” “allocation” “management”</p>	<p>“equity” “fairness”</p>
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Table 1 - Scoping literature river keywords used for Boolean-based keyword inquiries (example: “river recreation” AND [“permit” OR “allocation” OR “management”] AND [“equity” OR “fairness”]).

engagement occurred in the introduction or discussion of the study, or within the study design itself. The final list of research items that met inclusion criteria was sent to two experts in the field, one a foundational scholar and the other a practicing scholar, to review for exhaustiveness. Fifth, and finally, we summarize our results using a narrative synthesis approach (Mays and Pope 2020).

Results

Due to the very limited scope of this particular field of research, our Boolean-based keyword inquiry provided a large number of results that were not relevant to this study and were therefore removed. Of the 10 research items returned by our Boolean-based keyword inquiry that met our inclusion criteria, five engaged equity or fairness in a noncentral way, i.e., equity and/or fairness were discussed in the introduction or discussion sections but were not central to the design or purpose of the research. Five others centrally engaged with themes of equity and/or fairness in their study design. Two external experts in the field of river recreation use allocation reviewed the list and confirmed its exhaustiveness. A list of these studies can be seen in Table 2.

Paper	Equity/fairness central to study design?
Chouinard and Yoder (2004)	Central
Loomis, J. B. (1980)	Central
Schomaker and Leatherberry (1983)	Central
Shelby et al. (1982)	Central
Shelby et al. (1989b)	Central
McCool and Utter (1981b)	Not central
Shelby et al. (1989a)	Not central
Siderelis and Moore (2006)	Not central
Stankey (1977)	Not central
Wikle (1991)	Not central

Table 2 – Articles meeting inclusion criteria.



Figure 2 – The Middle Fork of the Salmon River has been the focus of multiple research projects focused on river recreation rationing. (Brad Pearson/Public Domain)

Equity/Fairness Not Centrally Engaged

We provide limited results for research items that did not centrally engage with equity or fairness. That research begins, chronologically, with Stankey (1977), who outlined the lottery system used on the Middle Fork of the Salmon River in Idaho as being founded on the assumptions that (1) the US Forest Service (USFS) seeks to maintain the functioning of the outfitting industry, (2) the permit system chosen should be fair and equitable, and (3) should fit within the agency's budget and personnel limitations. Despite equity and fairness being discussed in Stankey's (1977) workshop proceeding, most of the discussion centered around differences between commercial outfitters and private party permit accessibility under the Middle Fork of the Salmon River system, specifically. Additionally, Stankey (1977) recommended managing river recreation allocation on a regional level to deliver diverse experiences to meet multiple users' needs and more easily address equity concerns. He noted, however, that "any rationing system discriminates against certain people; in fact, it is this discriminatory feature that makes rationing work" (p. 400).

Stankey (1977) was quickly followed by McCool and Utter (1981b), who twice mentioned "fairness" in the context of the allotment systems. These are both brief discussions of respondents' perceptions of the 50-50 split system (between commercial and noncommercial boaters on the Middle Fork of the Salmon). Nowhere did the authors discuss or engage with the concept of equity, and instead focused on the preferences of different river users on this specific river at this

particular time in order to inform management agencies of what these users would prefer to see in a permit allocation system. Shelby et al. (1989a) applied a distributive justice framework in a discussion of user income, free time, proximity to the launch site, and perceptions of merit as possible factors in floaters' perceptions of allocation systems; however, this discussion centered more around users' perceptions of their own chance at obtaining a permit under each system rather than whether each allocation system allows for equitable distribution among these factors. Wikle (1991) explored different river permit rationing system preferences between river users and managers. In this study, lottery systems were discussed as being "eminently fair" and flexible enough for managers to adjust for fairness or efficiency goals. First-come/first-served was noted to favor those groups with fewer time constraints such as young and elderly users, and pricing systems were noted to discriminate against those unable to pay, despite being the most economically efficient system to utilize from a management perspective. Merit systems would discriminate against those unable or unwilling to gain the necessary experience and training and would be difficult for managers to determine what is "appropriate" behavior. Importantly, while Wikle (1991) discussed fairness and discrimination as it pertains to river permit rationing methods in the introduction of each permitting approach, the author did not discuss or engage with this topic beyond the introduction of the paper. Finally, Siderelis and Moore (2006) applied an economic approach to explore hypothetical modifications in per-

mitting procedures and the effects on whitewater boating behavior. While this paper considered user preference and included household income data in some of their modeling, equity and fairness of each permitting system was not discussed.

Equity/Fairness Engaged in Study Design

Aside from partial engagement with fairness or equity in river recreation allocation, other studies more fully engaged with these concepts directly in their study design. Shelby et al. (1982) explored the allocation preferences of backpackers and river runners, using a questionnaire to investigate allocation method preferences in three different study areas in Oregon. The authors discussed the merits of varying allocation systems, mentioning both equity and social efficiency in these discussions. Queuing (waiting in line) was discussed in the context of pricing, where time rather than money is traded for a specific recreation resource opportunity. The authors mentioned that queuing discriminates against users who do not live close to the backcountry area in question or value their time more than those users with fewer time constraints. Similarly, they discussed the merit-based allocation system as increasing social efficiency due to the time, effort, and money spent acquiring the skills required to obtain a permit (thereby placing a high value on the commodity) but also noted that this requires the system to specify who is "worthy" of this permit. Perceived fairness was measured directly via user questionnaires, and the authors discussed equity and fairness in the context of social efficiency as well. In the context of fairness, this study found that users favored pricing and reservation systems, and that river runners favored reservations more than backpackers. River runners also perceived lotteries to be fairer than queuing as compared to backpackers.

Another early paper by Loomis (1980) examined the equity versus efficiency issues that emerge when rationing the ecologically based optimal carrying capacity of river recreation use, employing a demand-for-use curve to model the intersection of a marginal ecological damage function derived from visitor use impacts. This study used an economic approach to estimate the demand function of optimal capacity and estimated the equity-efficiency trade-offs for both price and lottery rationing systems on the Colorado River in Westwater Canyon. This was done to explore optimal carrying capacity of river recreation use rationing when environmental damage is used instead of desire for solitude as the binding constraint. The author described allocation systems as maximizing efficiency to society from river recreation use based on carrying capacity and noted a "companion goal" of equity. This study described five allocation systems and how each of these meet equity and efficiency definitions, noting that each system requires users to give up a specific resource (whether it be time, money, etc.) to receive a river permit. This study focused on the pricing system, which was described as more efficient, and the lottery system, which was described as more equitable. Ultimately, a ratio of equity (an "equity index") for rationing systems was proposed, where managers could assess the cost of sacrificing efficiency to gain equity in specific allocation systems.

Schomaker and Leatherberry (1983) also investigated the concept of equity centrally by

exploring whether permit reservation systems discriminate against any identifiable group of the population by studying floaters on 26 river stretches in the US. In this study, fairness and equity were discussed in the context of river recreation being a public resource, thus managers must provide an equal opportunity to float the river to all users. From this perspective, first-come/first-served reservation systems were described as favoring those who are able to plan far in advance and contrasted this with lottery systems that give all applicants an equal chance to float a river. Ultimately, this study concluded that river recreation reservation systems do not discriminate against an identifiable group on these river segments but noted that if managers are concerned about this possibility, adjusted reservation systems that allow for allotted drop-in use could potentially be utilized. This paper engaged with the concept of equity on a direct level, aiming to measure potential inequities involved in river recreation reservation systems across the nation. However, the term "inequity" as it is used in this paper constrains itself to the river-running population, as most studies mentioned in this scoping literature review do as well.

Perceived fairness in the context of pragmatism was investigated by Shelby et al. (1989b) in a study of river runners on the Snake River in Hells Canyon for different allocation alternatives, finding that willingness to try an alternative was pragmatic and more strongly associated with perceived chance of success than with perceived fairness of the alternative. Acceptability, however, was found to be an idealistic evaluation for users and was more

strongly associated with fairness, discussed in the context of distributive justice. The authors developed a model that describes the relationships between user perceptions and evaluations of the five allocation alternatives studied, whether these were perceived as giving users a chance of success and whether they perceived the system as fair, and whether the alternatives were acceptable. While multiple conclusions can be drawn from the model developed in this study, the implication most crucial to managers developing new allocation systems is that users are most willing to try a system that will get results for them specifically, but also accept any system that they perceive to be fair, thus having both idealistic and pragmatic components.

Viewing this issue from a DEI lens is an important step in determining the accessibility of these river recreation settings and the allocation techniques utilized within them. Identifying the gaps in the literature as they pertain to equity and fairness (such as spillover effects, displacement, and ecological and social impacts) will be critical for river recreation managers to implement permit allocation systems that are acceptable and equitable to all potential users.

A final group took an economic approach to studying permit allocation, this time exploring the economic theory that allowing permit

trading in whitewater rafting lotteries would increase welfare among rafters due to the differential valuation of rafting trips among users (Chouinard and Yoder 2004). The authors explored several different market restriction options, using the Four Rivers Lottery system in place by the USFS in Idaho, in which permits are nontransferable. The authors discussed that while agencies have often considered alternative permit allocation schedules, such as rationing permits by price, these are rarely used as the primary method due to the inequity associated with pricing systems, as users with higher incomes are more likely to receive a permit. Chouinard and Yoder (2004) ultimately aimed to investigate this market restriction and whether it should be imposed from an economic standpoint. The authors discussed the level of efficiency under lottery versus pricing permit allocation systems, noting that pricing methods provide the most efficiency but are less equitable than lotteries. Lotteries, the authors noted, minimize preferential treatment toward certain groups regarding ease of access. Through evaluating three scenarios – the status quo (no secondary market), a secondary market for only "rafters," and a secondary market for anyone, including "nonrafters" – the authors concluded that a post-lottery market for rafters is a "double-edged sword" (p. 22). While rafters could trade permits and improve the aggregate value of river use, they would be less likely to obtain a permit in the initial lottery, ultimately paying more to an individual.

Discussion

Seminal papers such as Stankey (1977), Shelby et al. (1981), and McCool and Utter (1981b) set the groundwork for river recreation use allocation and began to discuss the equity of different distribution systems in their discussions. Schomaker et al. (1983) engaged with the concept of equity directly in their study design, aiming to identify potential inequities in different river recreation systems across the country. Later papers such as those by Shelby et al. (1989), Wikle (1991), and Siderelis et al. (2006) built on this research and continued the discussion of equity in their studies but did not always include these concepts directly in their study design. Additionally, Shelby et al.'s 1989b study explored users' perception of fairness directly and is a key example of equity engagement in the field. More economics-based papers such as those by Chouinard et al. (2004) and Loomis (1980) took a hypothetical approach to river permit allocation, discussing equity but from the standpoint that pricing systems are the primary method for achieving economic efficiency, thus are not focused on maximizing social equity, *per se*. Collectively, these studies either attempted to measure perceived fairness or inequity directly through surveys and questionnaires or used economics-based approaches to hypothetically manipulate the permit market to investigate equity or fairness for different adjustments. Importantly, the concepts of fairness and equity from an allocation or market perspective, as utilized in these studies, are quite different from an environmental justice perspective. The 2022 US Department of Interior definition of equity as "the consistent and systemic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such

treatment" (Secretary's Order No. 3406, 2022) is a modern and inclusive approach to the complex issue of achieving equity, and it is important to note that these studies were predominantly conducted decades ago when this topic was not discussed with the same nuance. Despite the evolving nature of these concepts, it is important to explore the river recreation literature for how they have been studied historically so that we can continue this research using modern and inclusive definitions. This updated look at equity in river recreation allocation is crucially needed, as river recreation continues to grow in the US, and river recreation use allocation systems continue to be implemented. While directly engaging with these concepts within a study design does not inherently lead to a large-scale impact on river allocation practice, these studies provide a few management implications worth noting.

Importantly, when discussing equity and fairness in most of these studies, these concepts are defined in terms of river-running populations, not recreationists more generally. By measuring "equity" as simply which groups within a population of river users can benefit from a reservation system (e.g., Shelby et al. 1989b), equity is not being discussed on the larger scale of the general population of those who are legally able to access public land, which is theoretically all people. This perspective is critical to note as in many of these studies, equity is discussed only for those users who are able to utilize the river recreation resource, and not all potential users more generally. Viewing this issue from a DEI lens is an important step in determining the accessibility of these river recreation settings and the allocation techniques utilized within them. Identifying the gaps in the literature as they pertain to equity and fairness (such as spillover effects, displacement, and ecological and social impacts) will be critical for river recreation managers to implement permit allocation systems that are acceptable and equitable to all potential users.

Limitations

An important limitation of this research rests on the fact that the word "equity" is defined differently across eras and contexts. Thus, temporal changes in context—and perhaps increased use of the word in the present context—may have impacted our review. Additionally, it is possible that some research items may have discussed equity or fairness without using the words themselves.

Conclusions and Management Implications

The issue of river recreation use allocation is not a new one, nor has use slowed down in the time since its allocation began being studied. Discussions of equity and fairness within these allocation systems were exploratory during the decades following their initial implementation (e.g., Shelby et al. 1989b). Different researchers have prescribed different frameworks, with some suggesting common frameworks and policy directives across all US river systems (Shelby 1981), and others stating that allocation decisions should be made on an individual river or regional basis (Lime 1981). McCool and Utter (1981a) have suggested a middle ground, stating a need for a national policy for recreation allocation to act as a framework for river managers, but that this policy would require flexibility to fit the needs of specific rivers and their unique social-environ-

mental contexts. They state:


Each group should recognize it cannot win at the loss of some other group. Each should understand that there are significant commonalities among all groups: each wants to protect the resource, each wants a quality experience, each does not want an expensive bureaucracy, each wants a fair and equitable allocation system. (p. 76)

The competing interests of commercial and noncommercial boaters have been debated publicly since use was restricted and has been brought to judicial review on more than one occasion. Transactive planning is one suggested model for managing these diverse interest groups, offered as an alternative to the more widely used synoptic planning approach to river recreation use allocation (McCool and Ashor 1984). This transactive planning approach directly involves the public and citizen groups in the decision-making process, noting that river management "occurs within the context of a highly politicized environment." However, the scarcity of river recreation resources is important to note here, as different user groups have different values and "lifestyles," so to speak. Schreyer and Dalton (1982) note that:

The rhetoric focuses around "crowding," or "motors vs. no motors," but the underlying issues are really concerned with the demand for types of experiences at differing levels of organization. Further, there is the recognition that managing for the facilitation of one type of experience may hinder the attainment of another. Thus, managers have been forced to confront concerns of social equity at the forefront of cultural evolution. (p. 139)

They make a comparison of managing user conflicts as "a series of brushfires" rather than broader recreation resource planning, which they point to as a pressing need in whitewater recreation management.

With almost 50 years of discussion surrounding river recreation use allocation, managers still do not have a clear path forward. While this scoping literature review does not fully describe the work surrounding river recreation allocation, it is important to note that it is not an extensively studied field, and there has been a gap in research since the 1970s on this topic. Perhaps partially as a result, many of the policies implemented at this time in different river recreation areas are still in use today, despite changing use numbers and different environmental and social concerns. Thus, more research is required to understand how allocation impacts equitable access to outdoor recreation, especially as we emerge from a global pandemic wherein lower income individuals and Black, Indigenous, and People of Color were more likely to cease outdoor recreation than begin participation (Taff et al. 2021). While studies surrounding allocation processes have discussed equity and fairness as theoretical concepts worth taking a deeper look at, this deeper look has yet to come into focus. The question of whether each allocation technique is equitable or fair to all potential river users has been addressed at varying levels since the 1970s, as this scoping literature review explores. But equity in this context is utilized at a minimal level of engagement – discussed within the framework of distributive justice and solely studying just

those users that already have access to a particular river. Future research will require a more extensive exploration into how equity might be weighed in concert with efficiency in informing allocation design, and whether current river recreation use allocation systems are equitable to all potential users, not just those that know how to work within the river recreation system. 

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