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Applying the United States Forest Service National Framework for Sustainable Recreation to the Entiat Ranger District: From Theory to Implementation

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M.A. Field Project

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Abstract

Recreation managers in the United States Forest Service (USFS) across the country face reduced budgets, increased visitation, and costly infrastructure problems . In the West especially, increased frequency and severity of wildfires has led to the closure and/or extreme damage to recreation opportunities. To address these issues, the USFS released the *Framework for Sustainable Recreation* in 2010 to guide recreation planners using principles of sustainability. Sustainable planning theory has existed in the literature since the 1980s as an approach to the consequences of climate change that incorporates economic, environmental, and social equity (Brundtland, 1987). Since 2010, some National Forest regional and forest-level offices have drafted localized guides to sustainable recreation. However, these documents remain at a broad, theoretical scale rather than providing operating guidance for ranger district staff (Selin, 2017). In 2019, the Entiat Ranger District (ERD) of the Okanogan-Wenatchee National Forest in Washington state, began developing the Entiat Sustainable Recreation Strategy. This document was created using participatory planning methods in combination with field evaluations of current ERD infrastructure. The development of the Strategy provides a case-study to analyze how sustainability principles are adapted from broad planning guidelines and applied on a local scale. The results of this case study illustrate how sustainable planning theory fails to meet the needs of current planning in the USFS, which is incapable of providing the opportunities it once did for recreationists. Rather than attempt to maintain the status-quo, planners should prioritize the facilities and opportunities most desired by current recreationists that do not impede on environmental protection. This type of management incorporates resiliency theory as the fourth dimension to sustainability (Ahern, 2013). As disturbances such as wildfire and major budget cuts impact managers ability to sustain recreation opportunities, managers must invest and divest in resources strategically to be able to meet recreation demands over the long-term.

Introduction

Reduced Forest Service Recreation Spending

As recreation use increases on public lands (Figure 1), federal spending for maintenance or expansion has been decreasing for decades (*2020 USDA Explanatory Notes*, 2020; Outdoor Industry Association, 2018). The Recreation, Heritage, and Wilderness account, which covers recreation spending for the Forest Service, has decreased by 23% since 2001 (U.S. Department of Agriculture, 2018) (Figure 2). As of the 2020 federal budget, $258 million was appropriated to the Recreation, Heritage and Wilderness account, $42 million less than necessary just to cover deferred trail maintenance costs. Moreover, inadequate budgets are reflected in the number of volunteers and community partners who help maintain recreation sites across the country. Nearly 70 percent of recreation sites are maintained or enhanced in some way by volunteers, which is reflected in the reduction of paid staff within the Forest Service (*2020 USDA Explanatory Notes*, 2020).
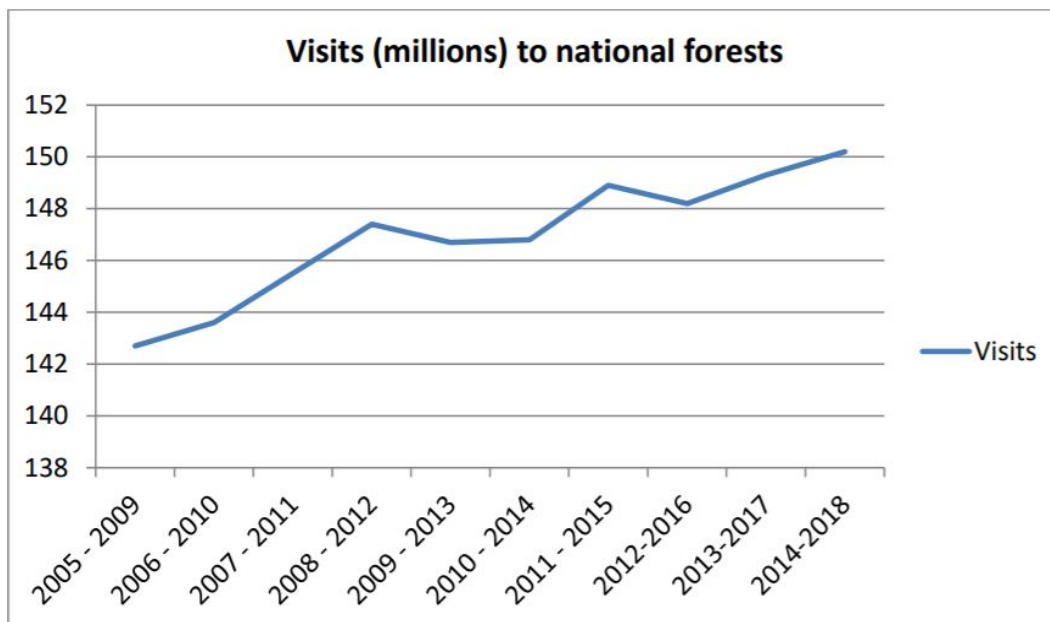

Figure 1. Visits to National Forests in the millions since 2005 (USFS National Visitor Use Monitoring Survey Results National Summary Report, 2018)
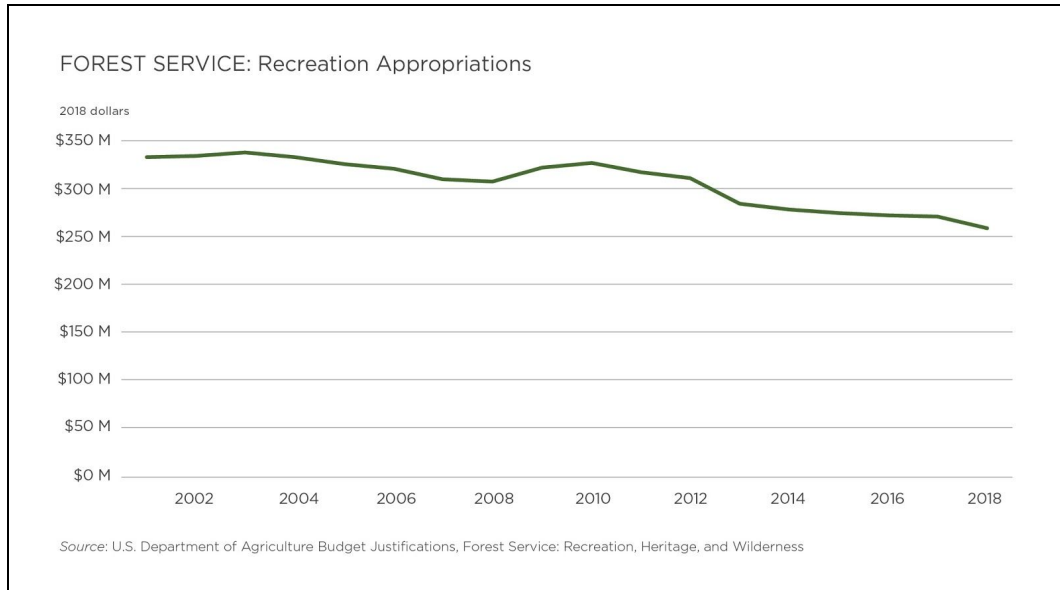
FOREST SERVICE: Recreation Appropriations

Figure 2. Forest Service budget appropriations to the Recreation, Heritage, and Wilderness Account from 2001 to 2018 adjusted for inflation (USDA Budget Justifications, 2018)

More Frequent and Severe Wildfires

Along with budget reductions, results of climate change such as more frequent and severe wildfires pose additional management challenges (Noss et al., 2006). Fire dependent ecosystems are prevalent throughout the American West. The occurrence of fire is not new, however, the frequency and severity has increased due to improper management, climate change, and encroaching human development. Now, as a result of nearly a century of fire-suppression, primarily by the Forest Service, high fuel loads propel fires across millions of acres annually. Beyond the initial destruction caused by these fires, poor management has led to entirely altered wildfire regimes and landscapes across the West (Agee, 1993; Dombeck et al., 2004; Hoover & Hanson, 2020; Noss et al., 2006).

Today, total fire-suppression policies are no longer the norm in the Forest Service along with the understanding that fire is a natural part of ecosystems. Managers now strategize how to provide recreation within a fire-adapted ecosystem while protecting sensitive environments and user safety. Recreation infrastructure is expensive to maintain under regular conditions, and becomes even more costly when wildfire damage requires extensive repairs or replacement. Common post-fire management strategies include logging-out dead and/or fallen trees, restoration through planting, and inevitably trail and site closures. Strategies must be implemented in a way that considers the temporal and spatial variability of wildfires, rather than relying on broad prescriptive policy (Noss et al., 2006). It may be appropriate to close sites in areas that are ecologically vulnerable after a fire like those with steep slopes or along river banks (Brown et al., 2008). However, other areas may open to new opportunities like permitted firewood cutting to assist with post-fire cleanup. In addition to the ecological components of

post-fire planning, managers must also consider social and economic consequences of their decisions.

Forest Service Planning: Public Participation

For over the last half-century, the Forest Service has governed all formal planning with a number of major rules. As agency priorities changed from primarily timber production to ecosystem protection to delivering opportunities to recreationists, new rules were implemented. The resulting Planning Rules were designed to sustain timber yields for generations, incorporate ecosystems science into planning, and hold managers accountable through citizen participation (Multiple-Use Sustained Yield Act of 1960, 1960; United States Forest Service, 2012). These rules provide mandates for local planning such as necessitating public participation and collaboration throughout planning processes. They require public involvement for all forest management plans based on the knowledge that "public participation can include greater understanding of interests underlying the issues and the potential development of a shared vision for the plan" (United State Forest Service, 2012, p. 21194). Public lands belong to all United States citizens. Thus, participation allows land managers to involve the owners of the land in the decision-making process.

Public participation is defined as a system of two way-communication with the purpose of incorporating citizen needs, goals, or values into government or corporate decision-making. The overall purpose of public involvement is to develop an outcome supported by the public through an organized process (Creighton, 2005). The complex nature of environmental management and the resulting impacts to social and economic issues require that planners look for diverse viewpoints that offer creative solutions to difficult problems and solutions that work for all communities. Participation methods such as interviews, surveys, focus groups, and community forums are used by USFS managers to gage public needs or desires. It is significant to note that these methods do not engage all communities at the same rate. Constraints to participating in USFS planning such as lack of time, failure by managers to engage, and historic distrust of federal agencies unequally impacts underrepresented groups, especially people of color (Arnstein, 1969; Koontz et al., 2004). Some methods of participation have been more effective in reaching these groups such as interviews and focus groups, even though these methods are more time consuming and reach fewer individuals than methods like surveys and public meetings (Laurian, 2009; Tashakkori & Teddlie, 2003; Thompson et al., 2005). Using a combination of these methods could minimize the limitations of one while taking advantage of the strengths of others to reach a broad and diverse group of participants (Tashakkori & Teddlie, 1998).

Forest Service Planning: Sustainability

Sustainability was originally defined in the Brundtland World Commission on Environment and Development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (1987, p.16). Brundtland's broad definition has since been applied to various fields such as business and

economics, community development, and environmental management. In the context of natural resource management, the USFS uses ecological, economic, and social principles to define sustainability. According to the 2012 USFS Planning Rule, sustainability is "the capability to meet the needs of the present generation without compromising the future"(United States Forest Service, 2012, 21272). The overall goal of sustainable management is to provide the same resources and opportunities in the future as are available today.

Sustainable recreation has been a fundamental component of USFS planning strategies since 2010 with the release of the *United States Framework for Sustainable Recreation* (Recreation, Heritage and Volunteer Resources, 2010). The strategy outlines key goals and visions for recreation. Major plan goals to address the three factors of sustainability include: restoring and adapting recreation settings, implementing green operations, enhancing communities, investing in special places, forging strategic partnerships, promoting citizen stewardship, providing the right information, developing a sustainable financial foundation, and developing our workforce (United States Forest Service, 2010, p.5-8). These goals provide guidance for localized planning, but no direct instructions on how to implement sustainability.

In a content analysis of six regional implementation strategies of the *United States Framework for Sustainable Recreation,* Selin illustrated the flexibility given to regional offices in defining "sustainable recreation" (2017). The stated goals within the *Framework* relate to social, environmental, and economic sustainability, yet they lack an overarching definition of sustainable recreation, which allows for flexibility at the regional level (Selin, 2017). Major themes appeared consistently in all six regional plans. While the specific, local actions differed, the overarching themes between the six strategies had similarities. All six strategies cited the following: "ensure financial sustainability of recreation programs" and "enhance identity/visibility of recreation programs." Highly cited steps were "sustainability analysis, revenue enhancement, citizen stewardship" (Selin, 2017, p.43). As regional strategies, these plans remain broad and lack specific recommendations for management actions at the district level. While more local than the national *Framework*, Selin's examples still illustrate a lack of clear definition of "sustainable recreation."

In the Nantahala and Pisgah National Forests in North Carolina, managers used the *Framework* to guide development of a non-motorized trail strategy. The strategy provides clear justification for investing in current trails based on identified definitions of social, environmental, and financial sustainability. For example, a trail is socially unsustainable if "the trail is not being used, has overgrown or fallen into disrepair, and has no volunteers willing to perform maintenance" (USFS, 2015, 12). These concrete definitions allow managers to use the document regularly to inform decision-making.

Since the national strategy was published, USFS Regions and Forests have developed more locally oriented strategies. However, until 2019 there were few if any strategies that aimed to implement sustainable recreation on a ranger district-level. In 2019, the Entiat Ranger District in Central Washington's Okanogan-Wenatchee National Forest received funding from the Washington State Recreation and Conservation Office to develop a Sustainable Recreation Strategy. The purpose of the strategy is to guide on-the-ground management decisions by incorporating social, environmental, and economic/financial concerns most relevant to the 272,101-acre district.

The purpose of this article is to review the process of developing the local sustainable recreation strategy aimed at informing day-to-day decision making in the Entiat Ranger District (ERD).The complexities of the Entiat Ranger District, while localized, are far from unique. Reduced USFS budgets, increased use, and frequent severe wildfires are themes that echo throughout the public lands in the American West. The ERD provides a case study for implementing the national USFS 2010 *Framework for Sustainable Recreation* on a district-level.

Case Study Site: The Entiat Ranger District

The Entiat Ranger District (ERD) is part of the Okanogan-Wenatchee National Forest unit in Central Washington. Located between Wenatchee and Chelan, Entiat, Washington, is in the heart of the Central Cascades recreation area of Washington state (Figure 3). The district's 272,101 acres include the 25,557 acre Glacier Peak Wilderness Area, and offers hiking, motorbiking, camping, mountain biking, and more. Beyond recreation, regular wildfire events characterize the Entiat Valley. The USFS categorizes the Entiat Ranger District as having a wildfire ecology, meaning the environment is adapted and dependent on a regular wildfire regime (USFS, n.d.).

Several fires in the last decade have severely damaged recreational facilities. Most notably, the Wolverine (2015) and Cougar Creek (2018) wildfires caused prolonged closure of recreational opportunities in the ERD. In 2015, much of the upper Entiat was closed due to hazards associated with the Wolverine Fire. The upper valley did not reopen until the spring of 2017, which was quickly followed by a severe wildfire season in 2018. Managing recreation in a fire-adapted region necessitates prioritizing recreation opportunities to establish which opportunities and assets should be maintained and which should be decommissioned.

The most popular activities in the Entiat are OHV riding, backcountry camping and hiking, general nature viewing, and horse riding. The Entiat has become particularly well-known for motorized recreation opportunities in recent decades (Laninga, Galambos & Meier, 2020). The nearly 140 miles of motorized trails draw dirt bikers, and OHV-riders in general, from across the state. Along with trails, motorized recreationists utilize Forest Service roads to access high elevation scenery unique to the region. In addition to its motorized notoriety, the Entiat is popular among mountaineers looking to reach peaks like Mount Maude, Saska Peak, Emerald Peak, and more. For mountaineers across the state, the

Figure 3. *The Entiat Ranger District is located in Okanogan-Wenatchee National Forest in Washington (USFS, 2020)*

Entiat provides solitude as an unknown gem in the Central Cascades. Both motorized and non-motorized recreationists find advanced opportunities away from Western Washington crowds. However, like many ranger districts in the West, much of the infrastructure of the Entiat was built decades to nearly a century ago (Laninga, Galambos & Meier, 2020).

Campgrounds, roads, and trails in the Entiat were built during times of larger budgets, more staff, and fewer visitors. While the legacy of resources has provided generations of access to the Entiat region, it has also led to potentially unrealistic expectations for the future. Current federal financial resources cannot match those of previous generations. As a result, the purpose of the Entiat Sustainable Recreation Strategy is not simply to uphold a status-quo developed lifetimes ago. Instead, priorities were developed with the current staff and budget capacity, future growth in visitation, and rapidly changing environmental conditions in mind.

Methods

Both qualitative and quantitative data collection methods were used to complete the Entiat Sustainable Recreation Strategy. These methods were divided into what was referred to as "social data" and "physical data" related to recreation infrastructure and field conditions (Table 1). Multiple methods were used within each data category for both qualitative and quantitative results. Employing these mixed methods provided researchers the ability to combine social science research focused on user needs and values with quantitative information regarding where infrastructure exists, its condition, and its popularity among users.

Table 1. Data Categories, Methods and Strategy Components.

Data Category	Data Method	Strategy Components
Social	Stakeholder Interviews	Popularity classification, district-wide goals and recommendations
	Open House	
	Online Survey	
	Interactive StoryMap	
Environmental	Trail & Campground Evaluations	Trail Score and site-specific-recommendations
Institutional Knowledge	Staff Workshop & Interviews	Priority trails for evaluation and Trail Score

Social Data Collection

This project employed a sequence of participatory mixed methods to inform the strategy priorities based on user needs, values, and preferences (Tashakkori & Teddlie, 2003; Teddlie & Yu, 2007). Sequential methods have been shown to allow researchers to refine methods after

each stage to inform the next method. Additionally, utilizing mixed-methods allowed the researcher to triangulate results and therefore affirm or question a result of one method based on the results of another. Finally, since all public participation methods have weaknesses, the aim of using multiple methods was to offset weaknesses with the strengths of other methods (Bryman, 2006).

The first method was key informant interviews with 25 stakeholders that were primarily identified by the Forest Service recreation manager. These stakeholders represented environmental nonprofits, local government agencies, recreation interest groups, local business owners, as well as retired Forest Service staff who still reside locally. The participants were asked 13 questions about their connection to the ERD, recreation opportunities, and their advice for managers. At the end of the interview, participants were asked if there were other people they recommended the researchers contact. Those not already on the list were added and contacted for an interview.

Informed by the interviews, the researchers hosted two public meetings in October 2019 in partnership with the Forest Service staff. The first meeting was hosted in Entiat on Saturday, October 5, 2019, at the Entiat Fire Station Community Room. A second meeting was held in Wenatchee the following Monday, October 7, at the Chelan County Fire Station. The purpose of hosting two meetings was to capture more community members who might have schedule restrictions due to where they live or work. About 25 people attended the Entiat meeting and about 10 attended the Wenatchee meeting.

The goal of both meetings was to collect insights and perspectives from attendees. Each meeting began with short introductions from the researchers and Forest Service staff before transitioning to self-guided activities for participants. Participants spent the majority of the meetings moving independently through four activity stations (Table 2). Utilizing this informal method, researchers were able facilitate discussions between attendees at each station much like an informal focus group.

Table 2. Public Meeting independent activity descriptions.

Station 1: Current Recreation Locations & Activities	Mark on the map locations where you recreate and the types of activities you do there.
Station 2: Future Recreation Opportunities	Mark on map new recreation opportunities you would like to see in the future, and areas you would like to see restored.
Station 3: Major Recreation Values Posters	Dot Activity - Show which statements you agree (green) and disagree (red) with. What's missing?
Station 4: Opportunities for Collaboration	What does the community need from the FS/what does the FS need from the community?

In addition, the researchers used open houses to determine the level of support for the major themes that resulted from stakeholder interviews. This was one way to confirm the

reliability of interview findings.The final purpose of the meetings was to inform community members of the planning process and encourage them to participate in the next stages of data collection — the interactive StoryMap and online survey.

The story map was initially published in the spring of 2019 concurrently with the USFS press release as a communication method for public engagement. A story map is an online presentation tool that incorporates text, maps, and images to bring readers through a narrative.The purpose was to collect specific data on recreation use on the Entiat Ranger District. Participants could drop points on the online map to identify trails and sites in the ERD and answer three questions with each corresponding point. The questions mimicked a question from the survey, which was also the basis of activity 1 for the Open Houses. By asking the same questions with three different collection methods, the researchers aimed to reach a wide audience (Laninga, Galambos & Meier, 2020).

The final method of social data collection was the online survey, which was distributed November to December 2019 through Qualtrics. To generate the sample, potential survey respondents came from three sources. First was the list of stakeholders from the initial interviews, along with any additional contacts recommended by stakeholders, which resulted in 53 contacts. Second was a list of contacts collected by researchers during field evaluations through in-person intercepts. While on trails, researchers spoke to nearly every adult they encountered with the purpose of collecting contact information. The researchers used paper contact cards with information about the strategy and space for an email address and/or physical address. For individuals who did not want to give their contact information at that juncture, the researchers distributed alternative cards with project information and an online link where they could give contact information. The researchers collected 47 completed contact cards over the summer. An additional 64 individuals gave their contact information through the online link. Third, a list was used of email addresses of interested persons maintained by the Okanogan-Wenatchee National Forest. The Okanogan-Wenatchee National Forest's list of interested persons amounted to 338 contacts. These were persons who had previously indicated an interest in events and updates in Chelan County, where the ERD is located.

Using methods outlined by Dillman et. al (2014), which included one initial invite, two follow-up emails, and one final non-response invitation, the survey was sent to 502 individuals over five weeks. The survey concluded with a response rate of 32% with 161 completed responses. The response rate was lower than anticipated, however, the online survey represents just one data source among many.

These combined methods provided both qualitative and quantitative data regarding users' preferences, needs, and values with regard to recreation in the Entiat Ranger District. The sequence of these methods allowed researchers to inform the following method with the results of the previous to narrow the project scope. Furthermore, the variety of methods broadened the scope of participants and provided the opportunity to triangulate results. A final public meeting was held online in April 2020 primarily as a method to communicate the strategy progress and to confirm that our findings from the social data collection methods aligned with public sentiment.

Recreation Infrastructure/Field Condition Data Collection

To incorporate data on the physical condition of recreation infrastructure, researchers created an original field evaluation system for trails and campgrounds. Recreation ecology literature points to erosion as the biggest concern for land managers regarding trail-related challenges. Erosion can damage trail tread as well as impact regional environments through increased waterway-turbidity (Olive & Marion, 2009). Poor trail tread can also encourage damaging user-behaviors such as switchback cutting and trail braiding (Farrell & Marion, 2001). From a financial perspective, trail erosion is also of primary concern because it requires substantial investment to correct. Additionally, literature suggests that management variables such as allowed use and seasonal closures, combined with and topographic realities like trail alignment and slope, influence trail infrastructure (Marion & Wimpey, 2017).

For the physical conditions reports, researchers focused on features present on the trail at the time of the study. These features were primarily variables related to erosion but also included safety issues such as unimproved crossings, major obstacles, and availability of signs. The database included 21 possible features each with an index for attributes such as severity, size/length, etc. For example, an unimproved crossing feature also required details for the length and availability of an alternative route. Using the ESRI applications Survey123 and Collector, the researchers collected feature data by hiking 24 trails over ten weeks. With close to 200 miles of trail in the district, researchers relied on Forest Service staff to prioritize trail evaluations based on visitor use and management issues. The evaluations produced close to 2,000 GPS points with feature information along with written, mile-by-mile accounts of every trail evaluated. Much like the social data, these trail evaluations combined qualitative and quantitative methods to give a full analysis.

Data Synthesis

The synthesis section of this article reviews how the methods accomplished the goal of creating an implementable strategy out of theoretical concepts of sustainability. The findings from the methods described above are not covered here. Those results are included in the final *Entiat Sustainable Recreation Strategy*. This section focuses on the methods researchers used to complete a strategy informed by qualitative data from social and field research guided by principles of sustainability. It also outlines the success and/or limitations of translating the results of social and field data into strategy priorities.

Translating Qualitative Data into Sustainable Management Priorities

As suggested by the literature, using sequential participatory mixed methods allowed the data to be triangulated between sources. For the ERD strategy, mixed methods provided legitimacy to the results of one method with those of another. Themes or responses that were common throughout all methods could be prioritized within the strategy over those that appeared only within one collection method. This was especially important as a tool to utilize qualitative data, such as recreation use patterns, in a quantitative way and thus prioritize specific infrastructure. To do this, researchers created an index to rank trails and sites based on the number of times each was mentioned across all three social data methods. Based on the

social data, trails and sites fell into four classifications of popularity: mentioned, somewhat popular, popular, and most popular (Table 3). Popularity was assigned using descriptive statistical methods to identify the interquartile range of the number of mentions per recreation site and trail (Figure 4).

Table 3. The Classifications for Trail/Site Popularity.

User Popularity Ranking	Number of Mentions
Mentioned (1)	1-2
Somewhat popular (2)	3
Popular (3)	4-9
Most popular (4)	10 or more

Interquartile Range of Frequency of Mentions of Sites in the ERD

1st Quartile: 2   Median: 3   3rd Quartile: 9

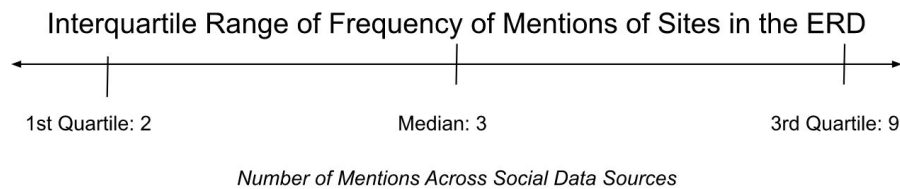*Number of Mentions Across Social Data Sources*

Figure 4. *The scale of popularity of a trail is determined based on the frequency of mention in the online survey, story map, and at open houses.*

These classifications allowed researchers to provide direct recommendations for which infracture should be prioritized based on user need or interest. Sites and trails with little to no public interest should have less investment than those most popular among users. Figure 5 shows user popularity by feature in the ERD. This ranking method provided a tangible means for applying social sustainability.
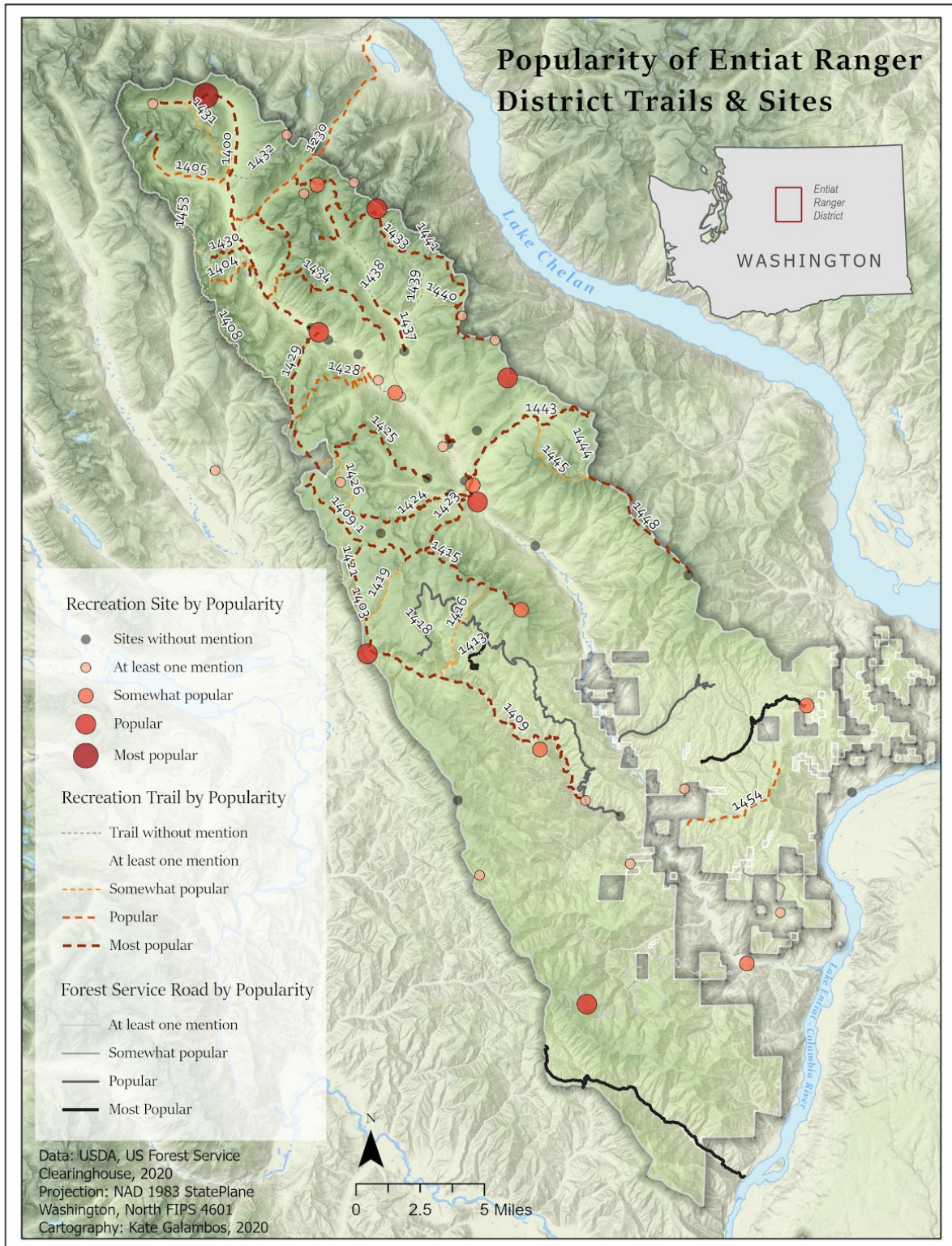
Figure 5. The results of the social data sources translated to classification of popularity for trails, sites, and roads across the district.

To incorporate the environmental and financial sustainability principles, researchers created another ranking system that utilized the results of the field evaluation data. Each GPS point collected while hiking in the ERD was given a total based on the type of feature and attributes assigned to that feature. Features were ranked according to the degree of resources or investment required to repair, restore or replace the feature. The ranking was based on expert knowledge from a diverse group of field office staff. Table 4 shows the ranking for the 21 features based on a scale of 1-4. This scale was based on the likely required maintenance of each feature. Features with a score of 1 were identified as "natural features" and therefore required no maintenance. Score 2 indicated existing maintenance, score 3 were identified as those that are impeding safety in their current state and therefore require additional maintenance. Finally, a score of 4 was only given to the erosion feature as instances of this feature likely meant total trail redesign was required. Additionally, each feature had a number of attributes. For example, an unimproved crossing included attributes of length, availability of alternative route, etc. Each attribute was given a numerical scale as well. An algorithm was developed to calculate an overall Trail Score for each trail that divided the number of trail features by the trail feature rank and numerical attribute ranks. Figure 6 shows the Trail Score formula.

Table 4. Feature Ranking Results.

Feature	Rank
Fall Line Slope	1
Blacked Vegetation	1
Wet Area	1
Washboarding	1
Trail Braiding	1
Snag	1
Potential Hazard	1
Unimproved Crossing	2
Obstacle	2
Scenic Vista	2
Cut Switchback	2
Culvert	2
Improved Crossing	2
Improved Steps	2
Fall Line Slope	3
Insufficient Signage	3
Washout	3
Overgrown Veg	3

Trenching	3
Concrete Trellis	3
Erosion	4

$$\text{Trail Score} = \frac{(Feature\ Rank(Attribute1Rank + Attribute2Rank)) + (Feature\ Rank(Attribute1Rank + Attribute2Rank))}{Number\ of\ Features}$$

Figure 6. *The final trail score formula.*

This analysis method translated the results of qualitative data into a system of prioritizing infrastructure based on principles of sustainability. In this case, trails with higher Trail Scores represent the least financially and environmentally sustainable in their current condition and therefore require the most investment to repair, restore or replace.

A final step was taken to create a Final Trail Score that coupled the physical conditions Trail Score with the user popularity ranking to give a final value to each trail. To do this, the Trail Score was multiplied by the popularity classification (Figure 7) thus weighting each trail based on user interest. The results of this ranking method was a quantitative index that translated multiple data types into a tool managers could use to prioritize infrastructure maintenance according to sustainable principles.

$$\text{Final Trail Score} = \text{Popularity Classification} \times \text{Trail Score}$$

Figure 7. *Formula to determine the Final Trail Score*

Beyond recreation use patterns (i.e. where/how people recreate) in the ERD, the social data methods collected more broad, value-based information. These results illuminated respondents' views on the purpose and value of the ERD, which were translated into strategy goals.These goals acted as a framework to guide consistent management beyond the specific recommendations listed in the strategy. In this way, the strategy utilized a management-by-objectives framework to ensure the community's values remained central to decision-making (Manning et al., 2011).

Five goals established an outline for long-term aims for the district (Table 5). These goals were drafted more informally than the trail and site priorities but still reflected the concepts most present during conversations with the public and Forest Service staff. Additionally, these goals were guided by sustainability literature and current Forest Service sustainability plans, policies, and documents. It was still essential to show a tangible connection from these goals to actionable priorities in the strategy. As stated in the literature review, much of the previous Forest Service sustainable recreation policy is too theoretical for direct application. In order to truly utilize the ERD strategy, all data needed to clearly relate to recommended action(s).

Table 5. *District-Wide Goals for the Entiat Sustainable Recreation Strategy.*

Goal	
1	Provide recreation opportunities that are accessible to current and future visitors
2	Create a resilient natural, cultural and scenic environment that supports recreation for future generations
3	Partner with public and private groups to ensure safe and quality recreation opportunities that consider changing visitor interests
4	Implement shared stewardship to ensure sustainable decisions, sound investments, and accountability in all recreation planning
5	Communicate with the public and partners effectively to support long-term relationships and decision making

To implement these five goals, researchers drafted District-Wide recommendations to pair with site-specific recommendations that resulted from the Final Trail Score. These District-Wide recommendations are relevant throughout the district, reflect long-term goals, and incorporate more broad recreation policy from the Forest and Regional level. The purpose of each District-Wide recommendation is to help fulfill one, or multiple, of the above goals. To demonstrate this, these recommendations each correspond to one or more goals. For example, one recommendation, to "identify locations for front-country trails based on environmental suitability," corresponds to goals two and three. Combined with the results of the Trail Score index, these recommendations provide action-oriented guidance for recreation managers based on community input and field evaluation.

Limitations of Trail Score as Sustainability Index

While the Final Trail Score provided a simple way to translate the results of both the social and field methods, it relied entirely on count data to inform management priorities. The popularity of trails and sites was determined by the number of mentions each received throughout interviews, open houses, and the online survey. As a result, the preferences of the majority of respondents were prioritized over those of the minority. Demographic data was collected for all survey respondents and showed respondents skewed male (66%), whiter (89%), older (55% over 55 years old) and English-speakers (93%). Formal data was not collected for the demographic makeup of interview and open house participants, but was generally reflective of the survey respondents. Issues of representation in participatory methods are a common theme within the literature (Rowel et al., 2012; (Stephenson) Triplett & Johnson, 2011). This strategy aimed to combat these limitations by using mixed methods to broaden and diversify the reach of the social data.

Based on the demographic data collected from the survey, the strategy did not engage a representative group of respondents. Nearly one third of the population of Chelan County (home to the ERD) is composed of those who identify as Hispanic/Latino (28.2%) (U.S. Census Bureau, 2019). Additionally, the Entiat Valley is homeland to indigenous people of the plateau area and is of importance specifically to the Yakama Nation and Confederated Tribes of Colville Reservation. About 2% of Chelan County identifies as American Indian or Alaska Native while 1.5% of survey respondents identified as such (U.S. Census Bureau, 2019). As it is likely that people outside of Chelan County utilize the ERD, these comparisons still do not reflect the actual demographic profile of users or potential future users of the ERD. These data simply show a general comparison of who participated in the strategy versus who might actually recreate in the ERD. Those who participated were highly influential in the final results of the Final Trail Score as the field conditions data was weighted by the popularity classification. Thus, trails popular among respondents were prioritized over those that were mentioned less. It is possible then that trails of lesser mentioned could still be important to underrepresented groups even if that is not reflected in the Final Trail Score thus undermining the social sustainability of the strategy.

Finally, the Final Trail Score focused only on prioritizing trails. Campgrounds did receive an alternative form of analysis which resulted in each being about equal in terms of priority. However, sites beyond trails or campgrounds were not evaluated based on current condition. While these alternative sites were mentioned in the strategy as additional data collected through social data sources, they were not the primary focus. These methods assumed trails, and to a slightly lesser degree campgrounds, as the most important recreation opportunities in the ERD. Alternative sites could include National Forest roads, dispersed camping areas, day-use areas, river access points, and more.

Application

The synthesis section of this case study offers a window into how researchers operationalized theoretical concepts of sustainability for implementation at a Forest Service district level. The result is a strategy that used mixed methods, both social and field research, in an attempt to address the three branches of sustainability: environmental, social, and economic/financial. To do this, researchers used qualitative methods and translated the results into a prioritization system — the Final Trail Score — as well as direct recommendations to apply district-wide.

Application of *United States Framework for Sustainable Recreation Goals*

To understand how well the ERD strategy met the Forest Service's ideas of sustainability, it is beneficial to compare the goals of the *United States Forest Service Sustainable Recreation Framework* to the strategy. Table 6 shows the Framework goals with which ERD Strategy components informed the goal's application at the district level.

Table 6. *Application of USFS Framework for Sustainable Recreation Goals to the ERD Strategy.*

USFS Framework for Sustainable Recreation Goal	Corresponding *Entiat Sustainable Recreation Strategy* Component
Restore & Adapt Recreation Settings	Field evaluations
Implement Green Operations	Final Trail Score
Enhance Communities	Participatory mixed methods (social data)
Invest in Special Places	Participatory mixed methods (social data)
Forge Strategic Partnerships	Participatory mixed methods (social data)
Promote Citizen Stewardship	Participatory mixed methods (social data)
Know Our Visitors, Community Stakeholders, and Other Recreation Providers	Interviews & Open Houses/Public Meeting
Provide the Right Information	Participatory mixed methods (social data), Strategy Goals
Develop a Sustainable Financial Foundation	Field Evaluation Strategy Goals
Develop Our Workforce	Strategy Goals

Restore & Adapt Recreation Settings. The ERD Strategy used recreation infrastructure/field evaluations to analyze the current recreation settings and plan for the future. These evaluations informed the Trail Score index, which managers can use to plan trail and site restoration, additions, and closures where appropriate.

Implement Green Operations. The national *Framework* focuses on aligning operations with "green" policy to reduce environmental footprint. Since the ERD Strategy was not focused internally, the strategy did not outline recommendations for managerial policies related to operations. However, the results of the Trail Score index can be used to reduce the environmental footprint of the ERD because managers can prioritize projects based on environmental data. Investing in restoration and maintenance will reduce the environmental footprint of users by creating more resilient infrastructure.

Invest in Special Places. The national *Framework* focuses on special places that are especially scenic or historic. These concepts are value-based, and therefore subjective. For the purpose of the ERD Strategy, special places were defined by those who participated in interviews, the online survey, open houses, or the public meeting. While some places may not be formally defined as scenic or historic, it is fair to say that those places identified by ERD respondents are just as "special."

Forge Strategic Partnerships. At the center of the ERD Strategy recommendations are the needs, values, and interests of community members who participated in the interviews, the online survey, open houses, or the online public meeting. These methods strengthened existing

partnerships and forged new ones. Participants of all of these research methods were asked about their interest in partnering with the Forest Service. These informal conversations and input laid the foundation for future partners and strengthened existing relationships.

Promote Citizen Stewardship. Utilizing participatory methods to engage the public in the strategy development promoted citizen stewardship. These methods provided opportunities for dialog between Forest Service staff and the public. Open houses were particularly critical to promoting stewardship because of the informal atmosphere. Forest Service staff were able to communicate their needs, offer gratitude for the support they already had, and brainstorm new ways of including citizen stewards. Community members were able to learn more and get excited about available recreation opportunities.

Know Our Visitors, Community Stakeholders, and Other Recreation Providers. Interviews, open houses, and the public meeting provided avenues for Forest Service staff to get to know visitors, stakeholders, and other recreation providers. However, since interviews were conducted by researchers and not FS staff, the Forest Service was not able to get to know interviewees first-hand. Instead, staff received the results of these interviews, which were anonymous. The open houses and public meeting provided a better opportunity for FS staff to meet with the community face-to-face. These methods were still limited though, as they failed to reach a representative group of users and potential future users. As stated in the limitations, people who identify as Hispanic and/or Latino were likely underrepresented in the participatory mixed methods.

Provide the Right Information. The participatory methods required external communication with the public to gather input on strategy goals and recommendations. Additionally, the interactive story map provided a resource for project updates and communication. Not only could the Forest Service communicate to the public, but the interactive feature allowed the public to provide comments to the Forest Service. Additionally, this resource could continue to be used for project updates and general news regarding the Entiat Ranger District.

Develop a Sustainable Financial Foundation. The field evaluations of both trails and campgrounds provide a baseline of current infrastructure, which managers can use for cost-benefit analysis. These evaluations also provide insight into the exact type of improvements necessary for trails and campgrounds. With this knowledge, managers can delegate appropriate projects to volunteer steward groups and prioritize staff time for more complicated, intense maintenance.

Develop Our Workforce. The ERD strategy addresses the need to develop the Forest Service workforce as part of the overall goals. Specifically, the strategy recommends a volunteer coordinator position be developed to support stewardship groups.

The ERD Strategy met most of the criteria outlined by the national *Framework* to achieve sustainable recreation programs. Furthermore, this strategy expanded the necessary components of sustainable planning to incorporate resilience and advocacy planning. These additional theoretical lenses aided researchers in addressing disturbances like fire and severe financial limitations as well as justifying recommendations that addressed needs of underrepresented groups.

Resilience Capacity

Traditional sustainability theory focuses on preserving the current resources for the future through environmental, economic, and social policies, design, research, etc. (Selin, 2017). This framework assumes that these resources can and should be preserved at the same rate into the future. In the context of the ERD, it was inappropriate to develop a strategy that recommended all current infrastructure be maintained for future generations. To do so would ignore the financial limitations of the district that were not present when much of the infrastructure was built. Additionally, wildfires were less regular and severe, both due to management and climate, in the early to mid-1900s when the district trails, campgrounds, and roads were constructed.

To address the realities of wildfire and reduced recreation budgets, the ERD Strategy employed resilience capacity as an additional framework to the three branches of sustainability. Resilience is the capacity of infrastructure and planning to mitigate the consequences of known disturbances in the long-term (Ahern, 2013). Following this framework, recommendations included specific details such as using fire-resistant wood or steel to construct major infrastructure. Related to reduced budgets, the recommendations focused on identifying new sources of funding and strengthening partnerships with volunteer groups. Finally, the strategy generally acknowledged the inability of Forest Service staff to successfully manage and maintain all recreation opportunities to the same capacity of managers in the 20th century. Rather than attempt to stretch resources thinly across the district, the ERD Strategy makes recommendations that focus attention to highest priority infrastructure.

Advocacy Planning

As stated earlier, the participatory methods of this strategy failed to fully reach underrepresented groups. The bulk of the recommendations were drafted to represent the needs and interests of the majority of respondents as their voices were heard most frequently. In order to be an equitable and socially sustainable strategy, the researchers still needed to include recommendations that could serve minority communities such as Hispanic and/or Latino users or differently abled users.

Interview, survey, and open house participants did not express interest or concern for ADA-accessible facilities, bilingual signs and programs, or more active outreach to underrepresented communities. To incorporate these services as recommendations researchers advocated beyond the needs and interests of the respondents. This was crucial to mitigating the limitations of participatory planning methods. Advocacy planning argues that planners have a special responsibility to plan for the needs of historically disadvantaged groups (Davidoff, 1965). This responsibility means incorporating the needs of communities even when they are not as present as others. As such, the strategy, among other suggestions, recommends putting Spanish on new signs and identifies the only ADA accessible trail as high priority for maintenance. However, the strategy's limited recommendations should not be used in place of seeking out connections with underrepresented communities as the strategy is still mainly shaped by professionals and majority voices.

Conclusion

The Entiat Sustainable Recreation Strategy offers a case-study to analyze methods of applying the *United States Forest Service Framework for Sustainable Recreation* to a local, action-based district plan. The *Entiat Sustainable Recreation Strategy* utilized primarily qualitative methods to address the three branches of sustainability: environmental, social, and economic (financial). Data synthesis illustrates how it is crucial to create a prioritization system to inform action-based recommendations on a site-specific and district-wide scale. The development of the Trail Score index allowed researchers to clearly indicate what infrastructure was most important to users and in need of the most investment. By translating the qualitative results to a quantifiable ranking system, the strategy avoided the broad, theoretical based planning common in the national *Framework* document. Furthermore, the strategy was able to meet the *Framework's* criteria for sustainable recreation by either the methods, results, or both.

Additionally, the strategy incorporated resilience capacity and advocacy planning to mitigate the limitations of sustainability principles and public participation. Guided by resilience theory, the strategy made specific recommendations to combat major disturbances in the ERD including fire and severe budget limitations. This allowed researchers to look beyond the status-quo and plan for the most likely future rather than the abundant past. As the means of engaging the public failed to reach representative respondents, researchers advocated for recommendations beyond those informed by the public. Specific recommendations included bilingual signs, investment in ADA-accessible facilities/trails/sites, and increased outreach to Hispanic and/or Latino recreation groups.

While the complexities of the Entiat Ranger District are localized, they are far from unique. Forest Service districts around the country are faced with similar issues derived from increased demand, diminishing financial resources, and a changing climate (USFS, 2010). Regional and district offices that aim to provide quality recreation that is sustainable, culturally responsive, and resilient to a changing climate can learn lessons from the *Entiat Sustainable Recreation Strategy*.

References

2020 USDA Explanatory Notes. (2020). 259.

Agee, J. (1993). *Fire Ecology of Pacific Northwest Forests*. Island Press.

Ahern, J. (2013). Urban landscape sustainability and resilience: The promise and challenges of integrating ecology with urban planning and design. *Landscape Ecology*, *28*(6), 1203–1212. https://doi.org/10.1007/s10980-012-9799-z

Arnstein, S. (1969). A Ladder Of Citizen Participation. *Journal of the American Institute of Planners*, *35*(4), 216–224.

Brown, R., Rosenberger, R., Kline, J., Hall, T., & Needham, M. (2008). Visitor Preferences for Managing Wilderness Recreation after Wildfire. *Journal of Forestry*, *106*(1), 9–16.

Brundtland, G. H. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. General Assembly of the United Nations.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, *6*(1), 97–113. https://doi.org/10.1177/1468794106058877

Creighton, J. L. (2005). *The Public Participation Handbook: Making Better Decisions Through Citizen Involvement* (1st ed.). Jossey-Bass & Pfeiffer Imprints, Wiley.

Davidoff, P. (1965). ADVOCACY AND PLURALISM IN PLANNING. *Journal of the American Institute of Planners*, *31*(4), 331–338. https://doi.org/10.1080/01944366508978187

Dombeck, M., Williams, J., & Wood, C. (2004). Wildfire Policy and Public Lands: Integrating Scientific Understanding with Social Concerns across Landscapes. *Conservation Biology*, *18*(4), 883–889.

Farrell, T. A., & Marion, J. L. (2001). Trail Impacts and Trail Impact Management Related to Visitation at Torres del Paine National Park, Chile. *Leisure/Loisir*, *26*(1–2), 31–59. https://doi.org/10.1080/14927713.2001.9649928

Hoover, K., & Hanson, L. A. (2020). *Wildfire Statistics*. 3.

Koontz, T., Steelman, T., Carmin, J., Smith Korfmacher, K., Moseley, C., & Thomas, C. (2004). *Collaborative Environmental Management: What Roles for the Government?* Resources for the Future.

Laninga, T., Galambos, K., Meier, J. (2020). *Entiat Sustainable Recreation Strategy*. USDA
　　　Forest Service: Entiat Ranger District, Okanogan-Wenatchee National Forest and
　　　Western Washington University.
　　　https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd841393.pdf

Laurian, L. (2009). Trust in Planning: Theoretical and Practical Considerations for Participatory
　　　and Deliberative Planning. *Planning Theory & Practice, 10*(3), 369–391.
　　　https://doi.org/10.1080/14649350903229810

Manning, R., Valliere, W., Anderson, L., McCown, R. S., Pettengill, P., Reigner, N., Lawson, S.,
　　　Newman, P., Budruk, M., & Laven, D. (2011). Defining, measuring, monitoring, and
　　　managing the sustainability of parks for outdoor recreation. *Journal of Park and
　　　Recreation Administration, 29*(3).

Marion, J. L., & Wimpey, J. (2017). Assessing the influence of sustainable trail design and
　　　maintenance on soil loss. *Journal of Environmental Management, 189*, 46–57.
　　　https://doi.org/10.1016/j.jenvman.2016.11.074

Multiple-Use Sustained Yield Act of 1960, no. Public Law 86-517 (1960).

Noss, R. F., Franklin, J. F., Baker, W. L., Schoennagel, T., & Moyle, P. B. (2006). Managing
　　　Fire-Prone Forests in the Western United States. *Frontiers in Ecology and the
　　　Environment, 4*(9), 481–487. JSTOR.

Olive, N. D., & Marion, J. L. (2009). The influence of use-related, environmental, and managerial
　　　factors on soil loss from recreational trails. *Journal of Environmental Management, 90*(3),
　　　1483–1493. https://doi.org/10.1016/j.jenvman.2008.10.004

Outdoor Industry Association. (2018). *Washington State Outdoor Recreation Economy* (Outdoor
　　　Recreation Economy). Washington State Department of Commerce.

Recreation, Heritage and Volunteer Resources. (2010). *Connecting People with America's
　　　Great Outdoors: A Framework for Sustainable Recreation*. United States Forest Service,
　　　USDA.

Rowel, R., Sheikhattari, P., Barber, T. M., & Evans-Holland, M. (2012). Introduction of a Guide
　　　to Enhance Risk Communication Among Low-Income and Minority Populations: A
　　　Grassroots Community Engagement Approach. *Health Promotion Practice, 13*(1),
　　　124–132. https://doi.org/10.1177/1524839910390312

Selin, S. W. (2017). Operationalizing Sustainable Recreation across the National Forest
　　　System: A Qualitative Content Analysis of Six Regional Strategies. *Journal of Park &
　　　Recreation Administration, 35*(3).

(Stephenson) Triplett, K. L., & Johnson, G. S. (2011). Environmental Justice and Transportation: An Analysis of Public Involvement at Pennsylvania Department of Transportation. *Race, Gender & Class; New Orleans*, *18*(3/4), 348–371.

Tashakkori, A., & Teddlie, C. (Eds.). (1998). *Mixed Methodology* (Vol. 46). SAGE Publications.
Tashakkori, A., & Teddlie, C. (Eds.). (2003). *Handbook of Mixed Methods in Social Science and Behavioral Science Research*. Sage Publications.

Teddlie, C., & Yu, F. (2007). Mixed Methods Sampling: A Typology With Examples. *Journal of Mixed Methods Research*, *1*(1), 77–100. https://doi.org/10.1177/2345678906292430

Thompson, J. R., Elmendorf, W. F., McDonough, M. H., & Burban, L. L. (2005). Participation and Conflict: Lessons Learned From Community Forestry. *Journal of Forestry*, *103*(4), 174–178. https://doi.org/10.1093/jof/103.4.174

United States Forest Service (USFS). (n.d.) Entiat Ranger District. Okanogan-Wenatchee National Forest. United States Department of Agriculture (USDA). Retrieved from https://www.fs.usda.gov/recarea/okawen/recarea/?recid=57119.

United States Forest Service (USFS). (Nov., 2015). Nantahala and Pisgah National Forests. United States Department of Agriculture (USDA).

United States Forest Service. (2012). *USFS Planning Rule*. Department of Agriculture.