PERCEPTIONS OF TRAIL SAFETY IN HUMBOLDT COUNTY, CALIFORNIA: AN ANALYSIS OF SAFETY CONCERNS, FACTORS THAT IMPACT TRAIL USE, AND THE VALUE PEOPLE PLACE ON TRAILS

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ABSTRACT

PERCEPTIONS OF TRAIL SAFETY IN HUMBOLDT COUNTY, CALIFORNIA: AN ANALYSIS OF SAFETY CONCERNS, FACTORS THAT IMPACT TRAIL USE, AND THE VALUE PEOPLE PLACE ON TRAILS

Natalie Arroyo

Trails in Humboldt County, California that are used for both transportation and recreation have myriad community benefits. However, people's concerns about feeling safe can affect trail use, design, and development, as well as how trails are valued and perceived by residents. There has been a lack of information in Humboldt County about trail safety perceptions despite it being a factor that repeatedly arises in infrastructure planning and funding conversations. My research was focused on answering the following questions: (1) How do Humboldt County trail users perceive their safety on and near trails? (2) What factors affect these perceptions about safety, and how do these perceptions affect the ways that people use and value trails? (3) How has development of trails changed the perception of safety in these public spaces over time? To answer these questions, I utilized a mixed methods approach that included an intercept survey of trail users on two local trails (n=198) and a series of semi-structured interviews of individuals who had unique knowledge about these two trails (n=15).

The input gathered from survey respondents and interviewees indicated that the majority of people who participated in the study felt safe on the trails, would recommend the trails to people they care about, value the trails greatly, and believe that the safety of

the areas around each trail were improved by trail construction. Among survey respondents, 89% rated their feeling of safety on the trails as positive. Survey respondents and interviewees emphasized how much they value the trails and shared a belief that trail development has made these areas safer. Participants expressed a significant interest in seeing public investment in these spaces and in using trails as a method of transportation to travel further and more frequently to key destinations. Specific design, management, and maintenance issues were identified that helped me to form a set of recommendations for future and existing trails in the region. These included an increase in formal patrols of trails, improvements to trail surfacing and striping, increased availability of waste disposal facilities, and more connections for pedestrians and bicyclists between trails and nearby destinations. I have connected these recommendations to best practices and important findings in the literature on community planning, landscape architecture, and design.

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INTRODUCTION

Trails for transportation and recreation have numerous benefits. Trails support reduced greenhouse gas emissions and traffic congestion by providing the opportunity to shift from travel in a motorized vehicle to an active, human-powered mode of travel (Brand et al., 2021; Mangan, 2020; Rose & Choe, 2015; Winer, 2017). There are more socioeconomically equitable travel options in communities with robust trail networks, especially when trails support people traveling without a motorized vehicle (Raskin, 2020; Shepley et al., 2019). Having trails as a nearby amenity leads to documented increases in property values and home resale potential in residential neighborhoods, as well as increased economic productivity in commercial businesses located near trails (Corning et al., 2012; Headwaters Economics, 2016; Lindsey et al., 2004). Having trails nearby can lead to a stronger sense of community pride, livability, and quality of life for residents (Deyo et al., 2014; Sandt et al., 2015). With respect to public health, trails provide increased protection from vehicle collisions for pedestrians, bicyclists, wheelchair users and skaters (Kaewunruen et al., 2016; Kuzmyak & Dill, 2012) as well as improvements to community health achieved by encouraging physical activity and providing a low-barrier option for people to walk, bicycle, skate, or use a wheelchair (Brownson et al., 2009; Pak & Verbeke, 2022).

Research suggest that safety and perceptions of safety are important factors that can drive trail use and benefits. On a national and international scale, there are numerous studies which explore the feelings people have about trails, greenways, and public parks. A meta-analysis of studies that gauged perceptions of safety and physical activity on

trails found multiple studies that showed people were less likely to be physically active in rural areas where trails were perceived as unsafe (Frost et al., 2010). In order to maximize the benefits of trails and to understand and address potential concerns, it is important to understand how trails affect perceptions of safety.

The study of people's perceptions is an important part of understanding human psychology, behavior and values (Foad et al., 2021), and it is gaining traction for resource managers because perceptions influence ecologically-friendly choices (Bennett, 2016; Zoellner et al., 2012). Perceptions about fear have been explored with respect to people hiking and using wilderness trails through a lens of supporting recreation, health, and independence, but these sources are not considering transportation as a primary goal (Coble et al., 2003; Jorgensen et al., 2013). Gathering information about perceptions about trails can provide important, actionable information related to trail use, management, and education.

There is a small body of literature related to perception of safety on trails and how these perceptions affect trail use (Schneider, 2000; Zoellner et al, 2012; Garcia et al, 2018). In these studies, a consistent finding is that trails make communities safer, that trails and publicly-accessible open space areas such as greenbelts, parks, or preserves with opportunities for pedestrian use have lower incidences of crime, and that trails have considerable other benefits (Brownson et al., 2009). Schneider (2000) found that "urban greenway trails do not increase crime and, in fact, are commonly regarded as improvements by adjacent property owners. Comparisons of mugging, assault, rape, and murder make it quite clear that rail-trail crime rates are almost non-existent on a per capita comparison to other areas" (Schneider, 2000). A literature review from the late

1990s included an analysis of safety information for 372 trails and determined that there were lower incidences of both violent and petty crimes in urban, suburban, and rural trail settings (Tracy & Morris, 1998). While the latter is one of the most robust compilations of available American trails and crime data over an approximately 10-year time period, more recent studies have also consistently supported these findings (Winer, 2017; Loh et al, 2012). The existing literature tends to focus on trails in urban areas and few studies exist in rural areas or in areas where there are significant transient or houseless communities.

Although the literature suggests a positive relationship between trails and safety, it is unclear whether those findings apply within the context of northern California. Available information about safety perceptions on northern California trails is typically associated with a specific trail development proposal, and access to the findings is often limited to public meeting records or trail studies aimed at identifying specific trail alignments, which are defined as contiguous trail locations or paths of travel (E. Sinkhorn, personal communication, 2021). Frequently, community members in Humboldt County speak to the "exceptionalism" of Humboldt – the sense that this community is different from others, and therefore cannot be compared to other parts of the state, nation, or world (C. Fiske, personal communication, 2023). There is a need for better data related to safety and trails in the Humboldt area to support better trail planning and management and to contribute more examples from rural communities to the trail-safety literature.

Humboldt County is facing a range of environmental challenges, including significant impacts from climate change, the highest rate of sea level rise on the north

American west coast due to rising sea levels and land subsidence (California Ocean Protection Council, 2018), increased wildfire frequency and increasingly volatile weather patterns (County of Humboldt, 2022), and looming challenges for maintaining civic infrastructure in the face of climate impacts (Grantham, T., 2018; County of Humboldt, 2023). In part due to its low population, large geographic area, and mountainous terrain, climate-friendly transportation options such as human-powered active forms of travel and mass transit exist but are constrained by resources or geography (HCAOG, 2022; HCAOG, 2023). These geographic and contextual factors mean that investment in robust networks of non-motorized or mass transportation systems are constrained while the impacts of climate change's local impacts are very apparent and visible to residents. The State of California's Active Transportation Program and a multitude of state and regional plans demonstrate a commitment to supporting active transportation for the purpose of supporting residents as they "make strides towards meeting their recommended daily activity levels, saving money on transportation costs, and reducing their carbon footprint. Combined with other transportation and land use strategies, active transportation can help build more sustainable communities in California." (California Air Resources Board, 2023; HCAOG, 2022). The County of Humboldt is in the process of developing a countywide Climate Action Plan, which includes strategies to increase active forms of transportation (County of Humboldt, 2022). Shared goals of increasing use of trails for transportation to advance public health and climate benefits are based on climate science data available at every level of government including from international sources (IPCC, 2022). There is a regional need to gauge people's reasons for traveling via trails and their potential for future increased use of trails because active modes of travel, like walking,

bicycling, skating, using a wheelchair or stroller, et cetera are linked to improved public health and decreased greenhouse gas emissions (IPCC, 2022).

Local information is needed to address concerns about a perception of trails as unsafe or undesirable. In the process of conducting trail planning in Humboldt County within the past ten years and via local media stories, community residents consistently indicate that they are concerned about public safety and access to public spaces by people who may be engaged in inappropriate or criminal activity (Eureka Police Department, 2017; RCAA et al., 2011). Specifically, the phrase “it will become a homeless highway” is used by community members to describe their concerns about potential future trail development (see Appendix C for example social media posts circa 2017 through 2022), and locals have shared strong feelings about their perception that public open spaces contribute to homelessness (Stansberry, 2017). When trails are adjacent to homes, residents express fears that criminals will have more access to opportunities for crime and a dark, hidden escape route (E. Sinkhorn, personal communication, 2021). There is a notable disconnect between trail studies that continually show that trails make communities safer, and the perceptions and fears that inform people’s communications and behavior in Humboldt County.

There are multiple trail planning projects on the horizon in Humboldt County and northern coastal California, including trails in the region’s most urban communities (each with a population below 30,000) and in very rural, isolated communities (Alta, 2019; GRTA, 2022; HCAOG, 2022). Quality data that helps to understand community concerns about public safety and how to address them will be valuable for the next stage of trail

planning on a regional level and can be applied in other communities that share similar characteristics.

To address these gaps in the literature and in local knowledge, I developed a mixed-methods research project to address the following questions:

(1) How do Humboldt County trail users perceive their safety on trails?

(2) What factors affect these perceptions about safety?

(3) How do these perceptions affect the ways that people use and value trails?

In addition to these core questions, I also sought to draw out people's perceptions about the value of local trails in their lives, whether they could see themselves making behavioral changes like increasing the distance of non-motorized travel on trails or increasing their frequency of use, and what specific concerns could be addressed to make this all possible. These questions were asked in part to understand what climate-related impacts could be achieved if trails were perceived as a good and safe option for travel.

LITERATURE REVIEW

This study draws from and is situated within a body of research and practice related to designing and managing safe public spaces which largely began in the middle of the 20th century and continues to evolve. This includes community planning literature that explores aspects of the "built environment" (infrastructure and physical spaces designed by people for people) as well as project-specific analyses and guidance documents to solve safety problems in defined geographic areas or settings. I also incorporated findings from research that explores the value of studying human perceptions to understand the actions, motivations, and decisions made by people, especially in the context of environmental behavior, planning, and management.

Community Planning and Design Literature Insights Related to Safety and Public Spaces

Scholars and practitioners in community planning and design have long considered the relationship between safety and the design of public spaces. Many approaches to public safety use a criminology lens to understand conditions that lead to highly discrete, specific, situationally dependent criminal acts (Clarke, 1983). These approaches may be effective in preventing certain crimes, but multimodal trails are dynamic public spaces - typically long linear areas that have changing environmental conditions depending on time of day and season, involving a variety of users and reasons why people use them. As a result, these complex environments are often best described by planners, architects, social scientists, and theorists who examine them as ever-

changing places while treating perception and human interaction as key elements of safety.

The work of a few key influential figures who examined and made observations about design of public spaces in the 1960s and 1970s has shaped much of the theory and practice related to planning and design. Jane Jacobs, an American writer who authored seminal urban planning texts based on her observation of large metropolitan American cities in the mid-20th century, described the importance of people being connected to one another and of places that support this connection. She frequently discussed the presence of groups of people as a circumstance that induces a perception of safety and a feeling of vibrance in public places, describing it as "…something everyone knows: A well-used city street is apt to be a safe street. A deserted city street is apt to be unsafe." (Jacobs, 1961). Additionally, Jacobs emphasized shared social responsibility among large communities of people, such that "people must take a modicum of public responsibility for each other, even if they have no ties to each other." (Jacobs, 1961). Jacobs advocated for dense, mixed-use development and walkable, connected streets that allowed people to gather and see one another. The study of physical attributes of the urban environment provided Jacobs with insight into people's relationship to public infrastructure, how it influences behavior, and ultimately, how it contributes to or lessens criminal activity. Three qualities of place she identified as important for safe shared use are: (1) Demarcation: clarity about which spaces are public, which spaces are private, and the definition between them, (2) Ownership of public space: a collective sense of observation of public space and shared obligation to maintain and behave appropriately in the space,

and (3) Constant users: frequent and continuous use of public spaces and observers to this use from adjacent buildings or other public rights-of-way (Jacobs, 1961).

A decade later, Oscar Newman, New York University's Director of the Institute of Planning and Housing, wrote about how to transform undesirable, dangerous conditions in urban areas and built upon Jacobs' focus on visual monitoring of public gathering places and routes of travel (Newman, 1971). Newman observed that crime was reduced when people could both see and be seen, such that "…residents, feeling that an area is secure, will make more frequent use of it and so further improve its security by providing the safety which comes with intensive use." (Newman, 1971). Newman proposed a set of core principles for architectural and facility design that create the feeling of "defensible space" – in this context, referring to space that provides a feeling of safety from crime. Lewis LaRue, a contemporary of Newman's and a law professor at Washington and Lee University, noted that:

> "[Newman's work] suggests that the topic for investigation is the link between the environment's physical shape and the inhabitants' mental state. The link might be physiological or biological; however, Newman's hypothesis, which is both plausible and worth investigating, is that the link is symbolic, i.e., people read certain physical shapes as having meanings which they understand and which thus influence their mental state." (LaRue, 1974).

Another theorist working at the same time as Newman, criminologist Clarence Ray Jeffery, authored Crime Prevention Through Environmental Design (CPTED) which focused on criminal psychology and behavior within the built environment (Jeffery, 1972). Jeffery's study of the physical characteristics of public spaces, including trails, parks, parking lots, and municipal buildings, sought to identify the aspects of these

settings that made criminals more or less likely to commit crimes. Jeffery's theories about criminal behavior were expounded upon by Tim Crowe in the 1990s and became a robust set of actionable principles and guidelines intended to enhance safety (Crowe & Fennelly, 2013). These CPTED approaches are widely used and promoted by law enforcement, architects, and public works personnel for the purpose of enhancing safety and reducing opportunities for crime in public places. Crowe distinguishes between approaches that are, "…organized (e.g., police patrol), mechanical (e.g., lighting), and natural (e.g., windows)", further clarifying that both programs and infrastructure play a role in safety (Crowe, 1993). While the Newman/Jeffery/Crowe theories that influence a set of core safety-through-design principles and practices are fully accepted in many communities, they have also been critiqued, particularly through a social equity and diversity lens. Joy Knoblauch, an architect and researcher, notes that:

> As a field, CPTED has yet to mature into more scientific practices of sharing data, or to account for complicating sociological factors; almost unchanged since Newman's day, it remains at best undeveloped on questions of race, gender, and economic class. At worst, it can be used to support exclusionary designs and policies. (Knoblauch, 2018).

Theories and research about the roles that walkable and bikeable community infrastructure play in communities have evolved from the 1990s through the 2020s. Transportation planners, landscape architects, and other practitioners who focus on making communities more pedestrian and bicycle-friendly have increased the focus on pedestrians and bicyclists due to their increased likelihood of being hurt when involved in a collision. Literature about the importance of walking and bicycling for people's well-being, local economies, and environmental outcomes has been produced, though many of

these resources focus on just one or two facets of safety. Jeff Speck, an urban planner, author, and the former Design Director for the National Endowment of the Arts, took a broader view of safety in his work, sharing guidelines to making walking safer, more utilitarian, and more appealing (Speck, 2012). Speck focused on the infrastructure required to make active modes of transportation technically feasible as well as how to make the experience comfortable, enjoyable, inviting, and frequent. He described the "fabric" of a very frequently walked community as having broad appeal, beauty, plenty of pedestrians, and abundant destinations. Speck noted that focusing exclusively on "adequate facilities" that meet technical specifications but lack *joie d'vivre* has led to "many an abandoned downtown" as well as underutilized parks, trails and other places that were specifically designed to support active transportation (Speck, 2012). Dan Burden, a former State Bicycle and Pedestrian Coordinator for the Florida Department of Transportation, has written about pedestrian safety and pedestrian use of public rights-of-way since the 1990s. Burden encourages a focus on engineering changes and physical improvements to the built environment that can support behavioral changes, leading to individual and community benefits (Burden, n.d.)

These community benefits can include long-term environmental improvements. In an analysis of seven European cities and "10,000 person-days of travel activity", researchers found that bicycling significantly lowered carbon emissions (Brand et al., 2021). Cycling to and from work or for social engagements reduced emissions the most significantly, and higher income earners who switched modes resulted in greater carbon emissions reductions than mode changes enacted by lower income earners. The research team's findings included:

> …highly significant associations between transport mode choice and total life cycle CO2 emissions... More cycling or walking decreased mobility-related life cycle CO2 emissions – suggesting that active travel indeed substitutes for motorized travel (i.e. this was not just additional travel over and above motorized travel). This means that even if not all car trips could be substituted by bicycle trips the potential for decreasing emissions is very high… The analysis of emissions for each trip purpose highlighted the relative importance of emissions from non-work/business trips, particularly trips for social and shopping purposes. (Brand et al., 2021).

Relationship Between Trails and Safety

Both the academic literature and planning and policy documents can provide insights and findings relevant to the relationship between trails, trail design, trail use, and perceptions of safety. However, substantial gaps in the understanding of these relationships remain. This study draws from trail planning and guidance documents from Humboldt County specifically as well as from other parts of the United States.

Humboldt County has a long history of planning for effective transportation. I reviewed planning documents for Humboldt County that outline regional trail and transportation needs, including the Humboldt County Regional Transportation Plan which contains a Commuter Trails Element (HCAOG, 2022), Humboldt County Regional Trails Master Plan (HCAOG, 2010), California Coastal Trail Implementation Strategy for Humboldt County (RCAA, 2011), and several plans developed from the 1980s through 2023 for smaller trail segments and individual communities where improved walking and bicycling connectivity is a top priority. The Humboldt People-Powered Pathways Project and multiple reports developed as part of this project identified safety measures such as trail patrols/ rangers, lighting, and other improvements as high priorities, however, only a

small portion of these recommendations have been funded. While some of these plans have included questions about safety in their planning phases, none included a comprehensive assessment of trail-related safety perceptions and concerns within the past 15+ years. Meanwhile, dynamics and trail connectivity have changed dramatically in that time. The Regional Transportation Plan's element on commuter trails includes policy language about trail safety, emphasizing "planning, design, construction, adequate maintenance, education, enforcement, and other actions to improve safety, and the perception of safety, for the intended uses of the regional trails system" (HCAOG, 2022). These local resources complement publications like a comprehensive guidebook of design requirements for multi-use trails, which speaks to "improved livability" in communities (Flink et al., 1993). This guide for trail planning, design, and management explores many of the aspects of trail siting, engagement with community members, and maintenance, all of which are identified as factors that affect feelings of safety.

Investment in rural non-motorized transportation infrastructure, including trails, is a strain of policy research that is particularly relevant to my study area. A comprehensive report about walking and bicycling in rural America explored the prevalence and benefits of walking and biking in communities ranging in size from 10 – 100,000 residents, with an emphasis on infrastructure investments in these places, showing that facilities for walking and bicycling have abundant positive impacts on rural economic health and public health (Loh et al., 2012). In this report, safety was primarily defined as safety from being hit by a car. A key finding was that federal funds for active transportation provide benefits to some rural areas that match or exceed the benefits experienced in urban areas. In large rural core communities (10,000-50,000 people, comparable to the population of

my study sites), trips made by foot or bicycle are similar to the national average, yet these smaller communities received about 10% less in funding (Loh et al., 2012). A group of land managers and researchers throughout the United States conducted a study of trail safety on rural tribal lands and found that a lack of access to walking paths has serious implications for safety within rural communities (Deyo et al., 2014). The researchers point out that, in these tribal, rural communities, a lack of trails or walking infrastructure is a result of reduced economic investment, noting that:

> Land tenure arrangements impede economic development, the absence of which is tied to public health concerns and limited and/or unsafe transportation. The interrelatedness of these challenges mirrors the interconnections of the economic, social, and environmental components of quality of life. (Deyo et al., 2014).

There is a body of research that shows that crimes do not increase due to trail development. While it was conducted over 30 years ago, a study of rural landowners' perspectives about a state-sponsored trail project along an old rail corridor coming to their community reflected many of the same concerns heard about trails in Humboldt County today. Kaylen et al explored fears about the Missouri River State Trail through a series of surveys completed by residents before and after trail construction, noting that many landowners who lived adjacent to the trail felt that their fears about potential impacts were not ultimately realized (Kaylen et al, 1993). Another in-depth analysis of community perceptions, design considerations, and demographic information of residents was carried out in multiple highly rural American communities with developed Class IV (paved multi-use) trail networks (Lowry & Chang, 2022). This research, along with a report published by the Rails-to-Trails Conservancy (RTC, 2012) regarding rural trail

development and many other publications reviewed during my research strongly indicated that the construction and use of trails does not lead to increased crimes, identified significant community interest and demand for more trails to connect rural and tribal communities, and analyzed barriers to trail use in these communities.

In 1995, a team of urban planners published a Toronto, Canada-based study about integrating public safety into greenway planning (Luymes and Tamminga, 1995). The distillation of this research was the use of "several key principles for the planning and design of safer public places… (1) visibility of others; (2) visibility by others; (3) choice and control; (4) environmental awareness and legibility; (5) solitude without isolation." (Luymes & Tamminga, 1995). Furthermore, the work was guided by planning principles that were developed by a community-led group, which included community engagement, specific design requirements such as lighting and signage, the ability for users to "self-police" the public spaces, and "locating activity generators" in these places (Luymes and Tamminga, 1995). With respect to the idea of activity generators, the researchers noted that:

> It is well-documented that use of public space tends to lead to more use…People are more likely to use a greenway if they feel safe there, which in turn leads to enhanced feelings of security… Activities that draw people are perhaps more important than physical design in enhancing real and perceived safety from the threat of crime. (Luymes & Tamminga, 1995).

Guidelines developed for application in urban areas can also be used in rural areas because of a strong emphasis on safety and the specific conditions that influence the feelings of trail users. In Seattle, Washington, local government and neighborhood groups have used Crime Prevention through Environmental Design (CPTED) principles to

analyze crime hotspots, assess these sites using detailed criteria, and identify specific opportunities to improve people's feeling of safety (Nelson-Zagar, 2013). Like the places in my study, there were relatively low numbers of trail users at any given time, visible trail maintenance needs, and challenges seeing other trail and public space users clearly. The safety principles this team promoted include:

> Site safety, [which] is directly related to a place's reputation and image, attracting 'positive' site users, or 'negative' site users. Positive user groups can become excellent guardians even if they are not doing anything other than using the space in a normal, 'pro-social' manner. Three elements are critical to image, maintenance and reputation: cleanliness, rule setting, and building a positive site reputation. (Nelson-Zagar, 2013).

Other benefits abound when trails are available and are considered safe, including improved neighborhood characteristics. A 2015 Louisville, Kentucky study of the impact of pedestrian-friendliness on property values and neighborhood crime included a detailed look at dozens of neighborhoods, and explored crime impacts, walking infrastructure, and the impact walking had on property values, foreclosures, and crime. The study found that the walkability of communities significantly and consistently made them safer, more desirable, and higher-value for property owners (Gilderbloom et al., 2015). A 2012 interview-driven analysis of the perceived benefits and concerns of people residing near two multi-use trails in the Bloomington, Indiana area (population of 81,115 at the time) found that "the qualitative benefits to property owners - including access to recreation and the natural world and connection to neighbors - far outweigh the negative effects of living adjacent to a multi-use trail in this study." (Corning et al., 2012). The downsides of living next to a trail, including trespassing from the trail onto private property and a reduction in privacy, were "not widespread across users and may be mitigated with trail

design…Overall, most property owners had favorable perceptions of the trail. Negative perceptions were generally isolated and due to individual experiences." (Corning et al., 2012).

Homelessness and its impacts on trails were part of a 2018 study conducted in Salt Lake City, Utah, which explored perceptions of safety in the setting of a regional trail with a focus on resident quality of life (García et al., 2018). The Utah team's goal was to "assess the perceptions of safety in [two locations] to gauge their capacity to offer quality of life to low-income neighborhoods while encouraging activity and public transportation." (García et al., 2018) This study utilized surveys and focus groups to explore the effects of homelessness and poverty. The research team found that while people did have safety concerns, they did not demonstrably deter use of the trail nor of transit. Homelessness, trash, and illegal activity were all factors impacting perception of safety. Ability to reach key destinations was very important to trail users. The authors noted that "improved lighting should alleviate many safety concerns and can be augmented with amenities like police call boxes or clearly marked trail exit points." and "a major barrier to the pedestrian experience in the study area…is the perception that it is unsafe regarding criminal activity. This finding is similar to other studies in low-income areas where there might be homelessness or land uses that are associated with criminality…" (García et al., 2018).

Given their extensive geographic footprint, many long, linear trails and greenways are challenging to regulate constantly, and enforcement of rules can be difficult. In San Diego, California, a 2017 study explored the impacts of trail-related enforcement on perceptions and behaviors of trail users (Greer et al., 2017). This study assessed the

effectiveness and longevity of enforcement efforts by measuring behavioral changes to redirect users to authorized trails. The study found that in the urban location at the heart of the study, a "hard enforcement" approach (e.g. fines or sanctions) was more effective than a "soft enforcement" approach (e.g. education and a warning). Over time, the researchers found that "illegal use in this study did not rise back to the levels prior to enforcement, suggesting that a shift in behavior was maintained during the 43-day post enforcement period", however, the hard enforcement approach alone can be very resource-intensive and lead to a "never-ending cycle of law enforcement" (Greer et al., 2017).

Importance of Understanding Community Perceptions

Social science research consistently highlights the importance of gauging people's perceptions as a critical form of research that can inform environmental and planning decision-making as well as communication strategies. In the context of people's conservation choices, Bennett asserted that perceptions are important as part of the suite of "determinants or moderators of behaviors, responses, and levels of support" (Bennett, 2016). This lends credence to the study of perceptions as integral to understanding the ways people value and use community amenities. The author argued that the scientific community gives preference to quantitative and objective methods, and this may hamper ability to analyze results in a meaningful way and can lead to lost opportunities to gain knowledge from local sources. Bennett posited that insisting on quantitative information may produce outcomes that are too little, too late when it comes to environmental needs.

This work provided clarity about what constitutes "perception", how perception differs from other measurable qualities and from experiential knowledge, and use of various tools to gather information about perceptions.

Studies show that people's perceptions are important to influence their choices about transportation mode and trail use. A Portland, Oregon-based team sought to characterize the "relationship between the objective (actual) environment and people's perceptions of the environment, and their relative effects on active travel behavior, particularly bicycling behavior" (Ma, 2014). This study found that people did not immediately recognize the bike-friendliness of places within their community, and that their perception was significantly affected by education and outreach efforts. Accordingly, "interventions aimed at improving people's perceptions of the environment may be necessary as a complement to current efforts which focus primarily on the physical design of the built environment", with possible interventions being informational materials, maps, and tips for bicycling (Ma, 2014). Researchers in Saint Paul, Minnesota conducted a study of adult bicyclists and the personal, lifestyle, location, and characteristics and perceptions which influenced their behaviors (Forsyth & Oakes, 2015). The study included three groups of adult bicyclists – those who cycled frequently, occasionally, and did not bicycle. The researchers made a clear distinction between "safety from crime" and "safety from traffic" in gauging people's perceptions of bicycling. They tested a variety of factors in a context where "the perceived and actual environments are often quite different", leading to notable results including:

> …significant differences among frequent, occasional, and non-cyclists: perceived access to services, places for walking and cycling,

> neighborhood surroundings, safety from crime, neighborhood satisfaction, and the social life/neighboring scale. In each case those who cycled more saw the neighborhood more positively, though a cross-sectional study cannot determine if this positive view was a result of their cycling or a cause of it. (Forsyth & Oakes, 2015).

Enclosed spaces, narrow paths, and a lack of clear escape routes decreased feeling of safety in a study involving an immersive virtual reality display (Baran et al, 2018). Participants were shown a park-like setting with visual stimuli depicting an environment with varying levels of physical enclosure, other people, paths, and landscape features. After viewing each setting, participants immediately rated their feeling of safety, with women reporting they felt less safe than men did. Notably, participants rated medium and low enclosure environments similarly, "suggesting that being able to partly view the surrounding environment may mediate perceptions of safety and danger". Ensuring that a path was clear and well-marked was also key to perception of safety, with the authors noting that "environments that do not have clearly demarcated pathways may lead to sense of feeling lost, which in turn could evoke perceptions of danger and/or feelings of fear." (Baran et al., 2018) Fears about crime in urban green spaces were explored in a 2014 meta-analysis which sought to understand the personal experiences, physical attributes, and environmental factors that were important in people's perceptions about fear of crime in outdoor spaces like trails and parks. This analysis of 48 related studies concluded that more emphasis should be placed "on how people perceive their surroundings to develop crime prevention techniques for outdoor spaces." (Sreetheran & van den Bosch, 2014).

Dimensions of individual racial, cultural, and gender identity are important to perceptions of safety. The views and perspectives of racially and culturally diverse communities were central to a study that analyzed the trail preferences of women and racial/ ethnic minorities in San Antonio, Texas. Safety and security were the most important trail attributes across two study sites, ranked as "very important" to 65% of respondents, with racial/ethnic minority-identifying individuals and women much more likely to rate this attribute as important compared to other groups. The authors noted that also, "Hispanics valued the trail for transportation most." The researchers recommended that "in addition to a focus on safety, managers could also increase diversity along greenways by enhancing opportunities for social interactions and cultural benefits through alterations to amenities such as adding places to sit and gather along the trail. Efforts to enhance connectivity to points of interest could also enhance the trails' capacity to serve as a transportation corridor by promoting higher levels of use among pedestrians/cyclists and individuals living within walking distance of the trails." (Keith et al., 2018) Another study in a diverse environment that explored the perspectives of women and people of color, conducted in 2005 on a college campus in Louisiana, found that perceptions of safety were paramount to people who identified as minorities or women, and that campus walking route designs played a key role. This project was intended to "demonstrate the process of applying perception of safety in a campus environment to actual crimes and to use the results to better implement safety improvements within the campus landscape." (Fernandez, 2005)

Pedestrian's perceptions of their environment played an important role in a 2012 walk audit-based study based in Hattiesburg, Mississippi, a rural community of about

45,000 people. This study looked at six factors: presence and maintenance of sidewalks, lighting, presence of dogs, speed of traffic, safety from traffic, and safety from crime (Zoellner et al., 2012). In this analysis, safety from crime was a key factor in both daytime and evening/ nighttime conditions, and study data showed that "the frequency of trail use increased with higher perceptions of pedestrian safety, trail safety, and trail amenities", demonstrating the importance of both the built environment and user's perceptions of the trail (Zoellner et al., 2012).

While the body of research I have examined does lend insight into modern day planning principles, best practices for safe design and use of transportation infrastructure, the importance of understanding perceptions, and well-researched aspects of trail safety, many of these studies are not in rural communities and are less relevant to present-day Humboldt County. This study seeks to fill those gaps, providing high-quality information about the relationship between trails and perceptions of safety that can inform local planning efforts in Humboldt County and provide additional insights to the literature drawing from experiences in rural communities.

METHODS

I utilized a mixed methods approach, comprised of an intercept survey of trail users on two local trails that are representative of some of the opportunities and challenges for trails in the region (n=198) and a series of semi-structured interviews of individuals who had unique knowledge about these two trails (n=15). In the results section, I share findings from both of these approaches and cite those findings using the identifiers indicated in Table 1.

Table 1. Survey and Interview Reference Identifiers.

Data type	**Total number of participants**	**Reference identifier within this document**
Survey responses	198	Survey, 2022
Interview responses	15	Interview 1 - Interview 15, 2023

This study included research with human subjects and was approved by the Institutional Review Board for the Protection of Human Subjects (IRB), IRB #22-016.

Study Sites

My study sites are both within Humboldt County in coastal far northern California, which has a population of approximately 136,000 and a land area of about 4,000 square miles (Humboldt County website, 2023). Within the County of Humboldt, the regional transportation planning agency is the Humboldt County Association of Governments (HCAOG), based in Eureka and governed by a board comprised of delegates from municipalities and the County. HCAOG is responsible for developing many of the region's transportation planning documents, recommending projects for infrastructure funding, and developing an annual work plan to support and improve transportation. The Humboldt Trails Council (HTC) is a non-profit organization with a mission to "serve as a unified voice to support development, maintenance, connection to, and use of trails for recreation and transportation throughout Humboldt County, California" (HTC website, 2023). The HTC is the fiscal and organizational sponsor for the Volunteer Trail Stewards, a longstanding program that involves frequent volunteer workdays on local trails, including the trails in my study.

Hikshari' Trail

The Hikshari' Trail is located within Eureka, CA, the Humboldt County seat and largest city, with a population of approximately 27,000 (U.S. Census Bureau, 2020). The trail winds along Humboldt Bay on the southern end of the city (Figure 1). The Hikshari' Trail consists of a 1.5-mile segment of the regional Humboldt Bay Trail and state-led California Coastal Trail (Rails-to-Trails Conservancy website, 2023). The name comes from an indigenous place name for the area in the Wiyot language, *Soulatluk* (City of

Eureka website, 2023). This portion of the Humboldt Bay Trail was officially opened to the public in 2012 (Redwood Community Action Agency website, 2023).

Figure 1. Map of Study Sites. This map shows the location of the two study sites in the greater Humboldt Bay area, as well as Humboldt County's location in the state of California.

The Hikshari' Trail is a flat, paved trail that skirts Humboldt Bay from a point immediately south of Eureka's Bayshore Mall near hotels and restaurants to a park and ride facility and subsequent section of trail near the mouth of the Elk River. Along the way, the trail passes a trailer home court and a few other residences, the City of Eureka's wastewater treatment plant, and weaves through a coastal forest. The trail is used by people who are walking, riding bicycles, skateboarding, roller-skating, using wheelchairs or strollers, and riding horses. The trail supports transportation uses, especially those of bicycle commuters and through-cyclists who are traveling the California Coastal Trail. There are five parking areas and trailheads along the Hikshari' Trail. Immediately to the north, the next contiguous segment of the Eureka waterfront trail includes a dog park, playground areas, and other recreational amenities.

The Hikshari' Trail is monitored by the Eureka Police Department, which has a Parks and Waterfront Ranger position equipped with a dedicated all-terrain vehicle, and trails are maintained by City of Eureka personnel who regularly open trailhead areas and restrooms. In addition, cleanup of trash, graffiti, vegetation maintenance, and site restoration activities are performed on a frequent basis by the Hikshari' Volunteer Trail Stewards, who have a longstanding group dedicated to this trail (Humboldt Trails Council website, 2023). Habitat values are supported through the removal of invasive plants and the planting of native plants for the purpose of enhancing biodiversity. The California Native Plant Society and Redwood Region Audubon Society note that this is a site with significant biodiversity which provides habitat for many native animal species (websites: CalFlora, 2023, Redwood Region Audubon Society, 2023, and City of Eureka, 2023).

The Hikshari' Trail was selected for this study because it is adjacent to busy commercial areas, residential uses, and government facilities, because it is heavily used, and due to its long history of use as a public space. Additionally, the Hikshari' Trail had been open to the public in its current form for about 10 years at the time of this study, so many local users could recall the area's pre-trail condition. Photos of the Hikshari' Trail from a location where surveys were collected are provided as Figure 2 and Figure 3.

Figure 2. Hikshari' Trail users enjoying the trail on horseback near the trail access area at the end of Truesdale Street in Eureka, California.

Figure 3. Hikshari' Trail users walking dogs, running, and riding a bicycle near the trail access area at the end of Truesdale Street in Eureka, California.

The Humboldt Trails Council placed a photo sensor trail counter along a nearby section of the Eureka waterfront trail, approximately two miles to the north of my study site, in 2022. The counter recorded data between January and June before being rendered inoperable due to damage. This time period was marked by chilly winds and unusually high precipitation levels, nonetheless, the average number of trips counted for all types of users per day was 216 (Table 2). Note that the automated counters register each individual trip, so an “out-and-back” trip would be counted twice.

Table 2. Average number of bicyclist and pedestrian trips on Hikshari' Trail.

Transportation mode -- >	Bicyclist trips	Pedestrian trips
Average number of weekday trips per day	52	142
Average number of weekend trips per day	82	153

Source: County of Humboldt Eco-Counter report, 2023.

The City of Eureka has placed very visible, mobile surveillance cameras in isolated areas of the trail periodically (Interviews, 2023). The trail includes a tree-lined section which creates a canopy-like effect and supports wildlife, but which requires frequent vegetation maintenance. The trail has been marked with paint every 100 feet by the City of Eureka, enabling individuals calling for help on the trail to identify their precise location (Interviews, 2023). There is a long history of human use of the green spaces in the trail corridor for unauthorized overnight camping, dating back at least 25 years (Interviews 3, 4 and 8, 2023). Unauthorized camping continues to occur along the trail, with law enforcement and social services workers contacting campers to connect them with resources and attempt to abate the camping (Interviews, 2023). There have been a small number of violent crimes reported on the trail within the past 10 years, with all or nearly all of these involving people who knew one another rather than random acts of violence (Creswell, 2021; Interviews 5 and 8, 2023). Nevertheless, local news sources have covered these cases extensively and they are part of public perception about trail safety.

Hammond Trail

The Hammond Trail lies within the unincorporated community of McKinleyville, CA (Figure 1), the third most populous community in Humboldt County with a population of about 17,000 people (U.S. Census Bureau, 2020). While most of the trail is managed by the County of Humboldt, some Hammond Trail portions and spur trails are on land maintained by the McKinleyville Community Services District, a separate government agency that operates nearby water and wastewater treatment facilities. The Hammond Trail is maintained by the County of Humboldt and a dedicated Hammond Volunteer Trail Stewards group, who assist with vegetation maintenance, trash removal, graffiti removal, and other ongoing maintenance needs (Humboldt Trails Council, n.d. and County of Humboldt, n.d.). Law enforcement is under the purview of the Humboldt County Sheriff's Department. Multiple trail stewards live immediately adjacent to the trail or in the surrounding neighborhood, and patrol the trail regularly as volunteers, reporting any problems (Interviews, 2023). The presence of a dog park adjacent to the trail results in many people visiting with their dogs. Leash laws are posted.

The Hammond Trail traverses coastal bluffs overlooking the Pacific Ocean and a river estuary, weaving through mature forests and skirting private property backyards, with a diverse plant community including some rare plants (Ralph, 2020). It connects residential neighborhoods and is also part of the California Coastal Trail (County of Humboldt, n.d.). The Hammond Trail has been planned since the 1970s, and the trail was largely completed by 2001, though several gaps existed until about 2008. The Hammond Trail is about five miles in length; the section used in my study was the portion from Hiller Park, a popular family recreation area, northward towards Norton Creek – a

distance of about one mile. This portion of the trail was selected primarily because of its proximity to homes and backyards. It was also selected because of its use by people enjoying other recreational amenities, including Hiller Park's baseball fields, playground, dog park, and other nearby recreational areas. The Hammond Trail has a long history of use and sees abundant activity. The County of Humboldt placed a trail counter on the Hammond Trail immediately to the north of Hiller Park (the site selected for this study), which showed that there are an average of 363 trips on the trail counted per day. Table 3 shows the breakdown of bicyclists and pedestrians, as well as the difference between average number of weekday and weekend users. Note that the automated counters register each individual trip, so an "out-and-back" trip would be counted twice.

Table 3. Average number of bicyclist and pedestrian trips on the Hammond Trail.

Transportation mode -- >	Bicyclist trips	Pedestrian trips
Average number of weekday trips per day	79	235
Average number of weekend trips per day	126	287

Source: County of Humboldt Eco-Counter report, 2023.

Since all of the areas that surround the Hammond Trail are either residential neighborhoods or publicly owned land, the trail is used extensively for recreation, enjoyment, and by California Coastal Trail users, including through-cyclists on multi-day coastal tours. While bicycle commuters do use the Hammond Trail, the trail alignment is such that many commuters traveling from home to work or key destinations choose to use roads in central McKinleyville instead (Mark Thomas, 2023). This segment of the Hammond Trail was selected primarily because of its very close proximity to residential

backyards (see Figure 4 for photos taken from the trail in this portion of the corridor). Additionally, the trail is heavily forested in many stretches, including the portion included in this study, which provided an opportunity to investigate people's perceptions of safety in densely vegetated environments (see Figure 5).

Figure 4. View of residences and fenced private properties immediately adjacent to the Hammond Trail in McKinleyville, California, with the trail in the foreground.

Figure 5. A forested portion of the Hammond Trail near Hiller Park in McKinleyville, CA.

Intercept Surveys

Study population and sampling approach

The target population for the survey was users of the Hammond and Hikshari' Trails during the months of September through November 2022. The survey did not target non-trail users and as such did not include the perspective of community members who have decided not to use the trail for safety or other reasons – a potential limitation. To obtain a representative sample of trail users during that time period, I worked with a team of research assistants to collect survey responses from individuals as they were using the trail during a set of staggered times throughout the study period. The surveying was conducted in fall of 2022 and was evenly divided between weekdays and weekends.

Each day, surveying was conducted between the hours of 11:00 am and 6:00 pm, with the later October and November dates including some surveying in dusk conditions as light began to fade.

On each surveying date, we set up a small table and sandwich board-style sign near the trail to inform oncoming trail users of the survey opportunity. When trail users came close enough to speak to, we asked individuals if they would be willing to take the survey about the trail. Every individual over the age of 18 who was willing to take the survey was invited to participate. I printed quarter-sheet flyers with the survey weblink and a quick response code (QR code), so that people could take the flyer and easily access the survey. Emphasis was placed on taking the survey right away, so that the trail experience was still fresh in respondents' minds.

In order to make the survey as approachable as possible, we selected some of the most accessible sites to set up for surveying, close to trailheads and gathering places. Survey respondents were asked to take the sur provided with the opportunity to take the survey once they got home or after they had given it some thought, rather than on the spot, with the recognition that some surveyed individuals might feel a certain pressure to rate the trail as safer in front of the surveyors.

Survey design

The survey consisted of 30 questions (Appendix A). Of those, one question was about consent to participate, ten questions were demographic questions, ten questions asked respondents to rank their perceptions on a numeric Likert scale, and nine questions were open-ended with narrative prompts. This survey was available in a paper format on clipboards as well as in an electronic format using the Qualtrics surveying platform. It

was necessary to sequence the questions with those that are the most important or central to the study being first, since responses drop off with longer surveys and when respondents are presented with multiple open-ended questions. Each question in the electronic survey could be skipped except for the first question which was the consent to participate.

Survey response information

We gathered a total of 198 unique survey responses. Additional duplicate responses, wherein a set of identical responses were received which could clearly be identified as an error in submission, were omitted. About 10% of the responses were paper surveys, which were inputted into Qualtrics. Survey respondents were asked which trail they were using, and I focused on achieving a roughly equal response rate between the trails. Ultimately, 48% of respondents were using the Hikshari' Trail, and 52% were using the Hammond Trail.

Demographic factors in the survey included age, gender, and race/ethnicity. Sixty-two percent of respondents were age 51 or older. Approximately equal numbers of men and women responded, with less than 2% identifying as non-binary or declining to state a gender identity. Seventy-eight percent of respondents identified their race as white, with the remaining 22% identifying as non-white. Ten percent of respondents stated their ethnicity was Hispanic or Latino. Additionally, survey respondents were asked where they lived and their level of land use knowledge. Ninety-four percent of respondents were Humboldt County residents. The majority (more than half) of respondents felt they were moderately well-informed or very well-informed about local infrastructure,

transportation, and land use decision-making matters. For a visual snapshot of respondent demographics and survey takeaways, please see Figure 6.

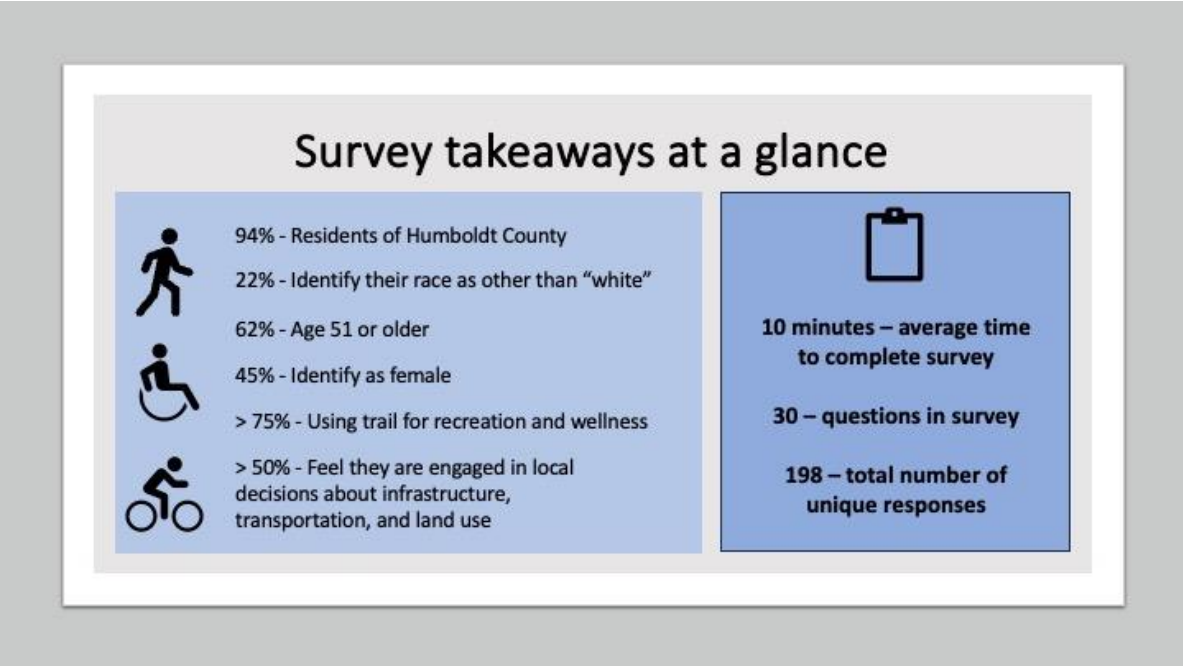

Figure 6. Survey takeaways at a glance.

QUITE A FEW SURVEY RESPONDENTS DID NOT COMPLETE IT OR SKIPPED QUESTIONS. THIS WAS ANTICIPATED, AND BASED ON RULES THAT GUIDE RESEARCH WITH HUMAN SUBJECTS, PEOPLE MUST BE PROVIDED WITH THE OPTION TO STOP THEIR PARTICIPATION AT ANY TIME. HOWEVER, ONE PARTICULAR QUESTION WHICH WAS DESIGNED TO SCORE DIFFERENT TRAIL CONDITIONS OR ATTRIBUTES ON A LIKERT SCALE ELICITED CONFUSION FROM MANY RESPONDENTS. WHILE IT WAS EASILY UNDERSTOOD BY PEOPLE TAKING THE SURVEY ON PAPER, OVER 90% OF RESPONDENTS COMPLETED THE SURVEY ELECTRONICALLY. IN THE ELECTRONIC FORMAT, THE QUESTION WAS HARD FOR RESPONDENTS TO UNDERSTAND. THE TOPICS COVERED IN THE QUESTION WERE ALSO ADDRESSED BY MANY RESPONDENTS

IN THEIR NARRATIVE RESPONSES AS WELL AS IN INTERVIEWS, SO THIS QUESTION WAS OMITTED FROM THE ANALYSIS (SEE

Appendix A, question 13 to view this multi-part question.)

As surveying continued, it was apparent that many bicycle commuters were not stopping to take the survey. Based on my concern that bicycle commuters were underrepresented in the sample, I contacted organizations such as the Humboldt Bay Bicycle Commuters' Association and the Humboldt Trails Council with the request to distribute the survey among bicycle commuters. Respondents were asked to complete the survey as soon as possible after using one of the trails in the study and were asked to share the survey only with other commuters or regular trail users. This resulted in an increase in local bicycle commuters responding, as well as a few additional responses from pedestrians. However, bicyclists using the trails for transportation may remain underrepresented in this study.

Semi-structured Interviews

Interview participants

The goal of the interviews was to gain more in-depth information about community perceptions of trails from individuals with deep connections to the trail. Interview participants were selected based on their experience with and knowledge of these trail locations. The invited participants were a mix of residents who live immediately adjacent to trails, business owners whose businesses are very close to trails, and people whose jobs or daily lives take them to trails. We agreed to protect the

confidentiality of the interviewees and in this report, names, titles, and identifiable roles are omitted. However, a breakdown of their broad community roles is provided in

Table *4.* Community roles of interviewees.. Interviewees were each given a number and are cited throughout this document with the interview number (e.g. Interview 2, 2023). In certain instances, where the individual's quotes, community role, or a combination of information about their interview could potentially result in them being identified, I cite them only as Interview/ Interviews,
2023.

Table 4. Community roles of interviewees.

Community role	**Number of individuals interviewed**
Law enforcement	3
Local government	3
Resident living next to trail	3
Non-profit service provider	2
Community volunteer	2
Private business owner next to trail	2
Total number of interviewees	***15***

To preserve the confidentiality of participants, demographic and/or self-identifying factors were not collected from interviewees. However, one of the desired criteria was having extensive experience with these trails over time, ideally, dating to the

time before each trail was constructed. Among interviewees, experience working or living on or near the trails ranged from 10 to 25+ years. As a result of this, many of the interviewees were inherently a somewhat older age group. Interviews provided the opportunity to probe some of the themes that came up throughout this research related to the perceptions of safety and potential next steps to address them, from the perspective of people with extensive lived experience. While the survey did inquire about respondent experiences, if any, prior to the trail's construction, the interviews provided a means to dig more deeply into the changes over time associated with these trails from the perspective of each interviewee.

Interview approach and guide

Interviews were conducted in a semi-structured format, whereby the interviewer will start with set of initial questions and then ask additional questions to probe interesting ideas based on the interviewee's answers. This approach allowed the flexibility to explore interesting, new, or insightful themes that the interviewee spoke about while still providing consistency. See Appendix B for the list of interview questions or prompts that guided each discussion. Key topics in each interview included the interviewee's personal familiarity with the trail, ways that they trail had changed over time, the interviewee's perceptions of safety using the trail, and concerns about trail safety they have heard from colleagues, peers, or loved ones. Each interview lasted between 50 and 80 minutes. Of the 15 interviews, 13 were held via video conference and two were conducted in person.

Data Analysis Approach

Quantitative data collection included survey questions where respondents chose a numeric value associated with each response and trail use count data provided by the County of Humboldt. Qualitative data collection included the responses from open-ended survey questions as well as responses from the semi-structured interviews.

To analyze quantitative responses to survey questions, I graphed responses to each question to identify insightful or interesting trends. Likert scale responses were treated as ordinal data while performing analyses. To understand differences in respondents' feelings about trail safety, I performed a series of analyses comparing specific demographic characteristics with respondents' reported feeling of trail safety. These included gender identity, age group, and racial/ethnic identity. To compare data and discover relationships between respondents' reported feelings of trail safety and other self-reported factors, I employed a set of linear models. These allowed me to determine the strength and direction of any correlations as well as the difference, if any, in these relationships between respondents from each trail.

To evaluate qualitative data, I used standard qualitative data analysis techniques that involved examining open-ended survey data and interview transcripts for a set of key themes or codes. Codes were developed both inductively and deductively - the inductive approach involved identifying key ideas which emerged from the data itself, while the deductive approach was driven by ideas from the literature and specific themes that were of particular interest to potential end users of this data.

In addition, I sought input from prospective users of my research to further guide my work. In early 2023, I presented my initial findings from the survey and interviews to the Board of Directors of the Humboldt Trails Council, a volunteer-led non-profit organization that supports and maintains trails in the Humboldt County area. This board provided feedback about the themes they found interesting and recommended additional analyses. These recommendations included (a) examining how people responded to the questions based on their demographic factors, particularly gender identity, racial identity, and quantitative responses that included scoring of perception of safety; and (b) comparing responses to specific questions between users of the Hammond and Hikshari' Trails to identify similarities and differences. These recommendations were incorporated into analyses and are reflected in this thesis.

RESULTS

Results were grouped into categories that relate to my research questions and findings which directly address the questions that potential users of my data have posed. These included study participants' perception of safety on these trails, aspects of survey respondent and interviewee identity that provide context or greater understanding about different demographic groups' safety ideas, aspects of these trails that have an effect on people's perceptions about them, and results which have implications for climate change adaptation or mitigation.

Perceptions of Safety

Survey and interview responses indicated a strong feeling of safety for users of both the Hikshari' Trail and the Hammond Trail. Survey respondents overwhelmingly reported that they felt safe in their experience on the trail on the day the survey was taken. In response to survey question number five, "How safe do you feel as a user of the trail today?" on a scale of zero to five, with zero being "not safe" and five being "very safe", the mean for the Hikshari' Trail was 3.74 (95% CI = 3.44 - 4.07), and the mean for the Hammond Trail was 4.27 (95% CI = 4.07 - 4.46) which were both above a neutral value of 2.5 (Figure 7). However, participants surveyed while using the Hikshari' Trail did report feeling less safe than those on the Hammond Trail ($p = .001$, $W = 4194.5$).

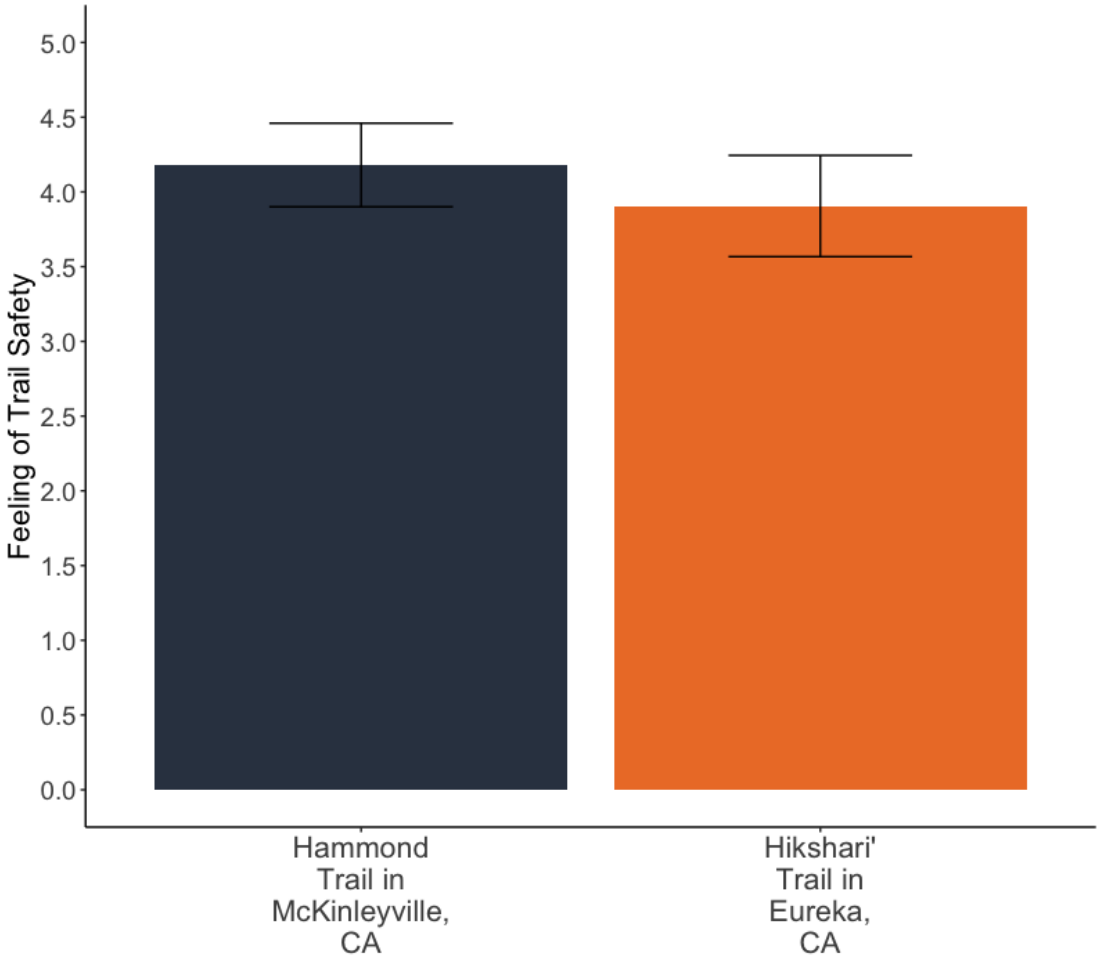

Figure 7. Survey responses about perception of safety on the Hikshari' Trail and Hammond Trail. Error bars represent 95% confidence interval from the mean.

Of the 165 respondents who answered survey question five about their own feeling of safety on the trail for either the Hikshari' or Hammond Trail, 89% (147 respondents) rated their feeling as a three, four or five, with five representing "very safe" (Survey, 2022). Respondents who asked were encouraged to use their own definitions of safety which could account for some variability in the responses. Due to there being six

possible answers ranging from zero to five, 2.5 and above was considered above the midpoint and therefore “safe”. No verbal descriptors were provided for the numeric responses of one through four. The diversity of responses varied by trail, with the numeric score of four being most common on the Hikshari’ Trail which had a more diverse spread of numeric scores among respondents, and a numeric score of five being most common on the Hammond Trail along with a narrower spread of numeric scores (Figure 8). Standard deviation for responses was 1.35 on the Hikshari’ Trail and 0.91 on the Hammond Trail. Overall, the Hammond Trail was seen as safer by survey respondents than the Hikshari’ Trail.

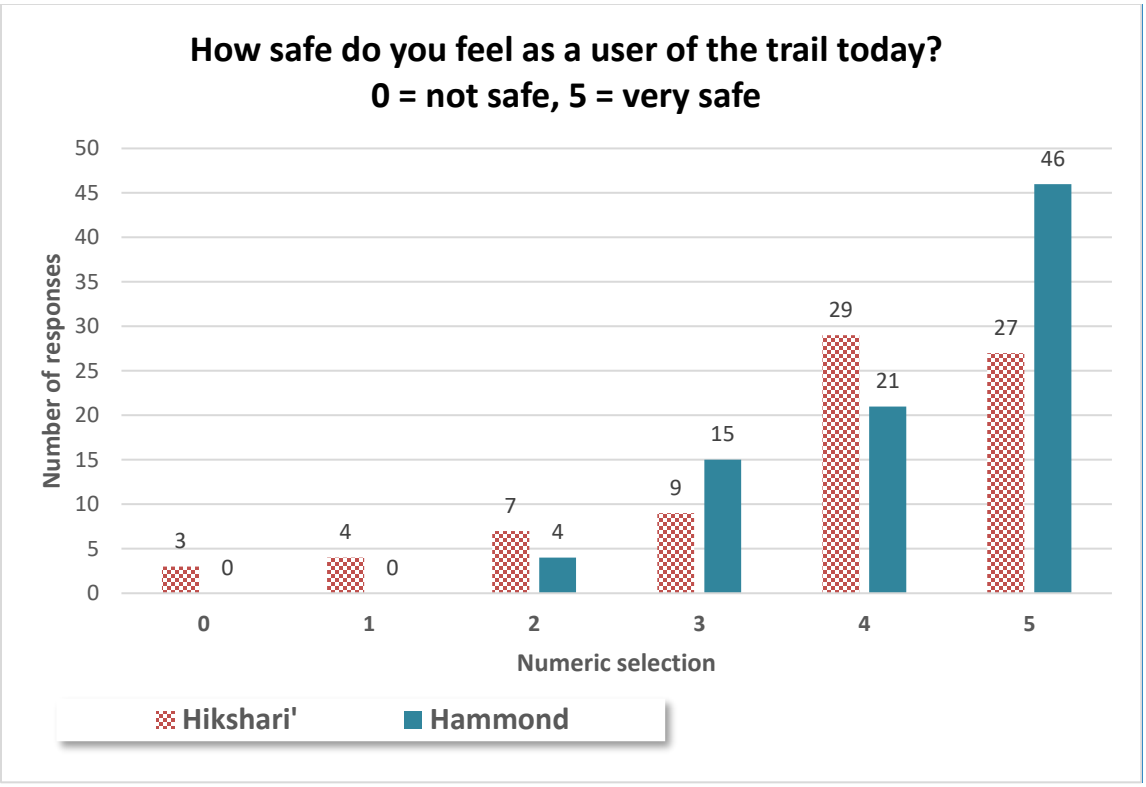

Figure 8. Responses to survey question, "How safe do you feel as a user of the trail today?" Responses based on Likert scale rating of zero (not safe) to five (very safe.) Numeric selections are depicted for both the Hikshari' Trail and Hammond Trail.

The next survey question was aimed at examining past experiences on the trail and if there had been times when the respondent felt unsafe. Survey question six asked "If you have visited this trail before, were there times when you felt unsafe on the trail?" (Survey, 2022). Many respondents who had previously used each respective trail reported that they had never felt unsafe on it in the past -- 44% of Hikshari' Trail respondents and 51% of Hammond Trail respondents (see Figure 9, which omits responses from those who have never previously used the trail). About half of respondents indicated that there were times in the past that they had felt unsafe on the trail. Interviews also reflected the notion that while they viewed the trails as safe overall, there were times when they or others they knew had occasional experiences of feeling unsafe. For example, one interviewee said, "I have never once felt unsafe on the trail, but I know others who might feel unsafe from time to time." (Interview 8, 2023).

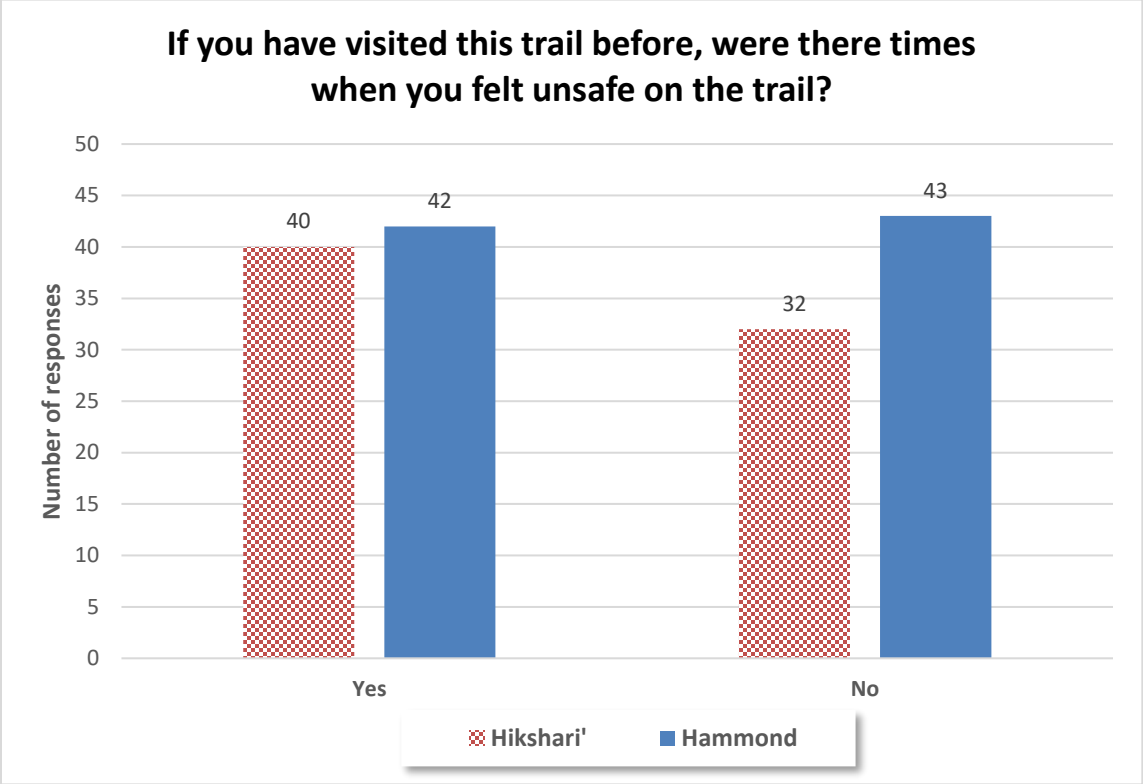

Figure 9. Responses to question, "If you have visited this trail before, were there times when you felt unsafe on the trail?" Responses are depicted for both the Hikshari' Trail and Hammond Trail.

The survey also posed a question about people's baseline feelings of safety in similar circumstances with question seven, "How safe do you typically feel in similar circumstances – for example, engaging in similar activities under comparable conditions in other public parks, trails, or greenway settings?" (Figure 10), which was also scored on the same zero to five Likert scale. There is a difference in this relationship between the two trails, with users of the Hammond Trail reporting a greater feeling of safety on the trail with respect to feelings of safety in similar situations than users of the Hikshari' Trail (P=0.006), despite there being no difference between users of the two different trails in their self-reported feelings of safety in similar situations (p= 0.52, W = 3581). Among

certain respondents who marked their feeling of safety as a zero or one, I examined the relationship between this question and question five about feeling of safety on the trail. There is a strong correlation between feeling of trail safety on the trail (Hikshari' or Hammond Trail) and feeling of safety in other similar situations ($P<0.001$, Adj. $R^2=0.53$; see Figure 11). This correlation suggests that respondents feel similar levels of safety on the trail as they do in other similar situations; in other words, the trails are not uniquely more or less safe than other similar places.

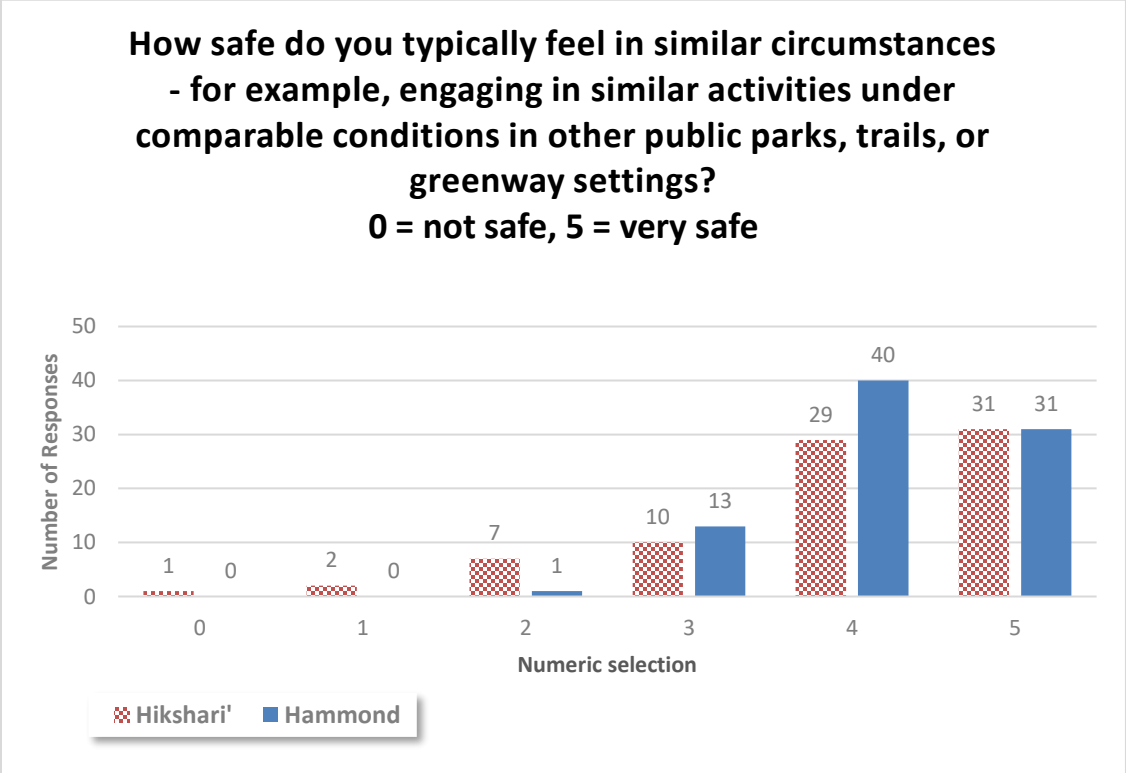

Figure 10. Responses to question, "How safe do you typically feel in similar circumstances - for example, engaging in similar activities under comparable conditions in other public parks, trails, or greenway settings?" Responses based on Likert scale rating of zero (not safe) to five (very safe.) Numeric selections are depicted for both the Hikshari' Trail and Hammond Trail.

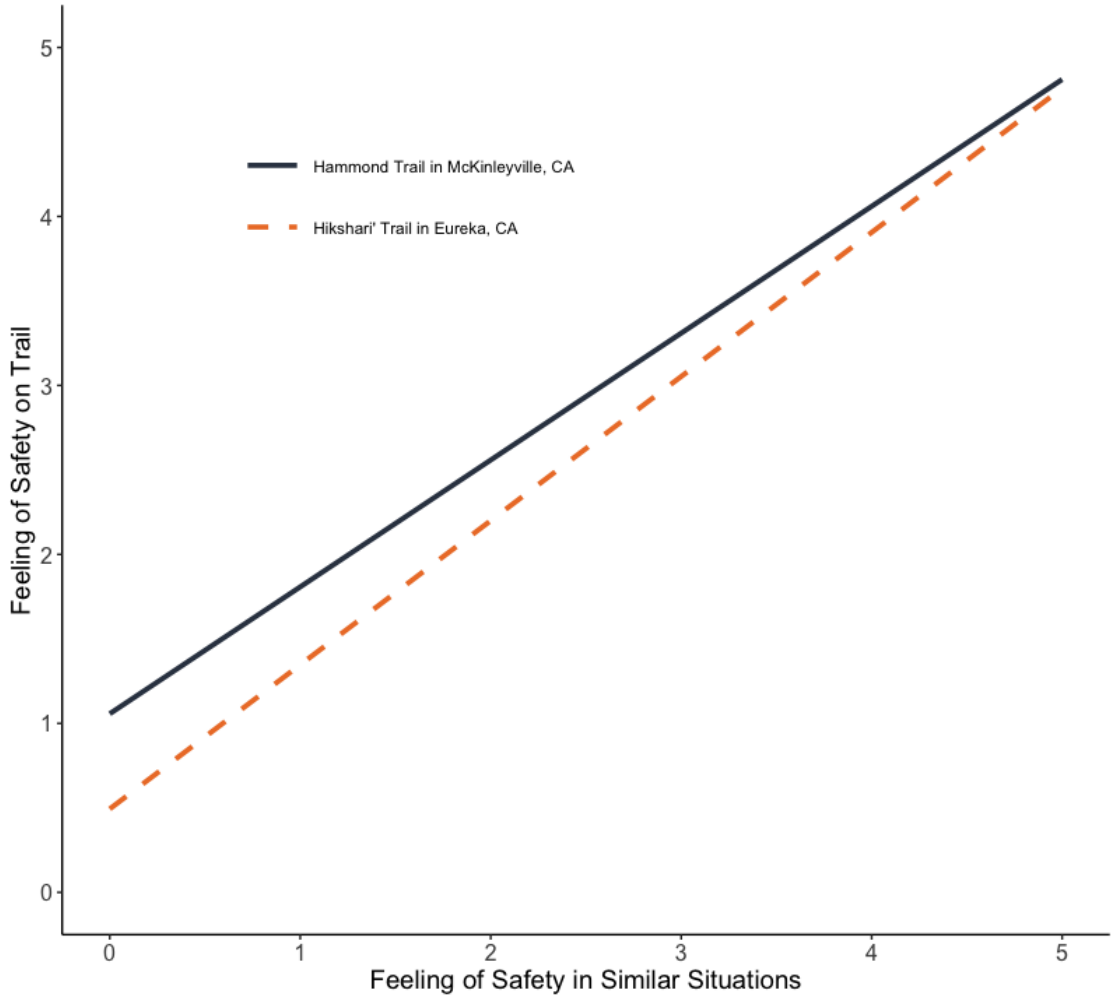

Figure 11. Relationship between responses about feeling of safety on the Hammond or Hikshari' Trail and responses about feeling of safety in similar situations.

The analysis shows that there is a difference in the relationship between perceptions of safety on the trails and feelings of safety in similar situations across the two trails, with users of the Hammond Trail reporting a greater feeling of safety on the trail with respect to feelings of safety in similar situations than users of the Hikshari' Trail (P=0.006). Among certain respondents who marked their feeling of safety as a zero

or one on the Hikshari' Trail indicating they felt unsafe while using it, there are corresponding low scores with respect to their feeling of safety in similar circumstances. At the lower end of the fit line, users of the Hammond Trail indicate feeling safer on the trail than they do in other similar situations, but this correlation does not hold at the upper levels of reporting (Figure 11). The spread of responses consists of a broader spread for the Hikshari' Trail and a narrower spread for the Hammond Trail (Figure 10).

The interviews and comments in the survey showed that respondents' definitions of safety were variable and contextual – they depended on whether trail users were alone or not, whether or not trail users had a dog with them, what time of day it was, and what else had been happening in the community or in people's personal lives. As one interviewee succinctly said, "People have different perceptions of what is safe." (Interview 1, 2023). Another interviewee noted that:

> Facts about crime don't really matter that much; folks will go or not go somewhere based on their gut. Lots of things can impact that gut reaction, which you would call perception of safety: whether other people are there who seem reliable and friendly, whether they have had similar past experiences to guide them, what the weather and time of day is. That gut reaction dictates how people act, which is what it all boils down to. (Interview 7, 2023).

The variability in survey respondents' views about safety was apparent when looking at individual survey respondent answers across all questions within the survey – at least 18% of respondents who rated their overall perception of safety as a three, four or five out of five went on to document negative experiences and safety concerns in response to subsequent questions. For example, multiple respondents rated their feeling

of safety as a five (“very safe”) but indicated that they had previously had negative and unsafe experiences on other trails, and they had strongly-phrased critiques of the trail they were using. This variability and complexity are notable aspects of studying this topic and attempting to make sense of the factors that most significantly impact people’s feelings of safety.

Interview and survey responses showed that many people who are familiar with these trails believe the completion and formalization of the trails increased rather than decreased the sense of safety in the area. Survey respondents were asked in survey question 17, “Do you remember this location before the trail was here? If so, what do you recall about your feeling of safety here?”. An overview of responses to this question can be found in Table 5. Of those who remember the pre-trail condition, 77% of these survey respondents felt that the trail they were using was safer after the trail was built than the area was prior to the trail’s construction.

Table 5. Perceptions of safety before/ after trail construction among survey respondents.

Trail	Total number of people who recall the area prior to the trail's construction	Feel it is safer now	Neutral response	Feel it was safer before
Hikshari' Trail	32	28	3	1
Hammond Trail	16	9	7	0
Example survey responses about the feeling of safety/ condition prior to trail construction	"There were camps and poaching in the Widow White (Creek) corridor. They don't exist or are not visual (sic) now that the trail has brought public scrutiny." – Hammond Trail "…has always been a trail, but initially not paved. Felt safe then." – Hammond Trail "I would ride on the highway 101 shoulder. Not as fun! Certainly feels more safe riding on trail." – Hammond Trail "Yes I do - it felt a bit unsafe because there weren't many people, and the people who were there were doing things like shooting guns and sometimes yelling at other people (mentally unstable individuals)" – Hikshari' Trail "It was interesting, ugly, and abandoned." – Hikshari' Trail "This is the closest beach access to our house and we often went to exercise and spend time. Before the trail there were a lot more unhoused individuals and communities there. I never felt unsafe, but I did feel like I needed to keep my guard up more…" – Hikshari' Trail			

Interviewees were also asked about their perceptions of safety prior to trail construction. Thirteen out of 15 interviewees believe there has been a significant improvement in the feeling of safety; the remaining two live near the Hammond Trail and feel it was about the same or safer before (Interviews, 2023).

Table *6* includes a sampling of various perspectives on safety provided by interviewees. Law enforcement personnel and people responsible for maintenance and management of these public spaces (e.g. City of Eureka and County of Humboldt personnel) emphasized their perception that the safety of the trail corridor areas have improved significantly (Interviews, 2023).

Law enforcement officers recall very dangerous and unpredictable circumstances with difficult, inconsistent site access in both locations prior to trail construction. When asked in interviews about whether they believe calls for a law enforcement response due to safety concerns ("calls for service") have increased, decreased, or stayed the same after trail construction, multiple seasoned law enforcement officers noted that calls for service are a difficult metric to use and to interpret (Interviews, 2023). They also shared that there may be more calls for service to 911 (police/emergency responders) when there are more people present and observing conditions on the trail, but that they perceive calls for service as a positive function of people caring about their community's safety, and that they believe that violent crime has declined in these areas (Interviews, 2023). Interviewees shared very specific, discrete, limited activities or conditions on the trails that led to their most-reported safety concerns. The most frequently noted were aggressive off-leash dogs, unsafe trail passing behaviors, poor etiquette when passing, animal waste and trash being present and visible on the trail, graffiti and vandalism presence, limited visibility resulting from overgrown vegetation, camping occurring in the trail corridor, wildlife presence and impacts, and people exhibiting erratic behavior.

Respondents to my survey shared a wide range of perspectives in their responses to open-ended questions about what they perceived to be presence of homeless individuals, which included people hanging out during the day along trails and presence of unsanctioned campsites in the trail corridors (Survey, 2022). Perspectives included statements ranging from: “I did have some concerns about safety before I arrived as [app/ website commenters] mentioned their own feelings of not being safe mostly due to unhoused individuals. But no one bothered me... The complaints were just that unhoused people existed nearby which doesn’t seem fair” to “There were a variety of people using the trail in their own way which I appreciated” to “Remove homeless people and tweakers, as well as signs of homeless” (Surveys, 2022).

Table 6. Interviewee quotes about how trail construction has impacted feeling of safety over time.

Interviewee community role	Quote about impact of the trail over time
Law enforcement	"People feel unsafe when they can't see what's around them. Tree limbing and maintenance that happened with the trail has made a huge difference for people using the area and for law enforcement. Love seeing the ducks and wildlife flourish now. It is positive all-around after trail construction."
Law enforcement	"The trail being built had a big positive impact because it takes people off the roadways… People want to call trails a 'homeless highway'. But people can be transient or homeless, and they will either use trails or use roadways. There are lots of fatal accidents on roadways, tragic for everyone involved."
Government	"Our general consensus is that it was a no-man's land before, and you didn't know what you'd encounter. There are still negative activities, but it's more isolated because of established trail use."
Government	"The transformation between the days before the trail and today is so significant. We used to go there and hope we made it home safe. Police visits didn't change the outcome as a whole. Having the public use this area has demonstrated a more effective way to manage these public places. It's night and day from what it was years ago."
Non-profit service provider	"We can be very isolated in our own lives. Trails are important to our health, tourism, connecting us to each other, and connecting us to the outside world. The trails have been very good for us all."
Community volunteer	"I never felt unsafe on this trail but I have heard stories about the old days before it was here. Trail volunteerism helps people be healthy and connected. Volunteers come from the neighborhood so they also know what's going on in the area… People learning about trail maintenance improves how trail users see the trail and how they act on it."
Community volunteer	"The larger issue is not really related to trails, which is homelessness. Trails don't cause or address homelessness. They have made it more visible, but they don't add to it or make it go away. The dialogue about this is just a knee-jerk reaction to seeing something you did not see before."
Private business owner next to trail	"I had my doubts about the trail. The situation varies based on the seasons and the economy and things like that. But I remember it before, and it was a totally lawless place. This isn't perfect but it's better."

Relationship Between Dimensions of Identity and Perceptions of Safety

The survey included a set of questions related to demographics of the respondents, allowing for the opportunity to explore the relationship between demographic factors and perceptions of safety. Demographic information collected survey respondents included age bracket, Humboldt County residency, gender identity, and racial/ ethnic identity.

Humboldt County's senior population is growing, with transportation plans identifying increased needs for equitable and safe transportation options for seniors (HCAOG, 2022) and life expectancy for California seniors at the second-highest average in the nation at 81.9 years (California Department of Aging, 2021). Transportation plans note that infrastructure is, ideally, planned to support people at every phase of life and for maximum independence, including stroller use, youth walking/ biking to school, wheelchair and walker use, and the needs of the disability community (HCAOG, 2022.)

Survey respondents were asked to identify an age range among the following groupings: 18-30, 31-50, 51-70, and 71 and older. Forty-four percent of all survey participants were between 51 and 70 years old, making up the largest single group. Only eight percent of respondents were between the ages of 18 and 30 years old (Figure 12). There was no statistically significant relationship between age and feeling of safety ($p = 0.28$, $F = 1.28$, $DF = 3$).

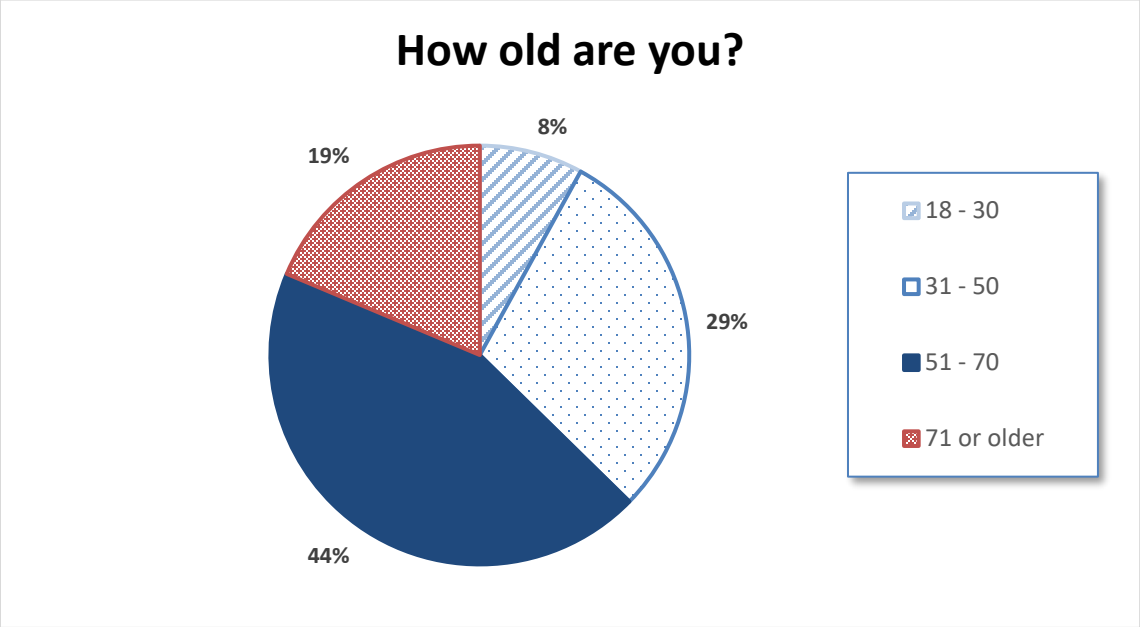

Figure 12. Ages of survey respondents. Responses are for both trails combined. Note: these categories are not the same as American Community Survey ("Census") categories, and therefore are not directly compared to Census data.

Survey participants were asked about whether they were a Humboldt County resident or not (Figure 13) – this was in part to understand their familiarity with the local area, local media, and the trails. Only six percent of respondents were not residents of Humboldt County, with the remainder identifying themselves as residents.

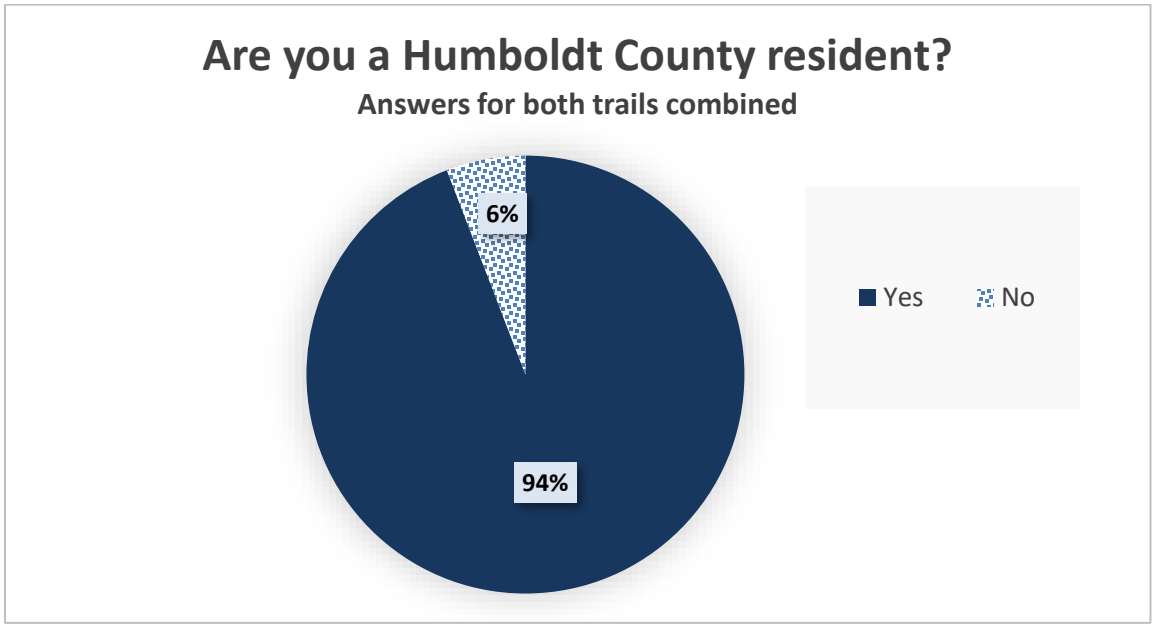

Figure 13. Humboldt County residency status of survey respondents. Responses are for both trails combined.

To determine whether the gender identity, racial identity, and Hispanic/ Latino identity of trail users is comparable to the total population in Humboldt County, I included Census data on total population for the county in Table 7,

Table *8* and Table 9. A lower percentage of female-identifying respondents took my survey than the percentage represented in the total population of Humboldt County. However, the Census assigns a male or female gender designator for every respondent and does not include a category for non-binary individuals or a "choose not to say" alternative. In my survey, people could also choose "prefer not to say" rather than simply skipping the question. Throughout this study and in conversations that led to my selection of the topic of trail safety, numerous individuals expressed concerns about women feeling safe on local trails. On the Hikshari' Trail, five respondents who identify as female or non-binary scored their feeling of safety on the trail as a zero, one, or two (less safe) on the zero to five Likert scale. On the Hammond Trail, one female respondent marked their feeling of safety on the trail as a two. Overall, there was no statistically significant difference between the mean values of respondents with respect to gender identity and feeling of safety on trails ($p = 0.75$, $F = 0.29$, $DF = 2$). Additionally, while the mean values are slightly lower for female survey respondents on the Hikshari' Trail than the Hammond Trail, there is no statistically significant difference between the two trails. No questions were asked about sexuality or gender expression. There is local concern and interest in the safety of people using trails who identify as queer, transgender, gender expansive, or other members of the Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, Asexual (LGBTQIA+) community (L. Doolan, personal communication, 2023), which was not addressed in this study.

Table 7. Gender identity of survey respondents and comparison to Census data for Humboldt County. Responses are for both trails combined.

Gender identity option	Number of responses	Percentage of responses	Percentage of total population, Humboldt County*
Male	77	51%	50%
Female	68	45%	50%
Prefer not to say	4	3%	**See note
Non-binary	2	1%	**See note
Other (option to add own response)	0	0%	**See note
Total number of responses	**151**	-	-

** Data for July 2022 from U.S. Census Bureau. ** The American Community Survey ("Census") only provides male and female as selections for an individual's sex.*

In addition to concerns about women feeling safe on trails, there were numerous study participants (survey respondents, interviewees, and people who helped to guide the development of the survey and interview questions) who questioned whether non-white and Hispanic/ Latino community members feel safe on local trails. On the Hikshari' Trail, seven respondents who identify as non-white, Hispanic, or Latino scored their feeling of safety on the trail as a zero, one, or two (less safe) on the zero to five Likert scale out of 20 non-white respondents total. There were no responses from a self-identified non-white, Hispanic, or Latino individual who rated their feeling of safety on the Hammond Trail as a zero, one, or two. On average, survey respondents who identified themselves as non-white, Hispanic, or Latino indicated feeling less safe on the trails than did white identified trail users (DF = 1, F = 10.654, p=0.0014; see Figure 14). A post-hoc, pairwise comparison of the different groups on the two trails showed a significant

difference in the feeling of safety between non-white Hikshari' Trail users and white Hikshari' Trail users (p=0.0045), non-white Hikshari' trail users and white Hammond Trail users (p=0.0003), and a suggestive difference between non-white Hikshari' Trail users and non-white Hammond Trail users (p=0.058). There was no difference in the reported feelings of safety between white Hikshari' and Hammond Trail users (p=0.808) nor was there a difference between white and non-white Hammond Trail users (p=0.892; see Figure 14).

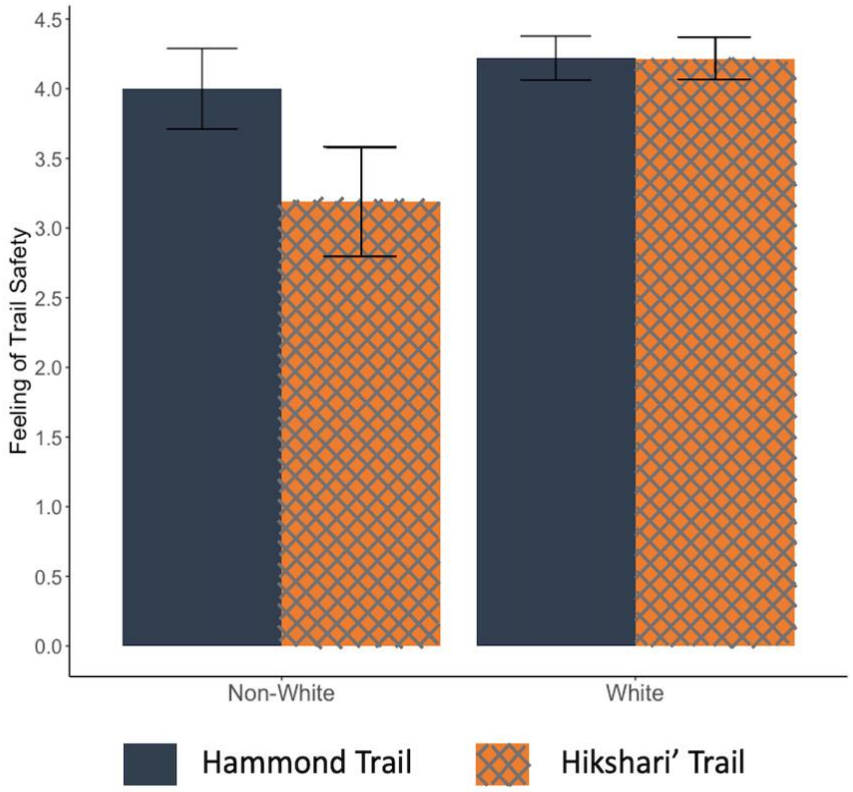

Figure 14. Mean feeling of safety ratings by white and non-white survey respondents for the Hikshari' and Hammond Trails. Error bars represent +/- one standard error from the mean.

While I intended to provide racial and ethnic identity categories that mirrored the Census, there were some slight variations that made it challenging to compare my data and the Census data (see Table 8 and Table 9 for detail). Table 8 represents self-identified race, and Table 9 represents self-identified Hispanic or Latino ethnicity.

Table 8. Racial identity of survey respondents and comparison to Census data for Humboldt County. Responses are for both trails combined.

Racial identity option	Number of responses	Percentage of responses	Percentage of total population, Humboldt County*
White**	120	77%	83%
Some other race***	20	13%	6%
Asian	6	4%	3%
American Indian or Alaska Native	4	3%	6%
Black or African American	3	2%	2%
Native Hawaiian or other Pacific Islander	2	1%	<1%
Total number of responses	155	-	-

** Data for July 2022 from U.S. Census Bureau. ** Census data differentiates between "White alone" and "White alone, not Hispanic/ Latino". *** The descriptor "Some other race" differs from the American Community Survey ("Census"), which includes the category "Two or more races" in addition to the other racial identity categories shown here.*

Table 9. Hispanic/ Latino identity of survey respondents and comparison to Census data for Humboldt County. Responses are for both trails combined.

Do you identify as Hispanic/ Latino? Yes/No	Number of responses	Percentage of responses	Percentage of total population, Humboldt County*
No	129	90%	**See note
Yes	14	10%	13%

** Data for July 2022 from U.S. Census Bureau.*
*** The American Community Survey ("Census") clearly indicates Hispanic/ Latino responses and a category of "White alone, not Hispanic or Latino" (73%) but is unclear with respect to people who identify with another race as well as Hispanic/ Latino ethnicity.*

Survey respondents were also asked about their political ideology on a spectrum of left-leaning to right-leaning, with a numeric value of one being furthest left ("very liberal") and a numeric value of 5 being furthest right ("very conservative"). The mean was 2.35. There was a slight but statistically significant relationship between political ideology and reported feelings of trail safety ($p = 0.034$, $R^2 = 0.053$) with participants who rated their political ideology as more right-leaning reporting lower feelings of safety on trails. There was suggestive but not conclusive evidence of a difference in reported safety between the two trails ($p = 0.08$) across political ideologies (Figure 15).

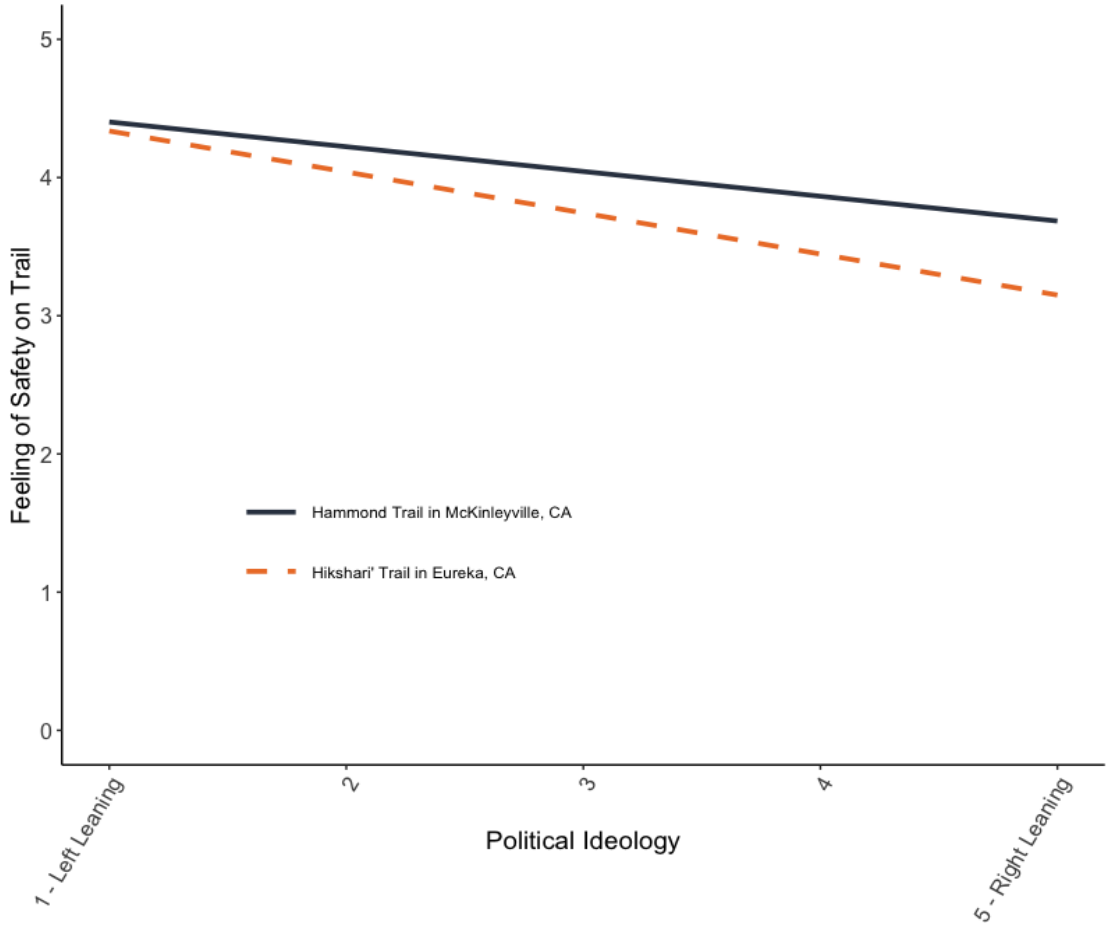

Figure 15. Relationship between feeling of safety on the trail and political ideology as indicated by survey respondents.

Disability status was not a question category in the demographics portion of the survey. However, five interviewees spoke to the importance of accessibility, whether for themselves as individuals or as a factor important to family or friends (Interviews, 2023). Survey responses include 27 narrative responses that feature the terms “accessible” or “accessibility” (Surveys, 2022). One respondent who disclosed that they are legally blind indicated that they use the Hikshari’ Trail as a pedestrian or while riding a tandem

bicycle. Additionally, there are 26 survey responses that include the words “flat”, “easy”, “stroller”, and “walkable” (Surveys, 2022), many of which describe fear or uncertainty stemming from other trail users potentially knocking them over and a desire to minimize these trail conflicts. Accessibility and level of comfort using trails are important factors to analyze in a future study.

No survey questions were asked about respondent income. The median household income for Eureka in 2022 was $43,199, while the median household income for McKinleyville in 2022 was $54,697 (U.S. Census Bureau, 2022). The income difference was mentioned by three interviewees, unprompted. One interviewee noted that the area near the Hammond Trail in McKinleyville is “more affluent and more residential” (Interview 2, 2023). An interviewee who spoke about the Hikshari’ Trail noted that “Eureka is more blue-collar than Arcata and McKinleyville – there are a lot of poor and working-class people who need to get around in this town” (Interview 8, 2023). Lastly, an interviewee offered their perspective about both communities’ culture and income, saying that “basically, Eureka is always going to be grittier than McKinleyville – one is a raucous, busy town with a big industrial zone, and the other is primarily a wealthier residential community with ocean views – catch my drift?” (Interview 10, 2023).

Trail Usage and Perception of Safety

Both the surveys and interviews revealed information about people's use of the trail, how their use of it impacts their feeling of safety, and how changes in use have affected their feelings of safety over time. In the survey, several questions were posed about current and projected uses of the trail. Respondents were asked about frequency of use (Figure 16), in part to determine how well people knew the trail. Nearly 46% of respondents use these trails at least weekly (Survey, 2022). These results indicate that survey responses are reflective of repeat users, and in many cases, of very frequent users. During interviews, people who were familiar with the before and after of both trails' construction described a notable difference in the "types of uses and the variety of people who frequent" both trails and a "marked difference in the atmosphere on the trail when compared to the unregulated green space of the past" (Interviews 3 and 8, 2023).

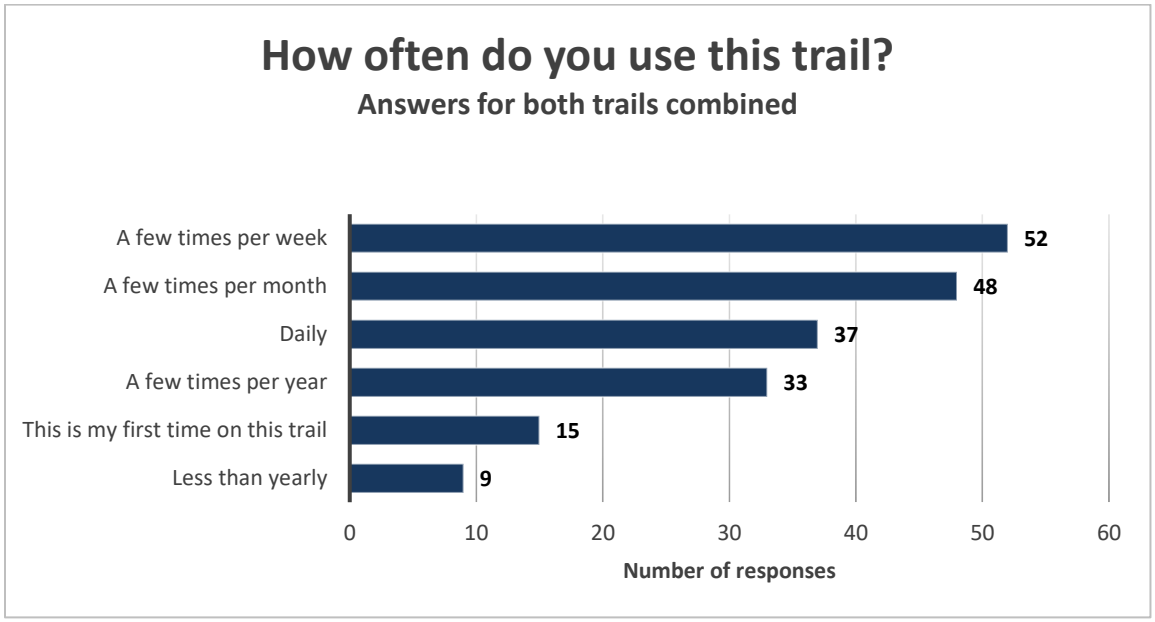

Figure 16. Responses to survey question about how often people use the trail, for both the Hammond and Hikshari' trails.

Survey respondents were asked about why they were using the trail on the day of the survey and presented with a list of options and invited to choose all applicable responses or craft their own (Figure 17). Respondents could select more than one reason why they visited the trail. It is notable that only 22 survey responses out of 406 (five percent) indicated that the trail was being used for transportation. A great majority of the users who took the survey were recreational users. Respondents were provided with "other" as an option; examples of these responses included: "mushrooms", "on way to brewery", "patrol the trail", "school project."

Figure 17. Responses to the survey about why respondents came to the trail, with options including a wide range of common reasons as well as an "other" category. These responses are for both the Hikshari' and Hammond trails.

The survey also included a question related to people's potential for future increased use of trails. This was linked to safety improvements through a question asking, "How likely would you be to choose to walk, bike or roll on local trails if they felt safer to you?" on a scale of zero to five, with zero representing "not at all likely" and five being "very likely". Many respondents expressed a belief that they would use trails more if they were perceived as safer. Fifty-four percent of survey respondents would be very likely to choose to use of trails more often if they felt safer (see Figure 18).

Figure 18. Responses to the survey question, "How likely would you be to choose to walk, bike or roll on local trails more often if they felt safer to you?" Responses based on Likert scale rating of zero (not at all likely) to five (very likely). Numeric selections are depicted for both the Hikshari' Trail and Hammond Trail.

Survey respondents were also invited to consider the distance in miles (or fractions thereof) they would travel on trails for transportation purposes. Along with the previous question, this question was intended to understand potential for behavior change and increased trail usage. Sixty percent of respondents said they would travel more than two miles round trip to access destinations, goods, or services that they care about. The question specifically asked about trail use for transportation rather than recreation (see Figure 19). Even if these responses were aspirational, the percentage is greater than anticipated, especially due to the number of respondents who said they were using the trail on foot (rather than on a bicycle or scooter) and to be outside (rather than for transportation purposes). Urban and community planners often use ¼ mile as the distance

that people are willing to walk on their commute or for daily tasks, and only two respondents said that would be their distance limit (Ontario Ministry of Transportation, 2012; Interview 7, 2023). It is also helpful to understand from these results that there are 20% of trail users who would not plan to use trails for transportation, or at least would not use the trail they were on during the survey for that purpose.

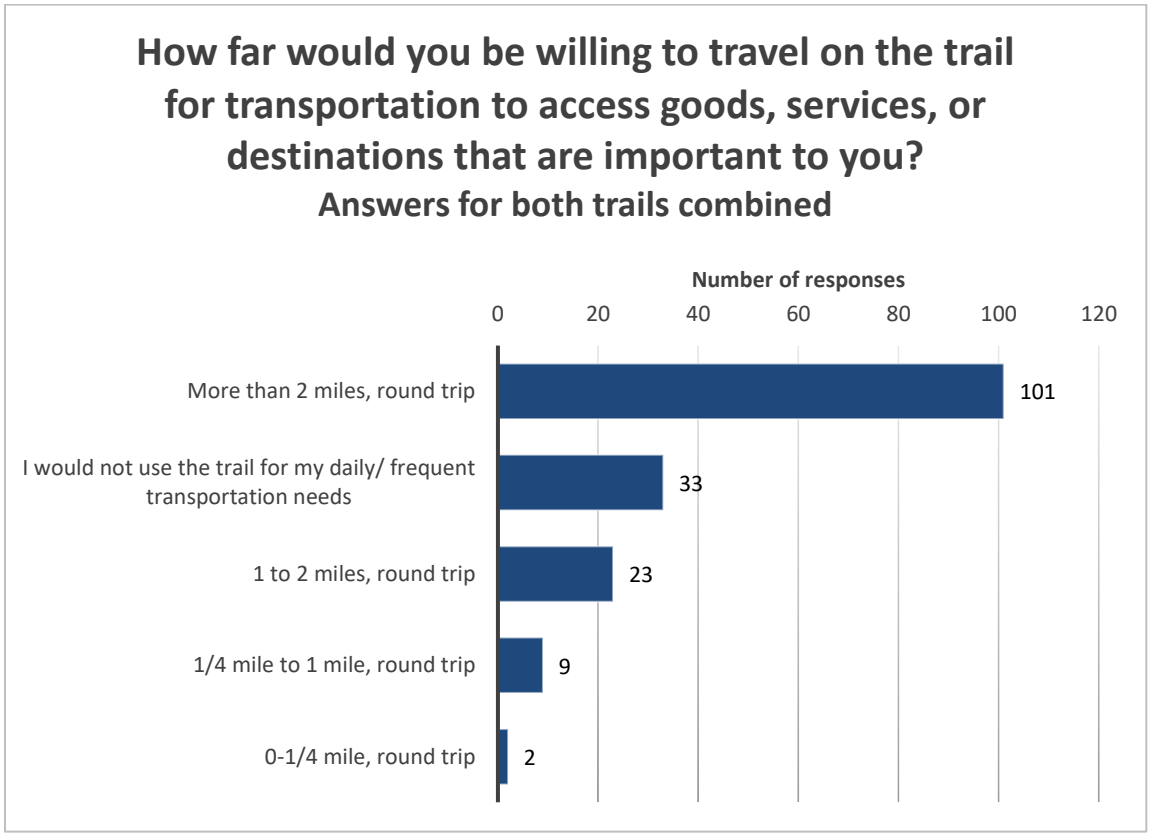

Figure 19. Responses to the question: How far would you be willing to travel on the trail for transportation to access goods, services, or destinations that are important to you? Answers include both the Hikshari' and Hammond trails.

On the Hikshari' Trail, 68% of survey respondents who answered this question reported that they would travel more than two miles round-trip for their frequent transportation needs, 15% of respondents would use it but would travel less than two

miles round trip, and the remaining 18% said they would not use the trail for transportation (Survey, 2022). On the Hammond Trail, 57% of respondents who answered this question would travel more than two miles and another 20% of respondents would travel less than two miles for transportation, while another 23% would not use the trail for transportation (Survey, 2022). According to the trail counter data collected by the County of Humboldt, average daily use of the Hammond Trail is already nearly twice that of the Hikshari' Trail (Figure 20).

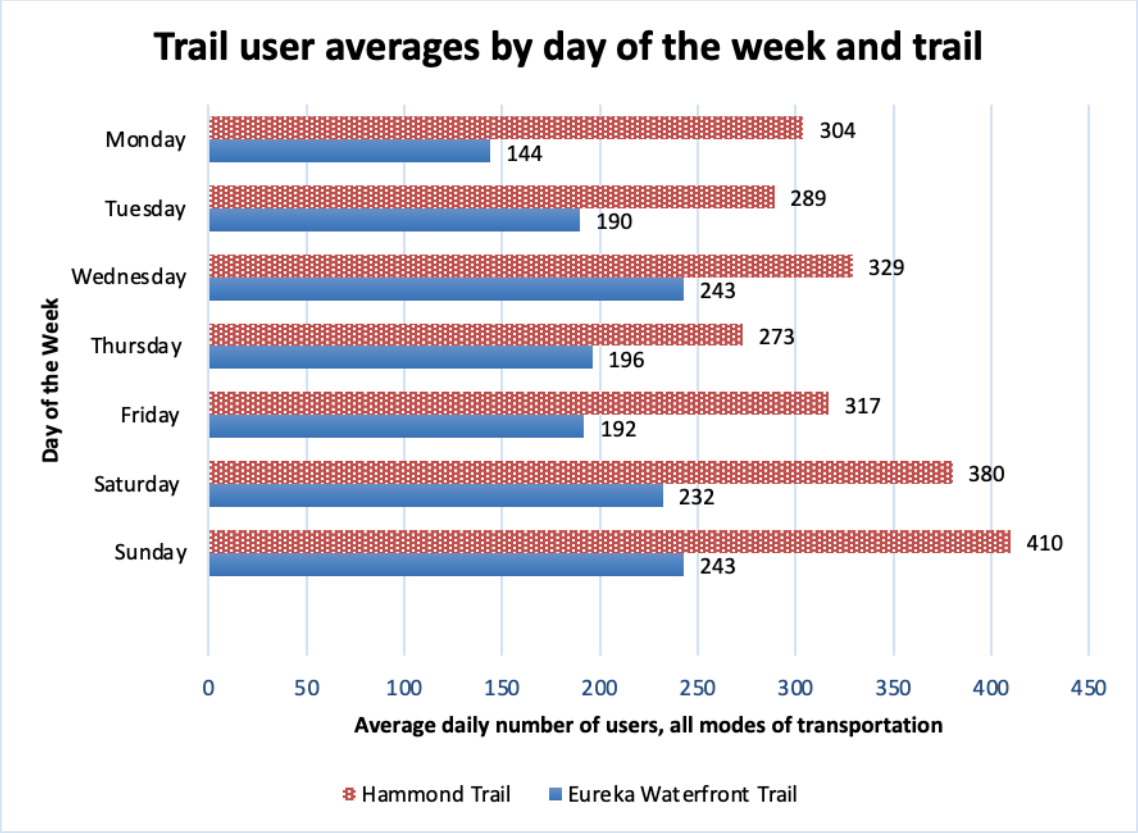

Figure 20. Trail user averages by day of the week and trail. Source: County of Humboldt.

One possible downside of increased use of the trail was articulated by multiple interviewees – impacts from wildlife that are drawn to human trash. Two interviewees felt that bears, skunks, and other animals that eat human garbage have been more abundant in recent memory, which they believed affected adjacent properties and trail users. Along with these interviewees, three survey respondents expressed that they believed there was a connection between an increased number of encampments near the trail, access to food and garbage at these sites, and the frequency with which bears are sighted or impact adjacent properties (Interviews 13 and 14, 2023). Social media also provides a forum for people to share wildlife concerns on these trails, with bear scat sightings on the Hammond Trail shared during my study (Appendix C).

Perceptions of Trail Value

Survey respondents were asked about the value they place on the trail (Figure 21). On the Hikshari' Trail, the mean score for the value and/or importance of the trail was 4.16 on a scale of zero to five, and on the Hammond Trail, it was 4.68 (Surveys, 2022). All 15 interviewees expressed that the trail area was an asset, resource, or amenity of significant value. One interviewee noted that the trail is "inextricable from daily life" and later noted that the trail is important to them because they "don't have to get in a car to go for a long walk" (Interview 14, 2023). Another interviewee stated that the trail offers beauty as well as spiritual grounding, noting that, "Long trails have always been my source of meditation, peace, reflection, head-clearing. From a social capital perspective, any healthy community has libraries, sports fields, parks, and trails – they're just as

important as other things we place value on." (Interview 4, 2023). Multiple interviewees expressed how the trail's value was inextricable from their feelings about its safety, with several comments about being able to experience solitude, such as, "I love walking alone. It feeds my soul… When there's a place to walk, I trust that other people will be there looking out for each other but not bothering each other – it's the most valuable, rare thing. It's a huge part of why I live here." (Interview 11, 2023).

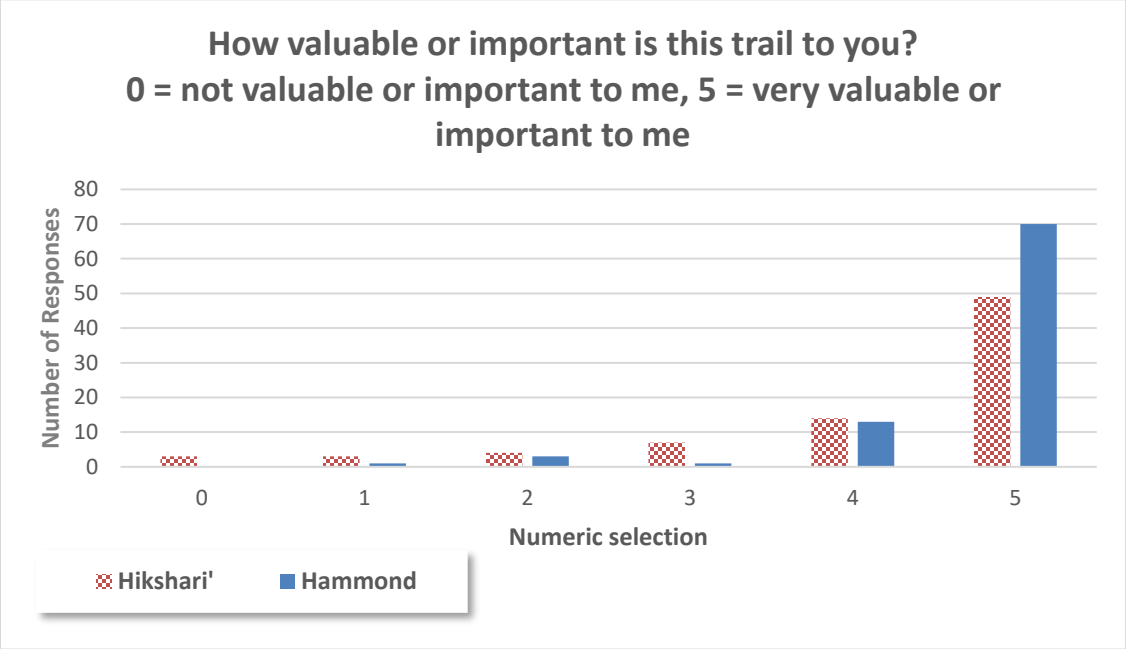

Figure 21. Survey responses to question, "How valuable or important is this trail to you?" Responses based on Likert scale rating of zero (not valuable or important to me) to five (very valuable or important to me). Numeric selections are depicted for both the Hikshari' Trail and Hammond Trail.

Respondents were also asked how likely they would be to recommend a trail experience to the people they care about (Figure 22). Interestingly, the scores selected by survey respondents to correspond with the likelihood they would recommend the same trail to the people they care about were higher overall than the scores for their own personal feeling of safety. For the Hikshari' Trail, the mean rating for personal feeling of safety was 3.74 (Figure 8), whereas the likelihood of recommending the trail to a loved one, using the same zero to five scale, was a mean of 3.83. Similarly, the mean for personal feeling of safety on the Hammond Trail was 4.27 (Figure 8), and likelihood of recommending the trail was a mean of 4.54. There was a strong relationship between people feeling safe on the trail and the likelihood of them recommending the trail to others ($p < 0.0001$, adj. $R2 = 0.49$) including a difference in the likelihood of recommending the trail to others depending on the trail ($p = 0.008$), and an interaction effect of the feeling of safety and which trail the respondent was using ($p = 0.042$; Figure 23). This was surprising because a commonly-heard sentiment was, in the words of one interviewee, "I don't feel unsafe myself, but I would not want my mom or my sibling walking alone on the trail." (Interview 14, 2023). Nonetheless, many respondents clearly indicated that they would be glad to recommend these trails to other people in their lives.

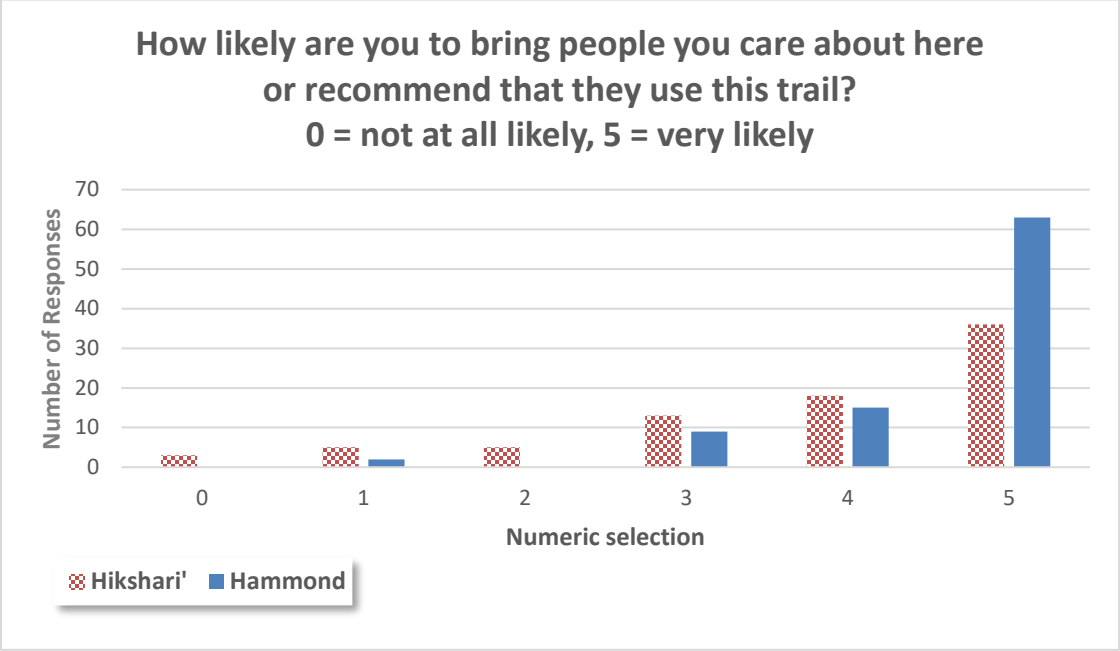

Figure 22. Survey responses about likelihood of recommending the trail to people the respondents care about. Responses are on a scale of zero, being not very likely, to five being very likely.

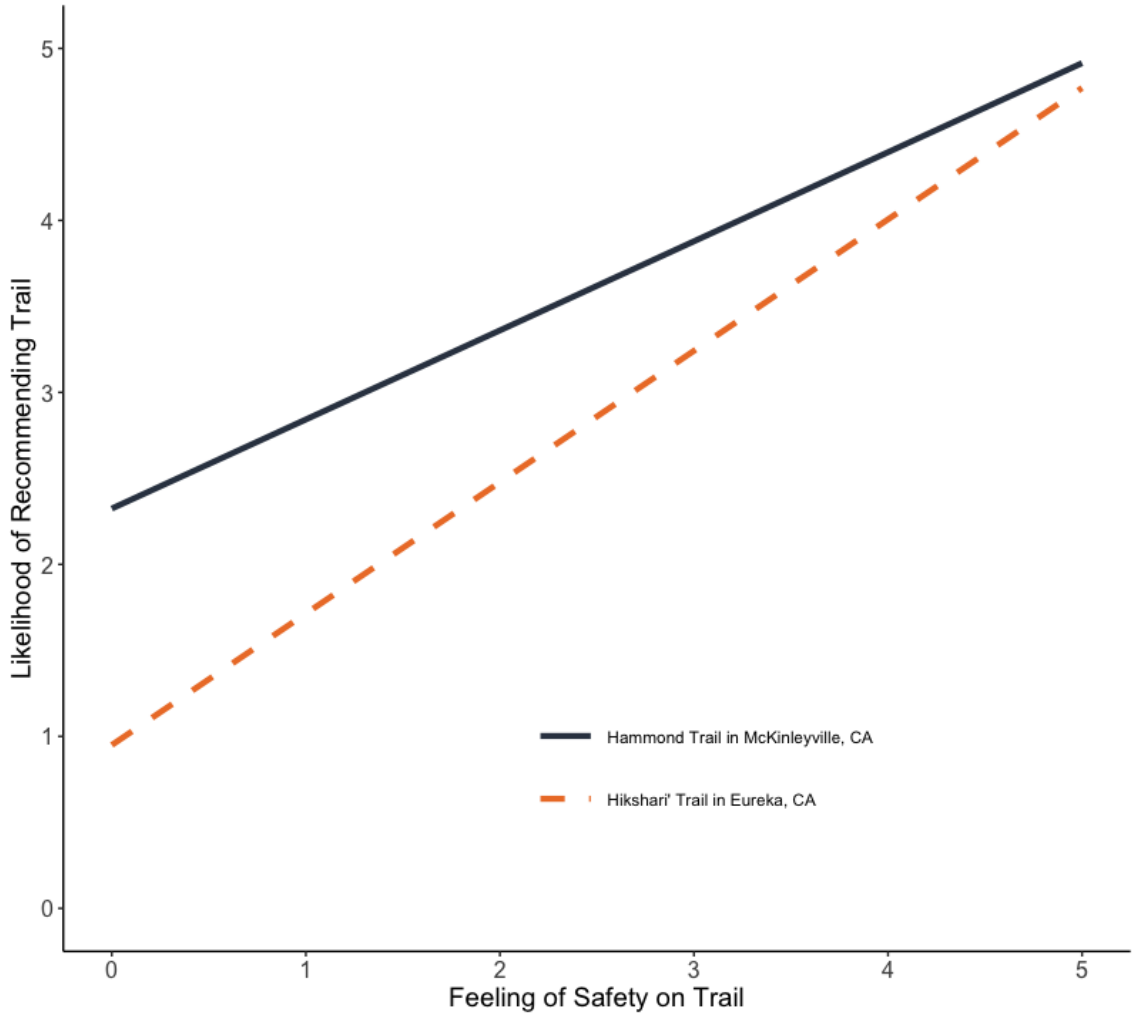

Figure 23. Relationship between survey responses about personal feeling of safety on the trail and likelihood of recommending the trail to others, shown for both the Hikshari' and Hammond trails.

Another survey question intended to gauge people's feelings and perceptions about the trail asked: If you could use just three words to describe this trail, what would they be? This question was designed to provide an open-ended opportunity to describe the trail using words generated either during or soon after experiencing the trail, while adding a limitation on word count so that respondents would prioritize their sentiments.

The words that respondents selected were overwhelmingly positive, with 77% of the words used to describe the Hikshari' Trail being positive words, and 91% positive words used for the Hammond Trail. Results are shown in Table 10, including a selection of examples for each trail (Survey, 2022).

Table 10. Responses to question "If you could use just 3 words to describe this trail, what would they be?"

Trail	**# of positive words used (3 max words per answer)**	**# of negative words used (3 max words per answer)**
Hikshari' Trail	140	42
Hammond Trail	211	21

Example responses for Hikshari' Trail:	**Example responses for Hammond Trail:**
"Continuous, welcoming, important" "Pretty, secluded, unsafe" "Beautiful views, wildlife" "Long, dirty, cold" "Connected, amazing, revitalized"	"Life-saving dog walk" "Peaceful, trafficless, wonderful" "Cyclist war zone" "Convenient, cautious, improving" "Bike life line" "Lovely, community building"

Survey respondents were asked to rate their level of knowledge about local infrastructure, transportation, and land use decisions. This was a way to gauge how nuanced their understanding and familiarity about these trails was. This question included a scale from one to five, and responses showed that most people felt they were somewhat engaged to very engaged (Figure 24).

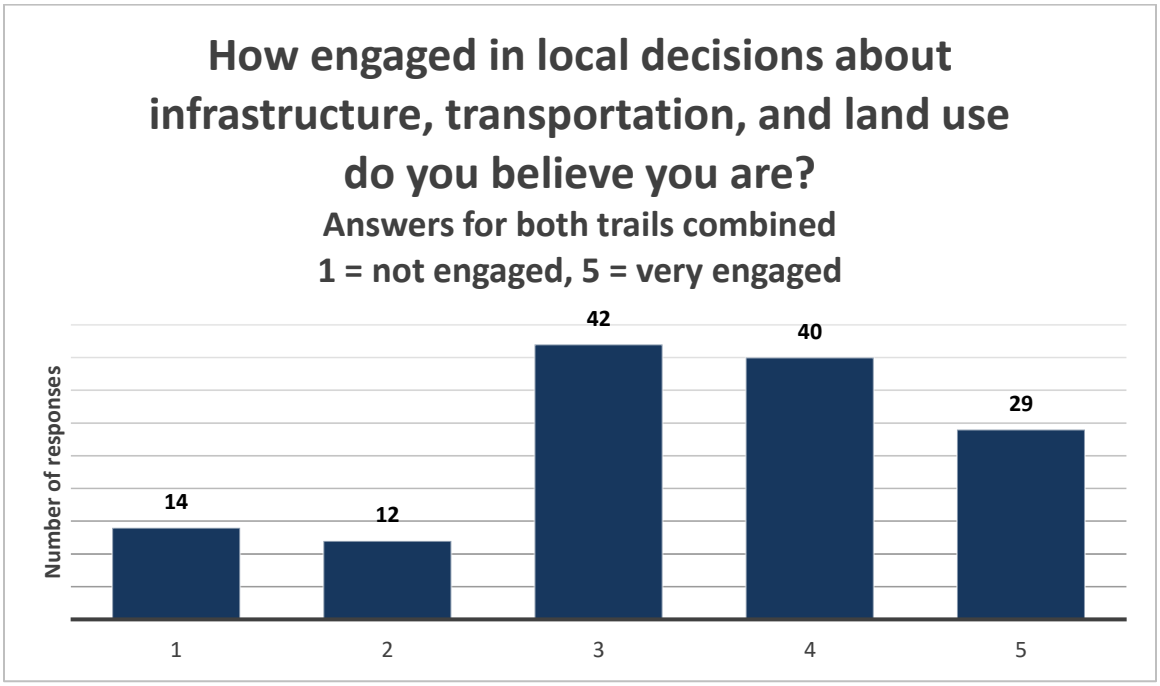

Figure 24. Responses to question about level of engagement regarding local infrastructure, land use and transportation decisions. Responses for both trails.

Climate and Public Health Implications

Due to the importance of decreasing motorized vehicle travel as a key strategy to reduce carbon emissions, I incorporated questions related to climate and trails in my survey. This included the survey questions, previously discussed, which were designed to gauge the likelihood that people who are already using trails would use them more frequently, would use trails to travel longer distances, or would feel differently about trails based on perceived improvements to safety. Considerations related to climate also came up in interviews.

Multiple survey respondents noted that they would prefer to use a trail instead of driving a car in open-ended responses to survey questions. These included comments such as, “Being away from cars is so important so I can make the decision to walk”, and “I desire more connective trails and paths to get to where I need to be, places that connect me with nature and other people. This would definitely make me walk or ride a bike or skateboard more.” One survey respondent very clearly articulated the climate and trail connection, stating that “We need to encourage people to get out of their cars so we can all survive the climate crisis.”

Interview respondents also spoke to the climate aspects of trail development, noting that trails are safer alternatives for people who wish to make climate-friendly choices and expressing that safe trails should be part of basic infrastructure provision to support environmental health in the long-term (Interviews 5, 8 and 11, 2023). One interviewee said that,

> Without good trails, many people will not experience bicycling or walking as a positive thing… having these positive experiences, even if they’re not for daily transportation, can be pretty important. Otherwise a lot of folks won’t gain the confidence they need to make this their daily form of transportation. (Interview 12, 2023).

Another interviewee shared that,

> McKinleyville has missed the boat on creating pedestrian infrastructure, but the Hammond Trail is a success… I want the trails to not only work for me but for the generations that come after me, so preserving these transportation corridors is important. We have finally hit the tipping point with local government where people are on board, after decades of trying. Now people have to have a sense that when they have concerns, that they will be addressed, so we can continue the momentum. (Interview 3, 2023).

Recommendations for Trail Improvements from Survey and Interview Respondents

Both interviewees and survey respondents were able to articulate the improvements that were most important to them based on their safety concerns (Table 12). I grouped these, which showed that services and resources for people lacking housing or behaving erratically were top suggestions. Many study participants would also like to see increased frequency of trail patrols, with two interviewees specifying that this be law enforcement while other interviewees and survey respondents articulated that they wanted this to be a community presence of unarmed individuals. Physical changes to the trail and maintenance recommendations comprise many of the other frequently-expressed ideas. Multiple interviewees expressed interested in greater regional trail length and connectivity, with one saying to, “keep making it longer, more connected, more useful for everyone” (Interview 7, 2023). Along with trail length and connections, interviewees expressed a need for ongoing maintenance, including the sentiment that, “maintenance is incredibly important. People feel crowded by the vegetation and it impacts their psychological feeling of safety - limb up vegetation so there is more visibility and it will go a long way!” (Interview 8, 2023).

Table 11. Recommended improvements to the Hikshari' and Hammond Trails from both survey respondents and interviewees.

Recommended improvement	Number of times mentioned per trail		# of times mentioned, both trails combined
	Hikshari' Trail	Hammond Trail	
Housing/ sleeping alternatives for homeless individuals	16	8	**24**
Provide services and interventions for individuals acting erratically or experiencing behavioral/ mental health crises	12	7	**19**
More frequent, formal trail safety patrols	11	8	**19**
Improve trail surfacing, mile markings, grade, or width	4	9	**13**
Improve dog waste disposal options	3	9	**12**
More frequent vegetation maintenance/ improve visibility	7	5	**12**
Centerline striping/ signs to define right-of-way and improve trail etiquette	7	5	**12**
Improve connections from the trail to other destinations	7	5	**12**
Extend the trail for a longer, continuous journey	6	6	**12**
Increase events and educational activities	5	6	**11**
Install more trash/ recycling receptacles	3	7	**10**
Other usage recommendations (speed limits, e-bikes, etc.)	4	6	**10**
More frequent cleanup of general trash	7	2	**9**
Enforce dog leash laws	3	6	**9**
Increase number and/ or quality of signs to orient trail users	4	4	**8**
Other maintenance recommendations (bathrooms, funding, etc.)	3	5	**8**
Improve trail seating	2	3	**5**
Add pedestrian-scale lighting	2	3	**5**
Improve visibility of water (bay/ ocean)	2	2	**4**
Decrease horse poop on trail	0	4	**4**

DISCUSSION

Study results revealed that people's perceptions about trails and about their own feelings of safety were personal, complex, and dynamic. The study also showed that perception was an important part of the way that people made choices about trail use and revealed aspects of community behavior and values. This work has implications for trail managers, planners, and policy-makers, building on a body of work about trail and open space management all around the world (Brownson et al., 2004; Jorgensen et al., 2013; Pak & Verbeke, 2022). The work can add to the understanding of how people perceive trails in rural and suburban communities where resources are inherently constrained. Additionally, findings can inform planning and management of trails in the Humboldt County area and in the greater geographic region.

Perceptions of Trail Safety and Value

Survey and interview findings overwhelmingly showed both that users of the trails feel safe while on the trail and that individuals who had experienced the trails prior to implementation believed the construction of the trails improved the level of safety in the areas. These results suggest that when it comes to trails and safety, Humboldt is not exceptional, as the findings are similar to many of the findings from the literature which tend to show that trails make places safer (Frost et al., 2010; Rails-to-Trails Conservancy et al., 1998; U.S. Department of Transportation, 2017).

The comparison of responses between the two different trails can provide some insights into factors driving perceptions of safety related to trails. Users of the Hammond Trail expressed greater feelings of safety than users of the Hikshari' Trail (Figure 8). One factor that might explain this difference is the relative level of use of each trail. Trailside automated counter data from 2022 showed a greater number of users on the Hammond Trail than on the Hikshari' Trail. In narrative responses to the survey and during interviews, many participants spoke about the importance of having other users on the trail whose presence improved their feeling of safety. Eleven out of 15 (73%) people interviewed spoke about the relationship between the presence of other trail users and feelings of increased safety and/ or reduced negative experiences (Interviews, 2023). This would be consistent with the literature about natural surveillance and perceptions of security in public spaces (Clarke, 1983; Fernandez, 2005; Jeffery, 1972).

It may be difficult to determine whether having a greater number of trail users has made people feel safer on the Hammond Trail, or the other way around – whether people feeling safer on the Hammond Trail has increased use. Additionally, there could be many other factors that contribute to both increased use and a difference in perception of this portion of the Hammond Trail, such as the proximity to Hiller Park's playground, baseball field, and dog park, and proximity to residential neighborhoods. The Hammond Trail was built many years before the Hikshari' Trail, with the first segment of the Hammond Trail first opened to the public in the 1990s (Interview 1, 2023) and the Hikshari' Trail first formally opened to the public in 2013 (City of Eureka, n.d.). As a result, local trail users have been frequenting the Hammond Trail for decades longer than

the Hikshari' Trail. Additionally, the neighborhoods and land uses surrounding these trails differ substantially, with the Hikshari' Trail surrounded by industrial, retail, and public land uses, while the Hammond Trail is surrounded by residential, public, and recreational lands. The community of Eureka has a lower median income than the community of McKinleyville. Additionally, the Eureka Waterfront Trail in its entirety has a history of unsanctioned camping which stretches back for over 15 years, including the establishment of very large encampments that were well-known to both law enforcement/ government personnel and the local community at large (Interviews 3, 4 and 6, 2023).

The high levels of reported safety on the trails might also be explained by familiarity. Humboldt County residents made up 94% of survey respondents and 100% of interviewees (Figure 13). This, combined with survey questions about trail use and the detailed responses that individuals were able to provide in their narrative responses, showed that the majority of respondents had a high level of familiarity with the region and the trails specifically.

Findings related to the relationship between demographic variables and perceptions of identity can have important implications for the literature and trail planning. The study did not find a statistically significant relationship between gender identity and perception of safety on trails, despite gender being a frequently mentioned aspect of identity during my study. However, I did find that racial/ ethnic identity was a factor, with self-identified non-white survey respondents reporting lower feelings of safety on the Hikshari' Trail. This is consistent with the literature, as studies have shown

safety on trails can be a significant concern for non-white individuals (Keith et al, 2018). This finding can pose equity considerations related to trail use and management. If non-white individuals are less likely to feel safe on local trails, they may also be less likely to use and derive benefits from those trails.

Factors that affected people's perception of safety on trails most significantly in my study included the behavior of other users and physical conditions of the trail. In surveys and interviews, participants consistently brought up several circumstances that influence their perceptions of safety: people behaving erratically on trails, people having unleashed dogs on the trail, unauthorized and unexpected camping in greenbelt areas adjacent to trails, and bicyclists passing pedestrians too quickly (Surveys, 2022; Interviews, 2023). The most commonly-mentioned concerns about trail condition that affected study participants' perceptions of safety were visible trash, vandalism, and dense or overgrown vegetation that restricted visibility (Surveys, 2022; Interviews, 2023).

Respondents to the survey expressed a high level of value, appreciation for, and personal attachment to these trails along with ideas about what needs to be improved or what has been problematic in the past. Surveyed individuals rated the trails as very valued (Figure 21) and a majority of respondents described the trails using effusive, positive language (Table 10). Additionally, there was a considerable level of self-professed knowledge about local land use and transportation decision-making among survey respondents (Figure 24). Collectively, these responses show a high level of investment in these trails by people who use them regularly, appreciate them very much, and know them well. This positive input was paired with descriptive critique of the trail

condition in open-ended questions, which may be indicative of a trail-using public who are connected to their trails and value them greatly, all while hoping to see them improve. Responses indicate that the Humboldt trail user community is highly engaged in using trails and noticing their condition, and this could be leveraged effectively to increase volunteerism and grow community support for infrastructure improvements.

Trail Use, Transportation, and Climate

Regional transportation, climate, and disaster resilience plans call for increased infrastructure to support non-motorized modes of travel to meet goals set by local and state government (HCAOG, 2022; Grantham, 2018). The percentage of survey respondents using the trails for transportation was lower than I expected, comprising 22% of responses for both trails combined (Figure 17). The low levels of respondents using the trails for transportation could be related to the study design and sampling frame – despite efforts to recruit more commuter cyclists to the sampling pool, they were likely underrepresented in the sample. Future researchers may want to consider adding another survey delivery approach, such as use of a more broadly-advertised online survey to reach those who utilize the trails for transportation purposes.

A somewhat unexpected outcome of the survey was the willingness that survey respondents expressed about how far they would travel on trails specifically for transportation purposes, with more than half of respondents saying they would use trails for transportation needs for two or more miles (Figure 19). This is much farther than

anticipated based on previous studies, which indicated that pedestrians would be willing to walk for 5-10 minutes - approximately 400-800 meters or ¼ to ½ mile - to reach their destination or embark on their next leg of travel if using transit (FHWA, 2013; Ontario Ministry of Transportation, 1993). In the U.S. National Household Travel Survey - which gathers input from a wider cross-section of people in the United States than just those using trails - the average distance for a walking trip for transportation was 0.7 miles with a travel time of less than 15 minutes. Only 12 percent of all walking trips were over one mile. The average length of a bicycling trip was 2.3 miles and approximately 19 minutes. Twenty-six percent of bicycling trips were more than two miles, but only 12 percent were longer than 30 minutes (U.S. Department of Transportation, 2017). One-quarter mile remains a common planning benchmark for transportation planners in North America – one which Humboldt County trail users have indicated a clear willingness to exceed.

Potential Study Limitations and Areas for Future Work

People who were not using trails in Humboldt County on the days and times surveying was conducted, or who were not part of the interview group, are not represented in this study. This includes people who do not use trails because they perceive this as unsafe, and people who have used trails in the past but ceased use due to safety concerns. Additionally, multiple survey questions asked if respondents would consider using trails differently - with more frequency, for greater distances, etc. These answers to these questions could be misleading or skewed if respondents already use

trails often, already feel safe, etc. It is also possible that “acquiescence bias”, wherein people give an answer they feel they should give, played a role in people’s responses, particularly to questions where they may have believed there was a preferred answer or behavior. Because interviews were conducted in a semi-structured format, I had the opportunity to clarify nuances of trail safety perceptions, therefore, interviews did not leave as much uncertainty in interpretation. A study that includes non-trail users could uncover additional useful information.

I believe that people using trails for commuting and daily tasks, especially cyclists, are underrepresented in my study. Understanding use of non-motorized transportation facilities in rural and smaller suburban areas, including use of trails, would be a valuable future research area. In particular, having robust data about transportation use of trails and how many motorized vehicle trips are being replaced by non-motorized alternatives would be beneficial to make climate-related projections for communities with lower population density. Furthermore, understanding why people do not commute using trails and seeking to address barriers is a worthy strain of future research.

Results from the study also highlight the potential for more research related to houselessness, poverty, and trail use. Numerous survey and interview respondents comments on the presence of perceived houseless individuals on the trail and how that affected their view of safety. This aligns with other findings in the literature (García et al., 2018). The topic of houseless individuals and trail safety also comes up regularly in public meetings, public comments, and social media posts about trails (Appendix C) While pervasive societal challenges such as poverty, homelessness/ affordable housing

shortages, and behavioral health resource availability are issues underlying several of these safety concerns, others are related to infrastructure design or present policy change opportunities. One study that explored social equity and trail design indicated that:

> The topic of sidewalks or bike lanes may not be at the top of the list of concerns for residents dealing with immediate or life-affecting issues such as homelessness, drugs, vacant properties, or neighborhood violence… bike lanes, sidewalks, and other facilities may in fact be very important for residents needing to safely access jobs, transit, healthcare facilities, and schools… every resident's voice can be heard and that small improvements to the street environment can empower communities to make bigger changes over time. (Sandt et al., 2015b)

A future study that evaluates trail use, need for trails, and value placed on trails by homeless individuals could shed light on ways that trails enhance safety for people who are unhoused.

While the economic impact of trail development was not explicitly part of this study, multiple interviewees mentioned that they believed the Hammond Trail had increased property values for surrounding neighborhoods. As a result, I sought more information from local real estate experts. One real estate brokerage based in Eureka, California has a webpage dedicated to the McKinleyville area, and about half of the text about the community is dedicated to the Hammond Trail, described as one of "Humboldt County's most popular local trails" (Benchmark Realty website, 2023). Other real estate listings for the Eureka area that were current in October 2023 describe both residential and commercial properties as "close to the Hikshari' Trail, connected to waterfront destinations" and "bay views, an easy walk or bike ride to a secluded beach and the Hikshari' trailhead" (Benchmark Realty website, 2023). Humboldt County real estate

agents who were directly asked about the connection between property listings and trails noted that “trail development was certainly a positive factor” (M. Conrad, personal communication, 2022) and “a well-maintained trail is an amenity that in most cases would increase the value of a property” (A. von Borstel, personal communication, 2023). Future analysis of residential property values and their relationship to trails would help to understand the economic value that trails have for communities, which could in turn help to make decisions about trail-related investments in future development.

This study focused on perceptions of safety; however, it does not include evidence related to indicators of safety such as prevalence of reported crime in the area. I had initially planned to include law enforcement data about calls for service to these trails (“call-for-service data”) and to compare that information pre and post trail construction. Due to data availability constraints and input from interviewees in the law enforcement sector, I did not use call-for-service data and instead focused my efforts on interviewee stories and personal experiences. Future researchers may wish to delve further into law enforcement, fire/ EMS responses, and other forms of data in conjunction with trail safety analyses.

In hindsight, there are several questions that I would have worded or structured differently in my survey to provide more clear or usable results. Ensuring that the demographic categories selected aligned more closely with the U.S. Census would have aided in comparisons with local demographics and demographic changes over time. I did not ask about income, but it could have been a useful variable to explore in comparing differences in perceptions between the two trails. Additionally, using the same numeric

rating scale for all questions would have provided more consistency, while using a seven-point scale with numeric values and descriptive labels for each choice would have added clarity, consistency, and additional nuance to people's answers.

I serve in a public role in the small, tight-knit community that is Humboldt County. I sought to articulate to both survey respondents and interviewees that I was working on this project in my role as a researcher and student rather than in any other role. However, it is quite possible that people's participation or responses were colored by their perceptions of me as the researcher. In an effort to be as transparent as possible, I simply shared that I was conducting this work as a graduate student and answered any questions that people had about my relationship to the work, which were very minimal.

RECOMMENDATIONS FOR TRAIL MANAGERS

Community members who participated in this study by responding to surveys or participating in interviews had myriad recommendations and ideas for how to improve the two trails (Table 11). Many of these observations and ideas were consistent with best practices for trail management from the literature and guidance documents I reviewed. Based on the input that study participants have provided through both surveys and interviews about what concerned them most on the trails and what impacted their feelings of safety and through findings from the literature I developed a set of recommendations for trail planners and managers in the region. I divided the recommendations into three primary categories: built infrastructure, management and policy, and education and engagement (Table 12).

Table 12. Recommendations to improve safety on the Hikshari' and Hammond Trails.

# (not ranked by priority)	Category of recommendation	Recommended change
1	Built infrastructure	Increase trail length and connectivity to local destinations
2	Built infrastructure	Improve trail surface smoothness and evenness
3	Built infrastructure	Stripe trail with centerline and install signage to indicate purpose/ meaning of striping
4	Built infrastructure	Paint or install mile markers/ distance increment markers
5	Built infrastructure	Increase wayfinding and guidance signage
6	Built infrastructure	Increase maintenance of existing physical infrastructure at trailheads and evaluate surveillance pros/ cons
7	Management and policy	Improve awareness of how, when, and where to report non-emergency conditions of concern
8	Management and policy	Increase formal trail patrols, considering Community Ambassador program
9	Management and policy	Establish consistent process for public safety dispatchers to identify and code trail-related calls and complaints for data tracking purposes
10	Management and policy	Increase litter abatement and vegetation maintenance efforts
11	Management and policy	Seek opportunities to increase public and private investment for trails
12	Management and policy	Establish trail use guidelines and speed limits, where lacking, and conduct outreach to notify users of them
13	Management and policy	Document trail-related history to increase understanding of how management and policy changes affect trails and people
14	Education and engagement	Hold structured public events with more frequency on trails
15	Education and engagement	Provide mini-grants or free permits for events on trails
16	Education and engagement	Conduct bike, skate, and scooter safety training on trails
17	Education and engagement	Conduct outreach about trail safety improvements to trail users

Built Infrastructure

Recommendation 1: Increase trail length and connectivity to local destinations. Both of the trails in this study are part of the California Coastal Trail, and as such, they are designated routes of travel that have been built as a State of California investment towards the goal of a complete coastal trail. The trails offer a north-south route of trail that connects to other roadways or trails, providing some continuity for users. However, local users noted through surveys and interviews that they would appreciate longer continuous routes of travel and more connections to the trail so that they can provide enhanced transportation benefits for local people who are using them on a frequent basis. This includes improved safety on streets, roads, and sidewalks to connect these trails to important destinations such as transit stops, shopping centers, business districts, and community amenities such as parks. Additionally, many users expressed excitement about regionwide trail connectivity and the completion of the Humboldt Bay Trail, which will connect the two most populous cities in Humboldt County, Eureka, and Arcata.

Recommendations 2-4: Trail surfacing, striping, and marking. The condition of the pavement and transitions to unpaved spurs, sidewalks, or roadways were noted by both survey respondents and interviewees. This includes repair of cracks and areas uplifted by vegetation or geologic processes, pavement smoothness for users of smaller-wheeled devices such as walkers, strollers, rollerskates, and skateboards, and transitions from paved surfaces to gravel areas or different textured surfaces. While disability was

not specifically asked about in my study, trail surface condition was spoken about as an accessibility consideration by interviewees and survey respondents.

Law enforcement interviewees and survey respondents noted that trail markings were beneficial for safety, especially the distance indicators or mile markings painted directly on the pavement surface of the Hikshari' Trail. These were identified as a low-cost option that can be maintained and expanded upon, and which could be installed by conscientious volunteers in collaboration with law enforcement and public works personnel of the City of Eureka and County of Humboldt. These markings provide an indicator for people who are calling for emergency response and need to provide their location.

In addition to distance indicators and mile markings, multiple interviewees and survey respondents expressed interest in having center line striping on trails to designate paths of travel. These are present in some areas of the Hammond Trail, but these segments with pavement markings are limited. Perspectives about what the center line striping should indicate varied – some individuals felt the line should separate bicycle and pedestrian paths of travel, while others shared that this should be used by all modes based on their direction of travel with users all staying to the right unless passing (Surveys, 2022). In either instance, if markings of this nature are implemented, they can and should be paired with signage and symbols or text trail surface markings that clearly indicate their meaning.

Recommendation 5: Increase wayfinding and guidance signage. Signs came up often in survey comments and interviews, with a consensus that additional wayfinding and guidance signage would be helpful – this included trail maps, signs along trails that show distance to certain destinations, and regulatory signage clearly indicating appropriate uses. While signs are currently present with much of this information, trail users pointed out that it depends where one accesses the trail, and new users may be less familiar with their location, feel lost, or feel uncertain about how far they need to travel to reach the next trail destination or place with informational guidance (Surveys, 2022). In summer of 2023, after my survey was conducted, the Humboldt County Association of Governments collaborated with the County of Humboldt, City of Arcata, Humboldt Trails Council, and other local partners to create and distribute temporary signs/ banners along with radio and television public service announcements about trail etiquette and appropriate uses (see Appendix C). These are helpful, simple, and effective resources which align well with this recommendation. One interviewee had abundant and helpful ideas about signs and public service announcements having the phone number for local behavioral health and crisis response resources (Interview 10, 2023). These resources are not currently posted on trails and would provide an opportunity for residents to have another outlet to provide help to others without directly contacting law enforcement – an option that some individuals who have had negative experiences with law enforcement or fear law enforcement may find helpful. Another interviewee strongly recommended having the phone number for the local public works or maintenance department for each

trail available via signage – a sentiment that was echoed by several survey respondents in their narrative responses (Interview 3, 2023; Surveys, 2022).

Recommendation 6: Increase maintenance of trailhead areas and evaluate surveillance options. Trailheads – access points to trails which often include parking areas, bathrooms, water fountains, and waste disposal facilities – were seen as important amenities but also places where inappropriate activities or crimes were more prevalent. Bathrooms, seating areas, and parking lots were all described by interviewees as presenting challenges when it comes to unwanted or illegal activity, such as drug transactions, property theft and vandalism (Interviews, 2023). Government employees who were interviewed noted that these are hotspots for property crimes and maintenance concerns. Government personnel and trail volunteers indicated that surveillance is tricky, both because of public concerns surrounding surveillance and due to the challenging coastal environment, which corrodes equipment quickly (Interviews, 2023). The City of Eureka has placed large, highly visible mobile camera systems near the Hikshari' Trail on a sporadic basis as a means of deterring crime, which has been a source of some community controversy (Interviews, 2023). Smaller, less-visible wildlife cameras have been used by volunteers to attempt to count trail users as well as to provide monitoring of trailhead areas, but these have become corroded easily, been damaged/ destroyed, or otherwise malfunctioned (Interviews, 2023). Participants in my study expressed a desire for regular, general maintenance of trailheads due to these locations setting the tone for people's use of trails. This is consistent with crime prevention through environmental design principles that recommend having clear points of access to common spaces or

"territorial reinforcement" and keeping these areas well-maintained to establish the space's appropriate condition (Crowe, 1993).

Management and Policy

Recommendation 7: Improve awareness about reporting non-emergency conditions of concern. Two topics of significant concern to trail users, as seen in Table 11, were seeing people who appeared to be unhoused within the two trail corridors and interacting with people who are behaving erratically or seem to be undergoing a mental health crisis. These are incredibly dynamic circumstances that may be separate from one another or can overlap in open space areas of Humboldt County. Empowering trail users to understand who to call and how to report these needs would be meaningful. As of 2023, the City of Eureka has a behavioral health response team of clinicians and social workers who are dispatched independently of law enforcement but who work closely with the Eureka Police Department – this team addresses needs along the Hikshari' Trail. The County of Humboldt's Sheriff's Office collaborates with clinicians from the Department of Health and Human Services to provide similar response capabilities on the Hammond Trail. Posting a non-emergency response number for each of these teams/ agencies for use by community members could be helpful in cases where emergency dispatch is not required, but a response to a human need is. One interviewee also shared an idea to create a guide for community members that walks people through how to report issues and to whom – they provided an example of when to call 911 (emergency

response number), when to call the County's Environmental Health department, and when to call a service provider about a social work need and how to make a referral.

Recommendation 8: Increase formal trail patrols/ consider Community Ambassador program. An increase in formal trail patrols was the second most-mentioned desire by trail users who were surveyed (Table 11). Seven of the 15 people interviewed also expressed a desire for more numerous trail patrol and/or enforcement personnel. One of these interviewees suggested a concept that straddles the existing Volunteer Trail Stewards role and that of law enforcement – a paid position similar to the City of Arcata's existing Community Ambassador program, whereby paid staff members with a local government or non-profit agency address a wide variety of needs and connect people to resources while informing them about appropriate uses of public space and involving law enforcement when necessary. Promotion of the existing, highly functional Volunteer Trail Stewards program and the provision of additional incentives through this program could address some of the needs that are feasible for volunteers to carry out, while also bringing more people to the trail. Several interviewees and survey respondents noted that seeing other people maintain the trail made them feel safer (Surveys, 2022; Interviews 2 and 3, 2023). The Volunteer Trail Stewards currently provide vests to regular volunteers which can be worn on the trail, and many stewards regularly walk the trails in these vests. A volunteer or paid docent/ambassador program would be beneficial to explore, either in addition to or as an augmentation of the Volunteer Trail Stewards program. Multiple interview participants expressed that if state agencies wish to fund trails to meet state objectives such as the California Coastal Trail, a dedicated funding

source for a patrol program in addition to volunteer maintenance and stewardship efforts would be highly desirable (Interviews, 2023).

Recommendation 9: Establish consistent process for public safety dispatchers to identify and code trail-related calls. Some law enforcement personnel who were interviewed expressed interest in analyzing data about crimes and reported safety concerns on trails and developing more robust data about the needs to help decision-makers with funding, staffing, and policy next steps. Call-for-service data in these locations was not clearly categorized or associated with trails when I undertook this study, but law enforcement personnel expressed interest in having this available. Law enforcement agencies could work with their dispatch personnel to specifically code concerns related to trails and find a way to categorize these calls so that reports can be readily generated and analyzed over time. Based on the findings of this study and the literature about people feeling safe when other people are around in great numbers, this analysis should identify and prioritize times when there is not a constant, steady stream of trail users, but there are still enough isolated individuals or small clusters of users to warrant a presence by trained personnel on patrol.

Recommendation 10: Increase litter abatement and vegetation maintenance efforts. Several aspects of trail maintenance including vegetation limbing, trash clean-up, graffiti removal, and restroom cleaning were often mentioned in survey responses and interviews. As with the desire for patrols, study participants expressed a need for a dedicated source or sources of sustainable funding. There were more comments made in the survey and interviews about cleaning-related maintenance needs on the Hikshari'

Trail than on the Hammond Trail, whereas the Hammond Trail was highlighted as a place for more frequent vegetation maintenance (Surveys, 2022; Interviews, 2023). The cleaning and graffiti abatement needs are tied to human behavior and use, whereas the vegetation maintenance is linked to seasons, precipitation, and weather patterns. Documenting a maintenance schedule that takes into account existing volunteer efforts, agency-led efforts, and observations about seasonal variation would be a worthwhile start to laying out needs for staffing and funding.

Recommendation 11: Seek opportunities to increase public and private investment for trails. Among study participants, more than 20 individuals expressed that more reliable and robust public and private funding for trails was a need. This topic was not directly prompted by any survey or interview questions and was separate from other discrete needs identified. Ultimately, both public and private investment is needed in these spaces that matches how loved, valued, and appreciated they are. Despite the common refrain that investment is needed to maintain and monitor these public spaces, opinions varied about whose responsibility that ultimately is and whether it is feasible to increase funding for these trails given other financial needs in each jurisdiction (Surveys, 2022; Interviews, 2023).

Recommendation 12: Establish trail use guidelines and speed limits, where lacking, and conduct outreach to notify users of them. A frequently noted concern among survey respondents was the speed of passing bicyclists and, to a lesser extent, e-scooter riders (Surveys, 2022). While this passing behavior elicited real fear from some trail users, others noted that these are multi-use trails designed primarily to support

transportation, demonstrating that there are a wide variety of views about suitable uses. Where they are not already established by policy, speed limits and usage guidelines would be very helpful. Clearly posting additional information about appropriate speed limits or passing behaviors in additional locations could be helpful. Targeted outreach to specific user groups such as commuting bicyclists could also be productive.

Sharing the trail with animals has led to plentiful commentary about animal owner behavior. Leash laws or criteria for having an animal off-leash are well-publicized at trailheads. However, off-leash dogs are a recurring challenge for humans and animals alike. Law enforcement personnel and government representatives very bluntly stated in interviews that these circumstances are so sporadic and variable that enforcement is extremely difficult. They did not believe that attempting to patrol for off-leash dogs would be particularly effective or a good use of public resources (Interviews, 2023). There was support for ongoing outreach and information-sharing about the impacts of off-leash dogs, but little agreement about an enforcement approach. Study participants thought that dog waste along trails was best addressed by providing more dog waste bags and trash cans at along trails, which are already present on these trails. These study participants wanted a greater number of trash cans and dog waste bag dispensers to be installed, but noted that there is a maintenance trade-off involved, with greater maintenance needs and costs as more trash cans are installed (Surveys, 2022; Interviews, 2023). Due to the challenges with enforcement and the existing presence of these dog waste amenities, the primary recommendation is to conduct ongoing community outreach about these courtesies to trail users. Since most of the users of these trails are local and

are repeat users, outreach in the local community is expected to reach people who regularly visit trails.

Another domestic animal-related concern pertains to horses. Equestrian use of the trails was observed during surveying on both the Hammond and Hikshari' Trails, and use of manure bags on the horses was rare (see Appendix C for photo). On paved trail surfaces, horse manure can persist and was identified as a slipping hazard as well as a hazard for trail users on smaller wheels such as walkers, scooters, rollerskates, or skateboards (Surveys, 2022). Interviewees acknowledged that because of the challenges involved in dismounting from horseback, it is even less likely that horse owners will pick up horse manure than many dog owners unless the horse is already outfitted with a manure bag (Interviews, 2023). Horse manure, while unpleasant to many trail users, was seen as challenging to address. If ongoing patrols are funded or recommended, pushing horse manure to the side of the trail would be a high priority due to the hazard it could present to unwitting trail users.

Recommendation 13: Document trail-related history to increase understanding of how management and policy changes affect trails and people. Interviewees expressed interest in working with local communications and history students, authors, or documentarians to focus on collecting and preserving trail-related stories. In addition to being interesting with respect to the region's history and the legacy of these sites as they have transformed over time, this documentation could also be used to catalog and track management and public use changes in these areas over time (Interview 4, 6, and 12, 2023). According to interviewees and survey respondents, problematic uses at these sites

were abundant prior to trail construction, especially in Eureka but also in McKinleyville. These uses have historically included paid sexual encounters, illicit sexual hook-ups, public nudity, distribution and use of illegal substances, public consumption of alcohol, problematic behavior stemming from excessive use of substances, illegal sales or distribution of firearms, public defecation, and a variety of forms of vandalism. Some of these activities have also involved youth (Interviews, 2023). Understanding the ebb and flow of these unwanted activities before, during, and after changes in management would help to have the fullest picture of the impact the changes have.

Education and Engagement

Several potential educational efforts have already been articulated as a way of sharing appropriate use of public spaces from a management and policy perspective. In addition to these, encouragement and education activities that promote use of trails by more people and support courteous sharing of trails would be very beneficial.

Recommendations 14 and 15: Hold structured public events with more frequency on trails and provide free permits or mini-grants to support more events on trails. This study has confirmed and reiterated the benefits of bringing a large number of people to trail and open space areas, which contributes greatly to the perceived safety of these places. Therefore, taking intentional actions that bring people to the trails is a recommended positive intervention. These actions could take the form of hosting outdoor events such as music and theater performances, triathlons, fun runs, skating or scooter activities, and outdoor fitness or dance classes. Existing outdoor activities that involve

trails include the annual Kinetic Grand Championship, an event that brings highly decorated art bicycles and plentiful bicycle and foot traffic to the Hikshari' Trail, the Humboldt Bay Marathon, and several events held by the Six Rivers Running Club. Addition of more events and the provision of free permits or small grants to encourage the hosting of more public gatherings in these spaces would aid in bringing more people to the trails, especially people who have previously avoided the trails or are not familiar with them.

Recommendation 16: Conduct bike, skate, and scooter safety training on trails. Given Humboldt County's dangerous record with respect to bicycle and pedestrian injuries and fatalities in collisions with motorized vehicles (C. Fiske, personal communication, 2023), the trails also can provide a place for people of all ages to learn skills that are needed to safely ride a bicycle, skateboard, or other wheeled modes of transportation. These educational activities can be undertaken with school groups, camps, and classes in a controlled environment away from roads, while also bringing more people to these spaces.

Recommendation 17: Conduct outreach about trail safety improvements to trail users. According to a study that informed this work, assertive programs that notify people of the safe and beneficial condition of local trails and bikeways can increase their use by community members (Keith et al., 2018). Therefore, targeted promotion of trails to specific user groups who have not previously experienced the trails but who live within the local community, especially promotion that focuses on the trails' safety, could improve the overall use of trails.

CONCLUSION

My study revealed that of individuals surveyed while using two Humboldt County trails, 89% expressed positive feelings of safety. Additionally, a significant majority of survey respondents and people who were interviewed shared that trail construction made these public areas safer. Participants also provided both quantitative and qualitative evidence that they highly value the trails, would encourage their loved ones to use the trails, and would use trails even more if they were expanded and safety improvements were made. Study participants also made it clear that there are many concerns that they have about specific aspects of trail safety, but these concerns do not prevent most of the people who participated in my study from using or appreciating trails.

Findings from this work can inform discussion related to the development of additional trails in the region. This research indicates that the Humboldt County is not 'exceptional' in this area and the community's experiences with these Humboldt County trails are aligned with research about trails in other places, and that the trails are widely seen as safe, beneficial community assets. The findings suggest that many of the public fears related to trail construction and safety do not bear out – and that if anything, construction of trails can increase perceptions about safety in particular areas. The strong sense of safety and community appreciation for existing trails highlight the overall value of trails in Humboldt County and indicate that there are potential safety, climate, and well-being benefits to be gained from the continued expansion of trails in the region.

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APPENDICES

Appendix A. Survey instrument

Humboldt County Trail User Survey

About this survey: This survey is part of a Cal Poly Humboldt graduate student research project to understand people's perceptions about safety on trails. It is intended to be taken by adults who are using portions of the Hammond Trail in McKinleyville or Hikshari' Trail in Eureka. The survey consists of 30 questions and is expected to take 10-15 minutes to complete.

Question 1. Informed consent to participate in research.
Project Title: Perceptions of trail safety in Humboldt County, California: An analysis of public safety concerns and factors that impact trail use

Project Type and Description: Social science research project to support the completion of a Cal Poly Humboldt Environmental Science and Management Master's program. You are invited to take part in a research study conducted by students at Cal Poly Humboldt related to trails and perceptions of safety in Humboldt County. Synthesized findings will be incorporated into a thesis document and presentation, and potentially into other journal articles or public presentations. Before you decide to participate in the study, please read this form and direct questions to us if there is anything that you do not understand.

Graduate Student Researcher: Natalie Arroyo, Master's of Science candidate, Cal Poly Humboldt Department of Environmental Science and Management

Faculty Advisor: Dr. Laurie Richmond, Associate Professor of Environmental Planning, Cal Poly Humboldt Department of Environmental Science and Management

What your Participation will Involve: You are being invited to take an anonymous survey via the "Qualtrics" electronic survey platform or a paper survey. The survey is 30 questions and will take approximately 10-20 minutes. Your participation is voluntary and you have the right to change your mind and withdraw at any time. If you feel uncomfortable answering a question, you can skip that question.

Possible Risks and Benefits: We anticipate little to no risk to you participating in this project. However, since the questions pertain to perceptions of safety, you may be reminded of a time when you felt unsafe, which could be upsetting. You will not receive any direct benefits or compensation for your participation. You will be aiding research about this topic in Humboldt County.

Protection of Information: If you agree, your responses to the survey questions will be recorded electronically or on paper. Survey responses will not be made available to anyone outside the research team. Research records will be kept on a removable drive or in a password protected, restricted folder on Cal Poly Humboldt's Google Drive. In either case, only the researchers will have access to the records. Your responses will be combined with other people's responses to create final products like a thesis document, thesis presentation, reports, and possibly, journal articles or public presentations. No individual identifying information will be shared.

Contact Information for Researchers: If you have any questions or concerns about this research, please contact any of the following - Student: Natalie Arroyo - natalie.arroyo@humboldt.edu; Faculty advisor: Dr. Laurie Richmond - laurie.richmond@humboldt.edu. If you are not satisfied with how this research is being conducted, or if you have any concerns/ questions about the research or your rights as a participant, please contact the Cal Poly Humboldt Institutional Review Board (IRB) for the Protection of Human Subjects at irb@humboldt.edu or 707-826-5165. Contacting this office will allow you to speak to an informed individual who is independent of the research team about this project.

Please mark the appropriate box below with your choice.

- o I am 18 years or older, and I consent to participate in this survey.
- o I am 17 years or younger, or I do NOT consent to participate (please end survey now).

Part 1 - Trail experience questions

In this section, please select from a set of choices for each answer. In the next section, you can provide your own ideas.

Question 2. Which trail did you use/ are you using today?

- o Hammond Trail in McKinleyville
- o Hikshari' Trail in Eureka

Question 3. How often do you use this trail?

- o Daily
- o A few times per week
- o A few times per month
- o A few times per year
- o Less than yearly
- o This is my first time on this trail

Question 4. Why did you come to this trail today? Please select all that apply.

- o Transportation to/ from work, school, or to run regular errands
- o For exercise on foot (like jogging or walking)
- o For exercise on a bicycle
- o For another kind of exercise or physical activity (like skating or yoga)
- o For activities with my child/ children (like stroller use or outdoor play)
- o To walk a pet
- o To spend time outside
- o To socialize with friends, family or other trail users
- o To do a specific nature activity (like bird-watching or taking nature photos)
- o To participate in a volunteer activity or clean-up
- o Other:

Question 5. How safe do you feel as a user of this trail today? Please note that you will be able to describe your definition of safety in a later question. Please circle your answer.

0 (not safe) – 1 – 2 – 3 – 4 – 5 (very safe)

Question 6. If you have visited this trail before, were there times when you felt unsafe on the trail? Please note that you will be able to elaborate on your response in future questions.

- o Yes
- o No
- o Doesn't apply to me as a first-time user of the trail

Question 7. How safe do you typically feel in similar circumstances - for example, engaging in similar activities under comparable conditions in other public parks, trails, or greenway settings?

Please circle your answer.

0 (not safe) – 1 – 2 – 3 – 4 – 5 (very safe)

Question 8. Do you change your trail use or behavior based on your perception of safety? Please note that you will be able to elaborate on your response in future questions.

- o Yes
- o No
- o Not sure

Question 9. How likely are you to bring people you care about here or recommend that they use the trail?

Please circle your answer.

0 (not at all likely) – 1 – 2 – 3 – 4 – 5 (very likely)

Question 10. How likely would you be to choose to walk, bike or roll on local trails if they felt safer to you?
Please circle your answer.

0 (not at all likely) – 1 – 2 – 3 – 4 – 5 (very likely)

Question 11. How far would you be willing to travel on the trail for transportation to access goods, services, or destinations that are important to you?

- 0 – ¼ mile, round trip
- ¼ mile to 1 mile, round trip
- 1 to 2 miles, round trip
- More than 2 miles, round trip
- I would not use the trail for my daily/ frequent transportation needs

Question 12. How valuable or important is this trail to you?

- 1 (not very valuable/ important to me)
- 2
- 3
- 4
- 5 (extremely valuable/ important to me)

Question 13. How do you feel about the following specific conditions or attributes on this trail? Please use the following scale to select one answer per row

Scale: 0 = Feels very unsafe/ negative; 5= Feels very safe/ positive

- Ability to access emergency services
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Clear information about where the trail goes
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Visibility - sense that other passersby can clearly see me
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Using trail during daylight hours/ well-lit conditions
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Dog friendliness for me to bring my dog
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Presence of volunteers who are actively maintaining the trail
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Presence of other trail users who are engaged in appropriate/ rule-abiding trail activities
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Presence of off-leash dogs owned by others
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Presence of trash/ dumped items
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Benches, trash cans, or other infrastructure
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Physical separation from motorized vehicles
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Lighting conditions at night
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Illegal activity occurring on or near the trail
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Presence of graffiti or vandalism to trail amenities
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Public art or informational/ educational signs
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Dense vegetation
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

- Presence of unhoused individuals living in the area
  0 – 1 – 2 – 3 – 4 – 5 – No opinion or doesn't apply

Part 2 - Trail reflection questions

This section asks you to express your personal opinions in your own words.

Question 14. If you could use just 3 words to describe this trail, what would they be?

Question 15. If you were not using this trail, what would you do instead to meet the same needs? (For example, if you are using this trail for transportation between key destinations, what other route would you choose? Or, if you are here to jog with friends, where else would you go?)

Question 16. What trail uses or activities do you think are appropriate at this location?

Question 17. Do you remember this location before the trail was here? If so, what do you recall about your feeling of safety here?

Question 18. What, if anything, do you wish that public agencies or volunteers would change about this trail?

Question 19. Can you think of an experience on ANY trail that affected your feeling of safety? What was unsafe about the circumstance?

Question 20. How do you define safety, in your own words?

Question 21. If anything was possible, what would your ideal trail be like? Please be as descriptive as possible.

Question 22. Is there anything else you would like to add about this trail and safety?

Part 3 - Demographic information

In this section, you can choose to provide demographic information for use in analysis of this data.

Question 23. How old are you?

- 18 – 30
- 31 - 50
- 51 - 70
- 71 or older

Question 24. What is your gender identity?

- Female
- Male
- Non-binary
- Other:

Question 25. What is your race? Please note: standard demographic categories that align with the U.S. Census were selected to allow additional analysis of responses.

- American Indian or Alaska Native
- Black or African American
- Asian
- White
- Native Hawaiian or Other Pacific Islander
- Some other race

Question 26. Do you identify as Hispanic/ Latino?

- Yes
- No

Question 27. Are you a Humboldt County resident?

- Yes
- No

Question 28. Where on this scale of political ideology would you place yourself?
Please circle your answer.

1 (very liberal) – 2 – 3 – 4 – 5 (very conservative)

Question 29. How engaged in local decisions about infrastructure, transportation, and land use do you believe you are?
Please circle your answer.

1 (not engaged/ not local resident) – 2 – 3 – 4 – 5 (highly engaged, follow decisions closely)

Question 30. How clear and easy to use was this survey?
Please circle your answer.

0 (not clear/ easy to use) – 1 – 2 – 3 – 4 – 5 (clear/ easy to use)

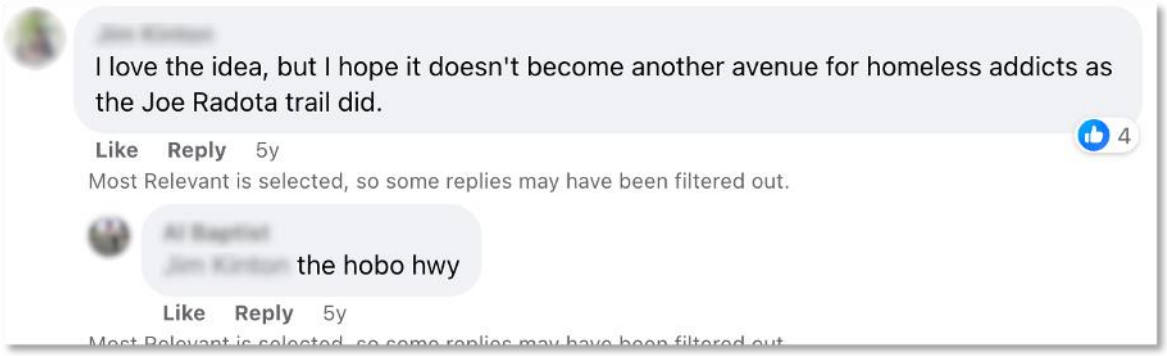
Thank you for your time and participation!

Appendix B. Interview guide/ interview questions

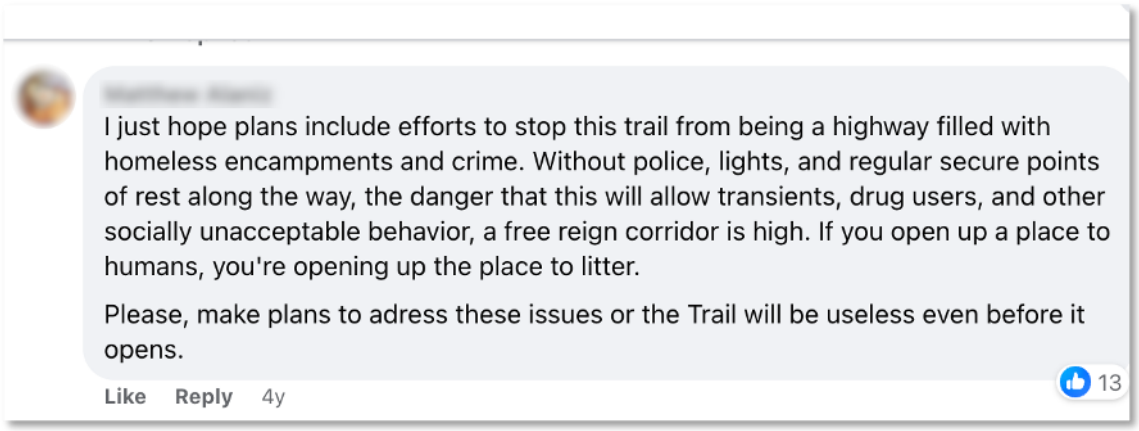
1. What is your relationship or connection to the Hammond Trail/ Hikshari' Trail?
2. What kinds of personal or professional experiences have you had with this location?
3. Do you remember this area before the trail was constructed? If so, what do you recall?
4. What were the impacts, either positive or negative, of the trail being built?
5. What benefits do you think the trail provides for other people or your community, based on your observations?
6. What changes have resulted? What effect has the trail had?
7. What consequences has the trail had for people in this area? What have you heard from other community members?
8. Are there some trails you enjoy? If so, which ones?
9. What do you like about the trails that you enjoy?
10. What activities do you engage in on the trail?
11. Have you had a personal experience on the trail that impacted your sense of safety?
12. What does "safety" mean to you?
13. Are trails important to you? If so, why?
14. If anything were possible, what would you do to improve this trail in particular?
15. Who else should I speak with who might have unique experiences with or insights about this trail?

Appendix C. Social media and print media examples.

Appendix C, Figure 1. Social media post about the Eureka Waterfront Trail, circa 2017.



Appendix C, Figure 2. Social media post about the Hikshari' Trail, circa 2018.

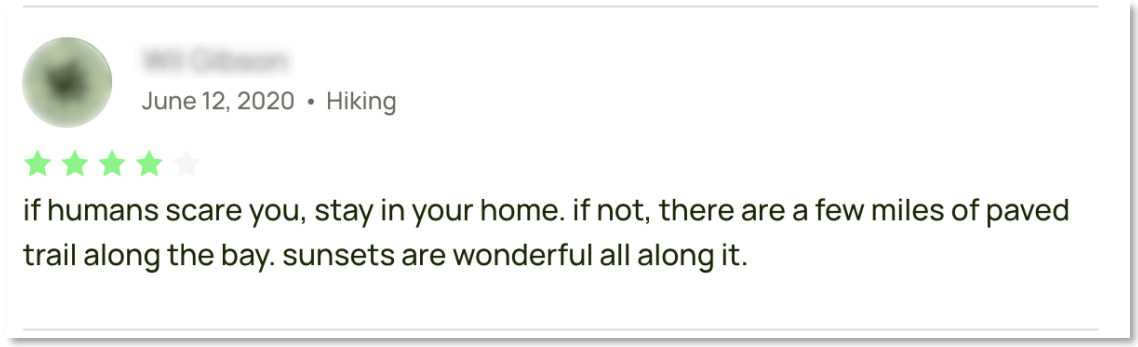


Appendix C, Figure 3. Social media post about the Great Redwood Trail, of which the trails in this study are a part, circa 2020.

Appendix C, Figure 4. Social media post from a local news source discussing trail patrol and emergency response, circa 2021.

Appendix C, Figure 5. Social media post about trail users expressing parameters of appropriate trail use, circa 2012.

Appendix C, Figure 6. A Hikshari' Trail web-based review circa 2022 describing unsafe conditions.

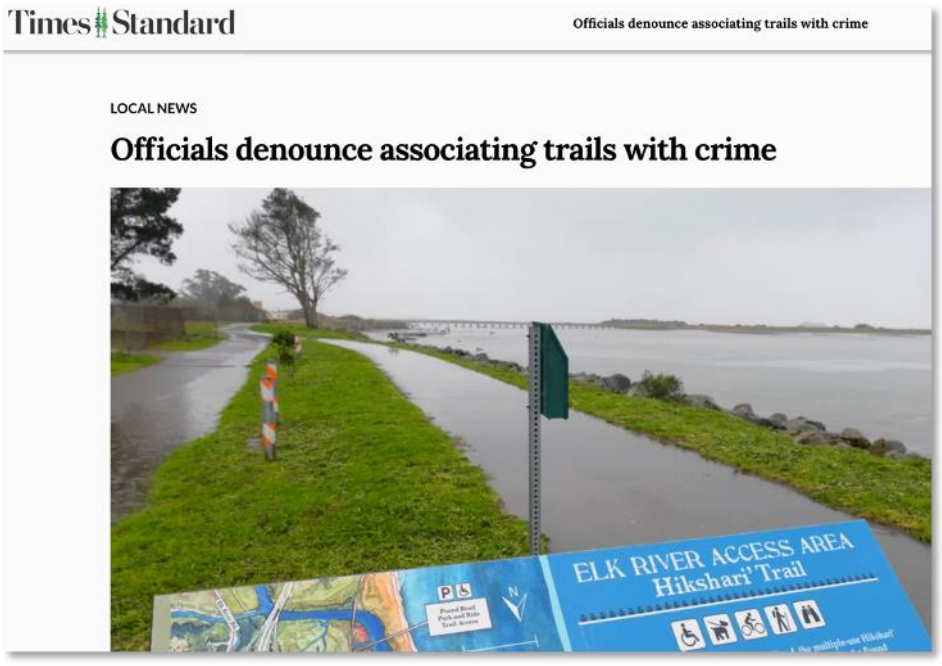


Appendix C, Figure 7. A Hikshari' Trail web-based review circa 2020 expressing positive experiences on the trail.

Appendix C, Figure 8. Social media post about the Hammond Trail, warning other users about the presence of bear scat in multiple locations that are within my study area.

Appendix C, Figure 9. Temporary signage installed along the Hammond Trail in summer of 2023 expressing appropriate trail use behaviors.

Appendix C, Figure 10. Local newspaper headline connecting trails with homicides in the Humboldt County area circa 2021.



Appendix C, Figure 11. Headline from local newspaper showing that local government officials sought to decouple perceptions about the Hikshari' Trail and crime, circa 2018.

Appendix C, Figure 12. Horse feces on the Hammond Trail in McKinleyville.