

E-bikes on Public Lands

A Survey of E-bike Users in Colorado

Natural Resource Center Colorado Mesa University

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INTRODUCTION

As the use of electronic bikes becomes more common, and as traditional bikers transition, supplement, or switch to e-bike riding, data on how e-bike users use their bikes in Colorado becomes more important for the management of e-bikes on public and non-public lands alike. This study was conducted with the intention of providing data about e-bike users and their relationship to public lands, including their demographic information, how they use and intend on using their e-bike, information on previous mountain bike use, barriers to e-bike use, and user conflict questions when using their e-bike. These categories are intended to provide information for public lands officials and policy makers about how to best manage e-bike use on public lands in Colorado.

PREVIOUS LITERATURE

Several studies have attempted to document the changing dynamics of e-bikes over the past decade. MacArthur, Harpool, Scheppke, and Cherry (2018) conducted a nationwide study on the use, attitudes, and barriers regarding e-bikes. The authors found that e-bike users generally purchase e-bikes to reduce physical exertion, allow riders to engage in challenging topography, and replace car trips. They find that e-bikes make it possible for more people to ride, and encourage more trips, longer trips, and various styles of trips. The authors find that e-bikes have the capacity to replace various modes of transportation, including motor vehicles, public transit, and standard bicycles. In addition to this, riders feel safer riding an e-bike than a standard bike, as they can take longer routes to avoid dangerous streets, they can accelerate quickly to get through wide intersections or away from a potential conflict, and they are able to keep up with the pace of traffic.

Fyhri and Sundfor (2020) confirm the result from MacArthur, et al., and find that that purchasing an e-bike leads to increased bicycle usage, increasing from 2.1 km to 9.2 km per day on average, a very large increase. Hall et. al. (2019) find that the average heart rate for e-bike users is 94% of that of mountain bike users, leading the authors to conclude that e-mountain bike users replace most of the excersize as mountain bikers. They also found that e-mountain bike use is perceived to be positive by survey respondents.

Some studies show concern from survey respondents about e-mountain bikes. Using data from mountain biking Facebook pages, Chaney, et. al. (2019), show that many mountain bikers have concern about e-mountain bikes damaging trails, and many mountain bikers saw riding mountain bikes as a "rite of passage" and viewed the e-bike version as "cheating." However, the authors note that in this survey, many of the mountain bikers were not fully educated on the features and capabilities of an e-bike or e-mountain bike.

METHODOLOGY

The goal of this study is to understand how e-bike users use their e-bikes on public lands. As discussed in the literature review, there are several studies that examine e-bike trends and usage. This study is different because it is a Colorado-specific study with an emphasis on the use of e-bikes on public lands. In addition to this, several of the questions were structured to gather information about how e-bike users differ in their e-bike usage from mountain bike users, or how the same user may differ in the use of e-bikes vs. mountain bikes. How e-bike users differ from mountain bike users is an important question for the management of trails and public lands.

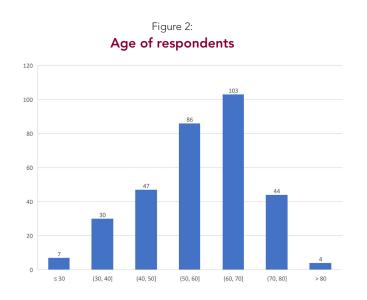
The survey was conducted using the Colorado Mesa University Qualtrics account, with a set of 30 questions that were distributed to businesses across Colorado who sell or rent e-bikes. These 30 questions are divided into 5 sections: 1) Demographics, 2) e-bike use, 3) e-bikes, public lands, and mountain bikes, 4) barrier questions, 5) conflict questions. The businesses were given permission to send the survey link to present and past customers, as well as to post on social media to e-bike users. The survey was distributed electronically and received 348 responses, approximately 323 that are usable. The survey was open from 10/16/20 to 11/20/20. While other studies look at the impact of just e-mountain bikes, this study examines all e-bikes on public lands, as there are many ways to enjoy public lands with biking that does not include mountain bikes or e-mountain bikes.

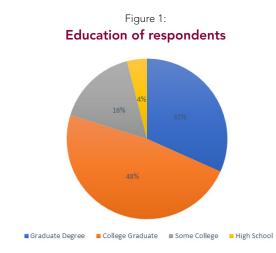
DEMOGRAPHIC INFORMATION

The average age of survey respondent is 58.03, with 321 responding to the age question. The highest age was 87, with the lowest age at 25. The median age was 60 years old, just above the average. The race and ethnicity of e-bike users was 87.27% White/Caucasian, with 4.66% preferring not to say, 2.8% Hispanic, 1.55% American Indian or Alaskan Native, 1.24% Asian, 1.86% other, and 0.62% Black (table 1). The survey respondents were 63.66% male and 34.47% female. 32% of respondents have a graduate degree, while 48% of respondents are college graduates, with 16% reporting some college and 4% reporting a high school education. This equates to 80% of e-bikers having a full college education. The mean income for e-bike users is \$127,056, while the median income was exactly \$100,000. 30.34% of ebike users describe themselves in excellent health, while 40.56% of users describe "very good" health. 22.29% describe "good health" while 6.19% describe "fair," and 0.62% describe "poor" health (figure 3).

Race/Ethnicity of survey respondents				
Race/Ethnicity	Frequency	Percentage		
White/Caucasian	281	87.27%		
Prefer not to say	15	4.66%		
Hispanic	9	2.80%		
Other	6	1.86%		
American Indian or Alaska Native	5	1.55%		
Asian	4	1.24%		
Black or African American	2	0.62%		
Total	322	100%		

Table 1:





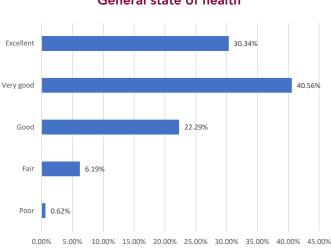


Figure 3: General state of health

E-BIKES ON PUBLIC LANDS

E-BIKE USE

Respondents were asked about how they use their e-bike. 81.13% of respondents own their e-bike, while 9.75% rent an e-bike and 9.12% responded "neither." Respondents intended on using their e-bikes as a mountain bike (34.82%), a street bike (35.80%), for hunting (1.95%), to travel to work (11.67%), and other (15.76%). Note that the survey allowed for multiple answers, so the count in table 2 is of importance. Appendix A includes responses for the open-ended question "how do you intend to use your e-bike?"

The average number of years that e-bikers have been biking on public lands is 18.15 years. When viewing this along with the average age of e-bike users, there is evidence that people are switching from traditional biking to e-biking as they age. E-bikers are split in terms of previous experience biking, with 13.68% indicating highly skilled, 38.25% skilled, 34.04% neutral, 11.58% beginner, and 2.46% novice (figure 4). In response to "why did your purchase your e-bike" 21.46% responded recreational purposes, while 18.93% wanted assistance with hills. 15.93% wanted to increase their fitness, while 10.5% wanted to be able to keep up when riding with friends and family. Note that question table 3 allows multiple answers.

The top speed of e-bikes purchased was generally class 1 (under 20 MPH) at 44.41% of respondents, followed by class 3 (under 28 MPH) at 26.57% and class 2 (under 20 MPH with throttle) at 22.03% (figure 5). Only 2.45% of respondents answered "greater than 28 MPH." This shows that the majority of e-bikers do not intend on using their e-bike for the purpose of high speeds, but for the purpose of assistance.

Answer	%	Count
street bike	35.80%	184
mountain bike	34.82%	179
other	15.76%	81
travel to work	11.67%	60
hunting	1.95%	10
Total	100%	514

Table 2: How do you intend to use your e-bike?

Table 3:	

Why did you purchase your e-bike?

Answer	%	Count
Recreational purposes	21.46%	229
For assistance with hills	18.93%	202
To increase fitness	15.93%	170
To be able to keep up when riding with friends/family	10.50%	112
Health: A health problem made an e-bike more pragmatic than a normal bike	9.28%	99
For environmental reasons	7.78%	83
Cost effective form of transportation	6.65%	71
Commuting	6.28%	67
Avoid parking hassles	3.19%	34
Total	100%	1067



Figure 4:

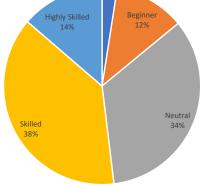
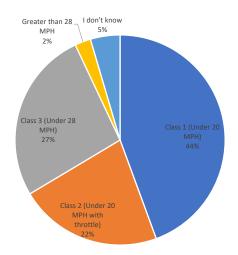


Figure 5: What is the top speed of your e-bike?



E-BIKES, PUBLIC LANDS, AND MOUNTAIN BIKES

The survey asked the respondents several questions about the relationship between e-bikes, public lands, and mountain bikes. Most people who own e-bikes live in a family that owns multiple bikes (e-bike or standard bike), with an average of 2.43 bikes per household. E-bike owners are also likely to own non e-bike mountain bikes, with almost 70% of respondents owning a mountain bike, 4.1% renting, and 29% responding "neither" (table 4). Respondents were asked if they use their mountain bike on public lands (table 5), with 20.59% responding "bike trails along rivers," 15.95 responding "state parks," 19.61% responding "local parks," and 14% each responding "BLM land" and the "United States Forest Service." Figure 6 shows that 93.15% responded that they take their e-bike onto public lands.

Respondents were asked if they intended on using their e-bike the same way as their mountain bike (note that the question was sorted so only those who own both could answer this question), and were asked to rate if they intended on using their e-bike less, the same, or more in 7 categories including distance, technical difficulty, steeper trails, relief from riding fatigue, riding from home to trailhead, commuting to work, and injury rehabilitation. Figure 7 shows that distance has a significant impact on whether riders will use their e-bike "less" or "more," with 78% of people saying they will use their e-bike to increase distance traveled. Technical difficulty is split, with 23% both saying "less" and "more." Respondents indicated their e-bikes will be used more for steeper trails (55%), relief from riding fatigue (80%), and riding from home to trailhead (59%). Commuting and injury rehabilitation both skewed towards "more," but had close to equal "same" and "more" responses, each around 40%. This shows that e-bikers do intend on using their mountain bikes differently, specifically for distance, steepness of trails, and relief from fatigue. E-bikers do not intend on changing their technical difficulty of trails. Both "distance" and "riding from home to trailhead" are expected to increase substantially (78% and 59.3%, respectively). Appendix B illustrates figure 7 broken down by age. As age increases, people use their e-bikes for distance and steeper trails, while younger ages use e-bikes more for injury rehabilitation and commuting, and all age groups use their e-bike for relief from fatigue.

Respondents were asked about the difficulty of trails for their bike, and 42% responded "moderately difficult" trails, while 25.87% responded "not difficult," and 2.8% responded "very difficult." Respondents were then asked if their e-bike rental or purchase would change the difficulty of trail they pursue: 38.35% indicated they would pursue a significant increase in trail difficulty, 39.85% indicated they would pursue a slight increase in trail difficulty, while 18.42% said they would pursue the same difficulty of trails.

Т	ab	ble	4

Do you currently own or rent a mountain bike?

Field	Percent	Count
Own	66.55%	195
Rent	4.10%	12
Neither	29.35%	86



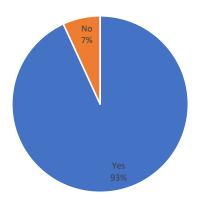


			Table 5	:		
Do	/ou	mountai	n bike	on	public	lands?

Answer	%	Count
Bike trails along rivers (City or County)	20.59%	231
Local Parks (City or County)	19.61%	220
State Parks	15.95%	179
United States Forest Service land	14.35%	161
BLM land	14.08%	158
National Park Service land	9.54%	107
Other	3.12%	35
U.S. Fish and Wildlife Services Refuge System	2.76%	31
Total	100%	1,122

Figure 7: Do you intend on using your e-bike the same way you use your mountain bike?

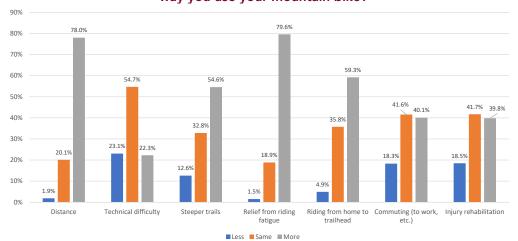
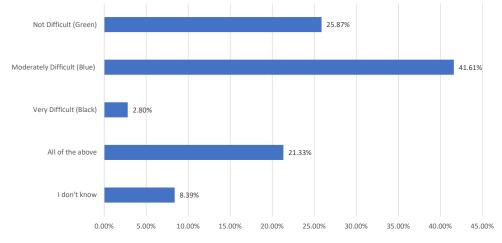
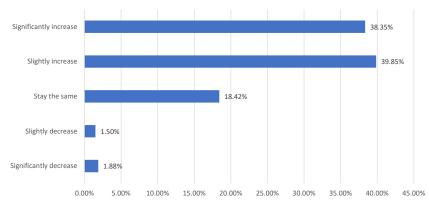


Figure 8: What level of difficulty do you intend on persuing on public lands with your e-bike?







BARRIER QUESTIONS

Respondents were asked about what barriers there were to using an e-bike. Most respondents say that there are very few strong barriers, except for lack of access to public lands. Time, cost, transportation, location, perception of e-bikes by other recreators, and language all had minimal people answer "very strong influence." In fact, in these barrier questions "no influence" was the top answer. The top barrier, which only had "some influence" was cost (32%), followed by location (28%). This can be seen in figure 10.

Perception of e-bike riders by other recreators seemed to be a small problem, with 50.75% of people responding "no influence," while only 24% responding "some influence." Note that this survey targeted e-bike owners/renters, hence this is the perception of the e-biker. There is no evidence of a language barrier, with 96% of people reporting that language was not a barrier. Those who reported "Hispanic" in the race ethnicity section (9 total) all responded "no influence" to the language barrier. This barrier was seen strongly in Perry and Casey (2016), but is not seen in the e-bike study, perhaps because of the small sample size of Hispanics responding.

Respondents were asked if they were familiar with riding destinations, and the results are illustrated in figure 11. The answers skewed to being familiar with riding destinations, with 15.79% responding "strongly agree," 30.18% "agree," and 29.47% "neutral." 19.3% responded "disagree" and 5.26% stated "strongly disagree." This is not surprising since many of the respondents were mountain bikers before they started e-bike riding.

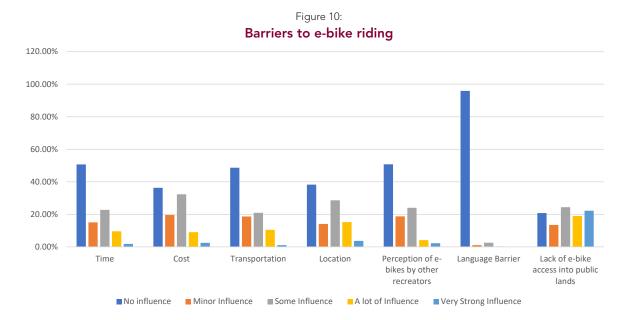
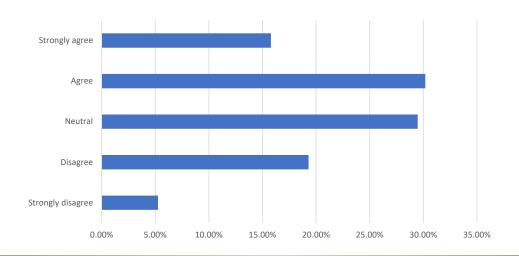
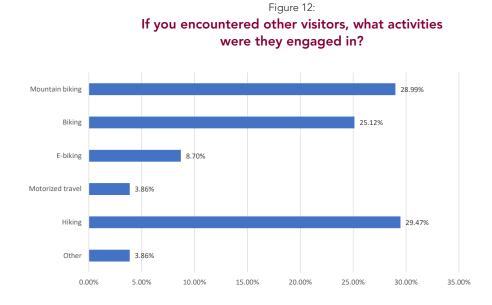


Figure 11: Familiarity with riding destinations

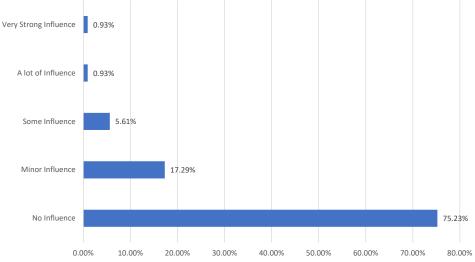


CONFLICT QUESTIONS

78.72% of respondents said they have ridden an e-bike on public lands, while 21.28% said they have not. 93% of respondents indicated that they have seen other visitors on public lands while riding their e-bikes, while 7% say they have not. When encountering these visitors, they were engaged in primarily mountain biking (28.99%) and hiking (29.47%), followed by biking (25.12%) and e-biking (8.7%) (figure 12). Figure 13 shows that 75.23% reported that these encounters had "no influence" on their experience in public lands, while 17.29% reported "minor influence," with 5.61% stating "some influence" and "a lot of influence" and "very strong influence" less than 1%. Figure 14 illustrates that 75.83% report the encounter had a "neutral" experience in their encounter with others, while 14.69% reported it enhanced their experience, while 8.06% reported that it diminished their experience, and less than 1% reported that it "greatly diminished" or "greatly enhanced" their experience. Appendix C includes the open ended responses for encounters on the trail.







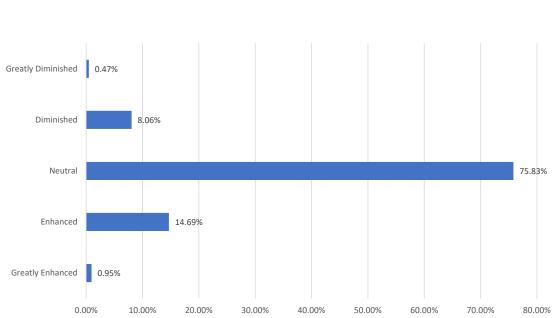


Figure 14: Did encountering other people on public lands enhance or diminish your experience?

CONCLUSION

The data and analysis in the previous sections leads to several conclusions. First e-bike owners are older in general, and older than the traditional mountain biking population. Perry, Casey, and Castaneda (2018) show that the average age of mountain bikers in Western Colorado is 32.36 years old, while this study that survey's e-bike users averages 58.03. These bikers have riden on public lands an average of 18 years. E-bike riders are interested in extending their riding ability as they age, and intend on using their e-bikes in a mostly similar way as they used to use their mountain bikes, with the differences being that the e-bike allows them to increase their distance and allows them to keep up with people they are riding with. As age increases, people use their e-bikes for distance and steeper trails, while younger ages use e-bikes more for injury rehabilitation and commuting, and all age groups use their e-bike for relief from fatigue. Barriers to e-bike riding were relatively minor and included cost and location. On the conflict side, there is little percieved conflict on the part of e-bike owners, with interactions with other recreators not inhibiting their experience.

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Table 6: How do you intend to use your e-bike? Open-ended question responses

Trail bike	Touring
Ride trails for exercise, and go to lunch	Gravel roads
Shopping and relatively flat trails	Ride on trails
Recreation, exercise	Gravel trails
Leisure rides	Mostly open space trails
Gravel bike	Boulder paths
Kids and kids training on motorcycles	Bike packing long distance
On trails or road	Recreational riding
Adventure riding	Recreation & local shopping
Off-road	Riding paved and smother crushed rock trails.
All errands. In dirt and gravel	Travel for errands around town
Recreation	Local trails
Trails and paths	Mostly path but could include cross country
We like to ride bike paths, paved and dirt	Exercise
Riding paved trails	Great way to see the awesome CO outdoors
Trails	Shopping
Riding on trails	Casual fun
Trail rides and street	Bike packing
Biking while geocaching	County open space
Shopping/other errands/exercise	Don't mountain bike
Transportation, kids to school, grocery trips, car replacement	Private lands
Trail riding	Private
Trails and mild mountain	Around our area
Bike trails	Roads
Private	Anywhere allowed
Do not mountain bike	My ebike, not mountain
County park bike trails	Around town
Out of state since limited either e-bike options in CO currently	Local bike trails
I don't know who manages all the lands where I bike	County open space
County open space trails	All, buttons not working
Our property	

APPENDIX B:

Table 7: How do you intend to use your e-bike, by age

			Count			Percentage		
	_	Less	Same	More	Less	Same	More	
Distance	Combined	5	53	203	1.9%	20.1%	78.0%	
	20-40	1	6	16	4.3%	26.1%	69.6%	
	40-59	3	22	80	2.9%	21.0%	76.2%	
	60 and							
	above	1	25	107	0.8%	18.8%	80.5%	
Technical difficulty	Combined	59	140	55	23.1%	54.7%	22.3%	
	20-40	3	16	4	13.0%	69.6%	17.4%	
	40-59	21	61	21	20.4%	59.2%	20.4%	
	60 and							
	above	35	63	30	27.3%	49.2%	23.4%	
Steeper Trails	Combined	33	86	140	12.6%	32.8%	54.6%	
	20-40	1	12	10	4.3%	52.2%	43.5%	
	40-59	10	38	56	9.6%	36.5%	53.8%	
	60 and							
	above	22	36	74	16.7%	27.3%	56.1%	
Relief from riding fatigue	Combined	4	50	209	1.5%	18.9%	79.6%	
	20-40	1	3	19	4.3%	13.0%	82.6%	
	40-59	0	21	85	0.0%	19.8%	80.2%	
	60 and							
	above	3	26	105	2.2%	19.4%	78.4%	
Riding from home to trailhead	k	12	86	143	4.9%	35.8%	59.3%	
-	20-40	1	9	12	4.5%	40.9%	54.5%	
	40-59	3	28	68	3.0%	28.3%	68.7%	
	60 and							
	above	8	49	63	6.7%	40.8%	52.5%	
Commuting (to work, etc.)		37	83	81	18.3%	41.6%	40.1%	
	20-40	6	5	12	26.1%	21.7%	52.2%	
	40-59	9	36	48	9.7%	38.7%	51.6%	
	60 and							
	above	22	42	21	25.9%	49.4%	24.7%	
Injury rehabilitation		39	88	83	18.5%	41.7%	39.8%	
	20-40	2	6	14	9.1%	27.3%	63.6%	
	40-59	13	38	39	14.4%	42.2%	43.3%	
	60 and	24	44	30	24.5%	44.9%	30.6%	

APPENDIX C:

Table 8: Encounters on trails: Open-ended questions

Never had anyone give negative response to me riding a ebike	We all share these same lands, using them in many different ways as I tried to show 2 questions ago however the survey only lets my enter one choice. This is a crowded state, it matters very little how someone's encounter with another user affected their experience as that would be a psychological problem they need to figure out.				
I gave the others the right of way.	No problem if you are courteous				
co-existed with no conflicts	These last few questions are worded horridly, I have encountered all of the above trail users and always have a positive experience. I'd prefer to see less people as anyone would but ultimately it doesn't affect my experience most of the time.				
Try to be more careful when encountering other users of al sorts.	Have never met anyone who objected to my presence. Some indifferent. Many enthused.				
Last rode on Mickelson Trail in SD. About half of riders we encountered were on e-bikes.	The public just needs to be educated that e-bikes are not electric motorcycles				
Friendly Hello, make it a great day	l enjoy more places to ride				
I've encountered all manner of trail users while using my ebike, and the only negative experience has been 2-3 times and the users had a blatant bias against any form of e-bike.	They were annoyed that we were able to move so fast behind them				
There are people everywhere on every trails these days	I love seeing people out in the outdoors whether, walking, running, hiking or riding what ever.				
Some people still aren't ready to accept ebikes.	We respected each other and supported each other being out in the wild.				
During pandemic, we do not talk with other riders.	I see a lot of other mtb riders and a few ebike riders while riding				
We had plenty of room to allow both of us to safely pass after slowing our speed	Lots of people compliment our bikes, we use a bell to alert walkers/runners/other bikers				
I've had no hostile encounters. Only positive ones.	Just said Hi to each other				
Barely notice other users	Never had any negative issues from other riders				
People are friendly	We love to ride and will weather or not we encounter other people				
Some were supporters some were very mean and aggressive	Non influential encounter. Not sure of the question.				
We were yelled at, called names, and completely made fun of for being in e-bikes when we used them once on trails nearby.	No influence at all.				
MT Bikers are almost uniformly courteous to each other on trails. I defer to uphill riders, and am more likely to defer to downhill riders also when riding my e-bike.	Went riding in lory state park with other mountain bikers and whiskers and hikers. No issues.				
I feel self conscious because of how other MTBers perceive e-MTBs	Just several bikers & runners on a trail. Most passed me. No issues.				
l'm out enjoying my time. People's opinions do not affect my experience.	I'm unaware of anywhere I can't ride my e-bike, so I ride wherever. I'm sure some really fit bikers think e-bikes are for sissies, but that's their problem. We don't ride any differently than they do, and mostly slower and more carefully.				
At my age, level of ability (legally blind) and desire to maintain my fitness level I really do not care what anyone thinks of me riding a pedal assist bicycle.	never had a problem				

being more careful	I try to ride on weekdays when there aren't as many people				
l just kept moving.	Busy biking/walking trails at times. I always slow down near croweded areas.				
No one cared	other bikers were friendly				
I don't think they were aware that I was using an ebike.	I Almost always come across others while riding				
No one cared what i was riding	Saw some emtb's but mostly analog bikers with no influence				
We all abide by same etiquitte, say hi, may or may not stop to chat.	Friendly trail interactions				
Other people riding bikes on the same trail. Not a big impact to me, if they were going a bit slower I'd wait for a time that I could politely go around them if they were slower.	Well, it's always nice to get out into nature to experience peace and quiet, so that's less likely to happen when the trails are crowded.				
Have never had negative encounter	Was questioned about my bike in an unfriendly way				
Some riders stopped to ask about ebikes and how I enjoy them	Nothing to explain				
I ride slower and more predictably when around other trail users, and yield to slower and faster trail users.	We passed some other mountain bikers and two people hiking. Most were friendly.				
Saw hikers and bikers. We're new. Mostly friendly.	Couple was hiking and stated how they liked and would get a e bike.				
Never had any issues with other visitors	Many of the hikers were very positive about our bikes, especially after learning that it helps my injured knee on hills.				
only took a test ride	They like my bike				
It's nice to see other people out enjoying public landsduhwe are the public	I didn't have the trails to myself. This seems like a silly question. Not sure what you're looking for.				
Just need to look out for people who are faster. Young people on mountain bikes are faster than older people on E bikes.	No problem				
I always say hello to other riders. Most have no idea my Levo is any diff than my other MTBs. Most of the time it's No Influence.	I was riding illegally on USFS bike trails. Minor interaction when encounter with no-eBike purists. But will readily poach again.				
The front range is flooded with hikers and mtn bikers. More trails needed	Most said cool ebike, some didn't know if we could or could not ride there and yelled				
I don't have a mountain bike. I have a bike suited for local trails both dirt and paved	Some riders rode past me too fast and did not signal their passing				
Didn't want to disturb the hikers	People do not even know what type of bike I ride				
I am a rec rider & an eBike gets me out more often at my age	trails had plenty of room, no problem sharing public lands				
NA	Pass by, wave high, maybe chat, get on with my ride				
Expect to see people on public trails	Everyone was kind and I respected their space				
Nice to meet people	No difference at all				
Just don't care	Occasional complaints that I was riding an e-bike (even tho I had the motor off)				
No one recognized we were on a ebike	No influence, Also you can only select 1 two question up which provides inaccurate results				
I experienced off road motorcycles, mountain bikes and e-bikes on my ride today. No one had any influence on my ride.	Biking, E-biking and hiking were also activities engaged in by visitors I encountered				
Some motorcycles passed my. No big deal.	COVID				
occasional other bikers, hikers, jeeps	No				

We passed each other using trail etiquette passing guidelines				
Always use common courtesy and give right away				
I see e-bikes and all types on my rides				
Not heavy useage, didn't impact my experience				
There are many bikers that travel much faster than me on mye-bike				
Other bikers rode very fast and didn't announce themselves.				
I have encountered hikers, bikers, and mountain bikers on trails. I slow down a lot around hikers. I get a lot of compliments from some people about how cool my bike looks, but I also get a few looks when I'm riding on tails.				
zip				
No				
Everyone I encountered were courteous trail users				
Ebike scrutiny				
I ride past other people and smile and wave. They smile and wave back.				
A few of the hardcore younger riders are offended, but overall other trail users are not aware I'm on an Ebike				
I typically don't interact with others on the trail and mind my own business. It's nice to see people using the trail systems though.				