
The COVID-19 pandemic is changing the way people recreate outdoors.

Preliminary report on a national survey of outdoor enthusiasts amid the COVID-19 pandemic.

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On March 11th, 2020, the World Health Organization officially declared COVID-19 a pandemic. The pandemic is rapidly altering daily life and leading to changes in the way we spend time outside. In an effort to gather timely and relevant data on national recreation patterns, before, during, and after the pandemic, the Leave No Trace Center for Outdoor Ethics worked quickly with its academic partner, Pennsylvania State University, to offer guidance to land managers, recreation providers, and outdoor enthusiasts across the country. In total, 1,012 outdoor recreationists were surveyed through the Leave No Trace community in a 48-hour window beginning on the morning of April 9th. Our hope is that the results of this rapid assessment will provide valuable information for managing the changing recreation use of public lands, predicting spikes in recreation, and offering insight for land managers as they work to protect the natural world.

The following tables, figures, and corresponding brief descriptions are intended to provide initial results of this research effort. Further results are forthcoming.

Please note that not all respondents answered all questions.

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Sample Demographics.

Response Rate:

63,890 recipients within the Leave No Trace Center for Outdoor Ethics' email listserv
 3,005 recipients opened the email containing the survey link
 1,012 recipients completed the survey

Gender:

Female: 57.8%
 Male: 39.0%
 Transgender: 0.2%
 Non-binary: 1.3%
 Other: 0.2%
 Prefer not to say: 1.5%

Age:

Mean: 45 years old
 Standard deviation: 15.6 years

Residency:

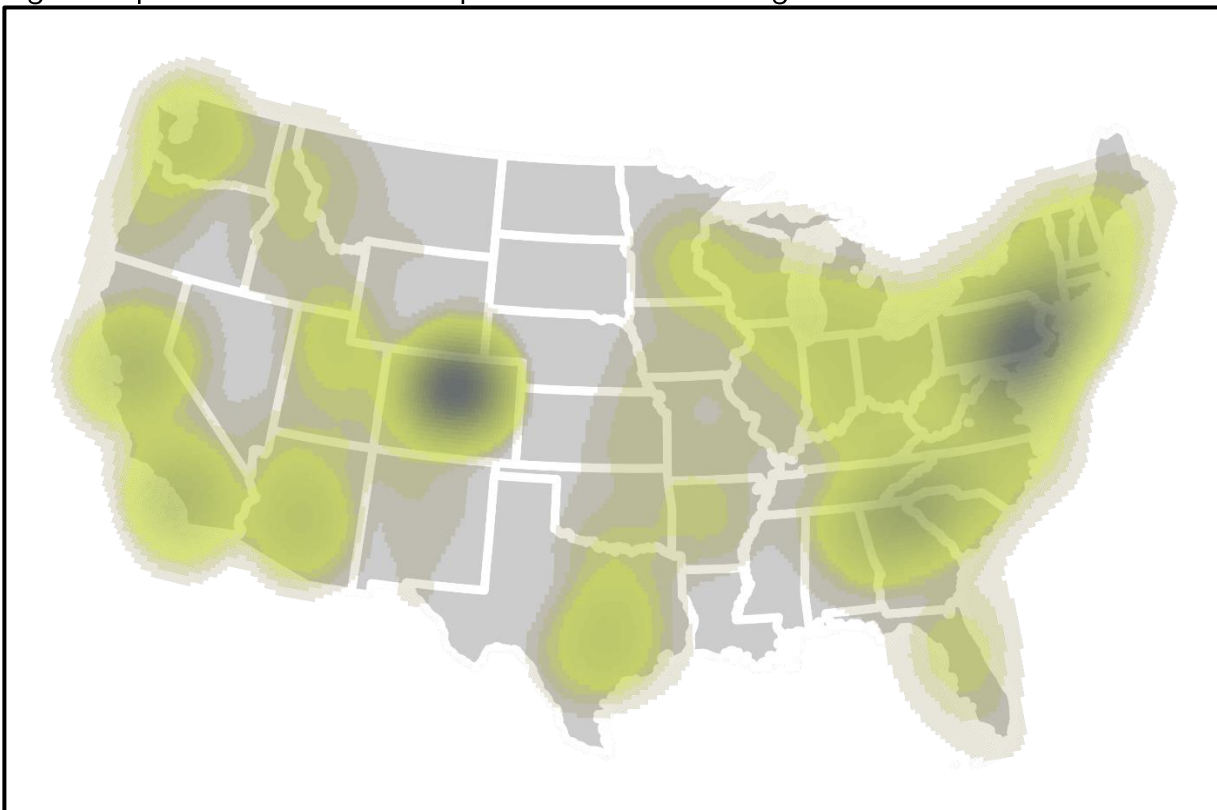
U.S. residents: 97.5%
 Non-U.S. residents: 2.5%

Table 1: Community of Residence

Community with a population of...	Frequency	Percent
...less than 50,000 (non-urban)	555	59.4%
...more than 50,000 (urban)	380	40.6%

Adapted from Miller and Vaske (2003)

Figure 1: Spatial Distribution of Responses within the Contiguous United States*



*Darker gradients indicate more responses

Ethnicity:

White: 88.5%

Hispanic or Latina/Latino/Latinx: 3.2%

Asian or Pacific Islander: 2.1%

Black or African American: 0.8%

Native American, American Indian, or Alaska Native: 0.6%

Other: 1.6%

Prefer not to say: 3.1%

Recreation Specialization.

Table 2: Specialization Items

My primary outdoor recreation activity...	Mean*	Standard Deviation
...says a lot about who I am. ¹	1.08	0.97
...allows me to really be myself. ¹	1.29	0.92
...allows others to see me the way I want them to see me. ¹	0.56	1.15
...is very important to me. ²	1.66	0.67
...is one of the most satisfying things I do. ²	1.55	0.74
...is pleasurable. ²	1.74	0.61
...is more important to me than other outdoor recreation or leisure activities. ³	0.68	1.05
...has a central role in my life. ³	1.12	0.94
...is becoming a more central part of my life each year. ³	1.03	1.00

*Scale: -2 = Strongly disagree, 2 = Strongly agree, 0 = Neither agree nor disagree

¹Measure of Identity²Measure of Attraction³Measure of Centrality

Table 3: Skill Level

	Mean*	Standard Deviation
Reported skill level in primary outdoor recreation activity	3.65	0.861

*Scale: 1 = Beginner, 2 = Novice, 3 = Intermediate, 4 = Advanced, 5 = Expert

Table 4: Reliability of Specialization Scales

	Mean	Cronbach's Alpha
Identity	0.98*	0.77***
Attraction	1.651*	0.82***
Centrality	0.94*	0.74***
Skill level	3.65**	N/A

*Scale: -2 = Strongly disagree, 2 = Strongly agree, 0 = Neither agree nor disagree

**Scale: 1 = Beginner, 2 = Novice, 3 = Intermediate, 4 = Advanced, 5 = Expert

***Beyond adequate reliability (Vaske, 2008)

Table 5: Results of Specialization k-means Cluster Analysis

	Cluster center for Specialized	Cluster center for Non-specialized
Identity*	1.41	0.22
Attraction*	1.91	1.19
Centrality*	1.36	0.22
Skill level*	4	3

*Statistically significant difference between groups at 99.9% confidence interval

Recreation specialization scales were adapted from Jun et al. (2015) to assess the breadth of recreation focus, particularity, and skill of the respondents of the sample. Results indicate that respondents within this sample are fairly specialized and of intermediate or advanced skill level on average (Tables 2 and 3). The measurement items were then grouped into the constructs of identity, attraction, centrality, and skill. Reliability analysis shows that these measurement items fit well within their assigned constructs (Table 4). Respondents were finally clustered around their level of specialization, resulting in two significantly different clusters: specialized and non-specialized (Table 5).

Change in Frequency of Outdoor Recreation.

Table 6: How many days per week did you participate in outdoor recreation for each of the following time windows before and after March 11th, 2020 (the date when the World Health Organization officially designated COVID-19 as a pandemic)?

	Mean Amount of Days*	Standard Deviation
In the month prior to March 11 th	5.07	1.97
Since March 11 th	4.76	2.52

*Difference between groups is statistically significant at a 95% confidence interval

Table 7: Results of one-way ANOVAs to test the difference in change in the amount of days with outdoor recreation of different groups

	Mean Change in Days	F-value
Non-specialized Recreationists	+0.58	11.46***
Specialized Recreationists	-0.52	
Non-urban	-0.17	4.033**
Urban	-0.52	
Male	-0.32	0.103 ^{ns}
Female	-0.26	

**Statistically significant at a 95% confidence interval

***Statistically significant at a 99% confidence interval

^{ns}Not statistically significant

Respondents significantly reduced the amount of days they participate in outdoor recreation on average since March 11th (Table 6). The change in recreation was significantly different based on respondents' level of recreation specialization and the size of the communities in which they reside. There was no significant difference by gender (Table 7).

Changes to Time of Outdoor Recreation.

Table 8: Since March 11th, 2020 (the date when the World Health Organization officially designated COVID-19 as a pandemic), have you changed the time of day you participate in outdoor recreation?

	Frequency	Percent
Yes	440	46.5%
No	507	53.5%

Table 9: If yes, of the times you normally recreate, which of the following times have you avoided for outdoor recreation since March 11th, 2020?

	Frequency	Percent*
Early morning	119	9.3%
Mid-morning	131	10.3%
Mid-day	202	15.8%
Early afternoon	173	13.6%
Mid-afternoon	176	13.8%
Early evening	151	11.8%
Mid-evening	108	8.5%
Night	117	9.2%

*Percent of those who reported change in timing of outdoor recreation (440 respondents)

Just less than half of all respondents reported changing the time of day they participate in outdoor recreation (Table 8). The most commonly avoided times since March 11th fall between mid-day and mid-afternoon (Table 9).

Change in Outdoor Recreation Activity Styles.

Table 10: Frequencies of activities in which respondents reported either increased or decreased participation since March 11th and average changes in participation levels for listed activities

	Frequency*	Frequency of activity being listed as Primary Activity**	Average Change in Participation Level***	Standard Deviation
Backpacking	218	31	-2.60x	1.92
Bicycling or Triathlon	192	42	+0.15x	3.21
Birdwatching or Wildlife Viewing	167	27	+0.30x	3.18
Boating or Sailing	23	3	-1.48x	3.03
Camping or RVing	259	48	-2.93x	1.62
Flatwater Canoeing, Kayaking, Rafting,	79	13	-1.46x	2.66

or Stand-up Paddling				
Climbing (outdoor)	90	35	-2.63x	2.05
Downhill Skiing or Snowboarding	111	63	-3.40x	1.25
Equestrian	18	6	-2.56x	1.85
Fishing	66	5	-0.85x	3.14
Gardening	198	19	+0.67x	3.36
Hiking	656	457	-0.87x	2.98
Hunting or Trapping	6	1	-2.40x	1.52
Motorcycling or ATVing	12	2	-1.67x	3.00
Nordic Skiing or Snowshoeing	45	36	-2.02x	2.35
Recreational Flying	3	1	-3.00x	1.73
Running (outdoor)	189	99	+0.39x	3.15
Scuba or Snorkeling	12	2	-2.67x	2.23
Shooting or Archery	34	6	-2.24x	2.27
Snowmobiling	1	0	+3.00x	N/A
Surfing	9	4	-2.00x	2.35
Whitewater Canoeing, Kayaking or Rafting	26	7	-1.42x	2.80
Other	134	105	-1.17x	3.30

^May not reflect seasonal changes

**“For the items below, please select up to 3 activities that you have either increased or decreased your participation the most because of the COVID-19 pandemic since March 11, 2020 (the date when the World Health Organization officially designated COVID-19 as a pandemic)?”

***“Of the activities listed below, which was your primary outdoor recreation activity in the month prior to March 11, 2020 (the date when the World Health Organization officially designated COVID-19 as a pandemic)?”

****“Of those activities selected in the previous question, to what degree have you either increased or decreased your participation since March 11, 2020 (the date when the World Health Organization officially designated COVID-19 as a pandemic)?”

For activities with more than 50 participants, backpacking, camping and RVing, outdoor climbing and downhill winter sports saw the greatest decreases in participation by respondents as a result of the COVID-19 pandemic (Table 10). Birdwatching and wildlife viewing, gardening, and outdoor running saw slight increases in participation.

Reasons for Changing Activity Styles.

Table 11: Mean responses of agreement and disagreement with statements related to change in participation by activity**

	Honor*	Expose*	Ill*	Caring*	Risk*	Closed*
Backpacking	4.26	3.93	1.54	1.69	3.58	4.10
Bicycling or Triathlon	4.20	4.12	1.55	1.67	3.28	2.41
Birdwatching or Wildlife Viewing	4.13	4.03	1.61	1.49	2.74	2.51
Camping or RVing	4.40	4.16	1.54	1.64	2.99	4.38
Flatwater Canoeing, Kayaking, Rafting, or Stand-up Paddling	4.18	3.89	1.51	1.57	2.96	3.08
Climbing (outdoor)	4.56	4.08	1.41	1.57	3.81	3.64
Downhill Skiing or Snowboarding	4.19	3.84	1.56	1.65	3.62	4.63
Fishing	4.18	4.28	1.81	1.78	3.01	2.84
Gardening	4.14	4.02	1.51	1.57	2.42	1.76
Hiking	4.35	4.10	1.53	1.56	3.21	3.16
Running (outdoor)	4.07	3.83	1.45	1.64	2.85	2.26
All Activities	4.23	4.03	1.53	1.6	3.13	3.14

Table 11 (continued)

	Open*	Obligations*	Economic*	Transport*	Friends/Fam*	Alone*
Backpacking	2.31	2.43	2.77	2.05	2.71	3.76
Bicycling or Triathlon	4.01	2.49	2.62	1.93	2.10	4.60
Birdwatching or Wildlife Viewing	3.69	2.47	2.42	2.14	2.17	4.65
Camping or RVing	1.85	2.60	2.63	1.91	2.76	3.44
Flatwater Canoeing, Kayaking, Rafting, or Stand-up Paddling	3.09	2.34	2.68	1.86	2.37	3.77
Climbing (outdoor)	2.52	2.47	2.82	2.00	3.02	2.02
Downhill Skiing or Snowboarding	1.49	2.36	2.40	2.10	2.47	3.33
Fishing	3.50	2.68	2.81	2.00	2.54	4.46
Gardening	4.28	2.32	2.36	1.76	1.71	4.61

Hiking	3.25	2.41	2.54	1.97	2.33	4.27
Running (outdoor)	3.92	2.22	2.49	1.99	2.13	4.62
All Activities	3.15	2.43	2.55	1.97	2.35	4.08

Scale: 1 = Strongly disagree, 5 = Strongly agree, 3 = Neither

*Key:

Honor	I wanted to honor social distancing recommendations/policies
Expose	I did not want to expose myself to individuals who may be carrying COVID-19
Ill	I felt ill
Caring	I was caring for an ill individual
Risk	I did not want to risk injury that would require medical attention
Closed	The area(s) where I am able to participate in this activity was closed due to the COVID-19 pandemic
Open	The area(s) where I am able to participate in this activity has remained open during the COVID-19 pandemic
Obligations	Other obligations in my life (e.g., childcare, household responsibilities) now occupy my recreation time
Economic	My economic situation has changed because of COVID-19
Transport	My access to transportation has changed because of COVID-19
Friends/Fam Activity	The friends or family with whom I recreated are no longer recreating and I don't want to/can't do it alone It is an activity I can do alone

**Only activities with more than 50 participants are included in these measures

Honoring social distancing guidelines was the most agreed with statement as to why respondents chose to change their outdoor recreation activity levels (Table 11). Statements related to recreation areas being closed and respondents not wanting to expose themselves to COVID-19 also saw higher levels of agreement. Being ill and caring for an ill individual generally saw higher levels of disagreement from respondents.

Distance Traveled to Participate in Outdoor Recreation.

Table 12: Distance travelled by respondents to participate in outdoor recreation*

		0-2 Miles	3-5 miles	6-15 miles	16-50 miles	>50 miles
In the month prior to March 11th	Frequency	102	109	187	295	240
	%	10.9	11.7	20.0	31.6	25.7
Since March 11th	Frequency	440	167	169	81	20
	%	50.2	19.0	19.3	9.2	2.3

*Means are statistically significant at a 95% confidence interval

Respondents significantly reduced the distance travelled to participate in outdoor recreation following March 11th, 2020 (Table 12). Prior to March 11th, 10.8% of respondents typically traveled within just two miles from home to participate in outdoor recreation. Respondents are now staying significantly closer to home, with 49.9% remaining within two miles.

Change in Outdoor Recreation Area Use.

Table 13: Average change in use among respondents for various land designations

	Average Change in Use ⁺	Standard Deviation
Private land or waters	-0.68x ^{*2}	2.22
Neighborhood or city streets	+0.92x ^{*2}	2.46
City or town parks	-0.85x ^{*2}	2.35
County or regional parks	-1.15x	2.21
Land trust or conservancy lands	-1.07x ^{*2}	1.94
State Parks	-1.58x ^{*2}	2.12
State Forests	-1.35x ^{*2}	2.08
State Game Management lands	-1.04x ^{*2}	1.88
National Forests	-1.38x ^{*2}	2.05
Bureau of Land Management lands	-1.18x ^{*2}	1.88
National Wildlife Refuges	-1.19x ^{*2}	1.81
Army Corps of Engineers recreation areas	-0.94x	1.73
National Park Service sites	-1.62x ^{*1}	1.85
Wilderness Areas	-1.28x ^{*2}	1.99
Ocean	-1.05x ^{*2}	1.78

^{*}Statistically significant at a 95% confidence interval

¹Statistically significant between specialized and non-specialized recreationists

²Statistically significant between non-urban and urban residences

⁺“Please indicate by what amount you have changed your use of the following types of recreation areas since March 11th, 2020 (the date when the World Health Organization officially designated COVID-19 as a pandemic).”

Of all the varying types of land designations listed, only neighborhood and city streets saw increases in use due to the COVID-19 pandemic (Table 13). Of those with declining use, urban residents saw significantly larger decreases in use of nearly all land designations than non-urban residents. For National Park Service sites, specialized users saw significantly larger decreases in use than non-specialized users.

Change in Outdoor Recreation Group Size.

Table 14: Typical outdoor recreation group size by respondents

	Average group size [*]	Standard Deviation
In the month prior to March 11th	5.61	10.35
Since March 11 th	1.85	1.08

^{*}Statistically significant at a 95% confidence interval

Outdoor recreation group sizes significantly dropped among respondents since March 11th (Table 14).

Backcountry Distance Traveled During Outdoor Recreation.

Table 15: Approximate distance from roads ventured by respondents for outdoor recreation activities

	Average miles traveled* ¹	Standard Deviation
In the month prior to March 11th	4.77	2.97
Since March 11 th	2.61	2.49

*Statistically significant at a 95% confidence interval

¹Statistically significant between specialized and non-specialized recreationists

Respondents significantly decreased their average distance travelled from roads during outdoor recreation since March 11th (Table 15). Specialized recreationists decreased their backcountry distance travelled significantly more than non-specialized recreationists.

Psychosocial Factors Influencing Outdoor Recreation Decisions.

Table 16: Importance of various items when making outdoor recreation decisions

How important are the following factors when making outdoor recreation decisions (e.g. frequency of outing, distance from home, activity) during the COVID-19 pandemic?	Mean*	Standard Deviation
How severe I perceive the COVID-19 pandemic to be in the area I am recreating. ¹	3.75	1.175
How likely I believe I am to contract COVID-19 while participating in my outdoor recreation activity. ¹	3.38	1.330
The likelihood that I will unintentionally spread COVID-19 to others while recreating outdoors. ¹	3.69	1.277
The outdoor recreation behaviors of my friends or family. ²	3.36	1.308
The outdoor recreation behaviors of my neighbors and surrounding community. ²	3.51	1.239
The discussion I see on social media about recreating outdoors during the COVID-19 pandemic. ²	3.02	1.325
The behavioral recommendations provided by the Center for Disease Control. ³	4.14	0.951

The behavioral recommendations provided by the World Health Organization. ³	3.94	1.144
The orders and regulations of my state of residence regarding allowed behavior during the COVID-19 pandemic. ³	4.27	0.887
Recommendations from land management agencies regarding outdoor recreation during the COVID-19 pandemic. ³	4.12	0.948
The open/closed status of public lands or public lands facilities. ³	4.42	0.849
The desire to support my physical health through exercise. ⁴	4.27	0.917
The desire to support my overall health by spending time in the outdoors. ⁴	4.35	0.889
The desire to relieve stress and support my mental health. ⁴	4.33	0.889
To fill the time I normally spent doing other recreation activities that I cannot do during the COVID-19 pandemic. ⁵	3.20	1.257
To have a reason to leave home during the COVID-19 pandemic. ⁵	2.99	1.400
The desire to partake in a safe leisure activities during the COVID-19 pandemic. ⁵	3.96	1.062

*Scale: -2 = Strongly disagree, 2 = Strongly agree, 0 = Neither agree nor disagree

¹Included in Perceived Risk Scale

²Included in Social Norms Scale

³Included in Orders from Authority Scale

⁴Included in Health Benefits Scale

⁵Included in Substitution Scale

Table 17: Scales developed on psychosocial factors influencing outdoor recreation decisions during the COVID-19 pandemic

	Mean*	Cronbach's Alpha
Perceived Risk	3.6072	0.788**
Social Norms	3.2976	0.757**
Orders from Authority	4.1783	0.840**
Health Benefits	4.3166	0.847**
Substitution	3.3853	0.665**

*Scale: -2 = Strongly disagree, 2 = Strongly agree, 0 = Neither agree nor disagree

**Beyond adequate reliability (Vaske, 2008)

Table 18: Results from repeated measures ANOVA examining psychosocial factors influencing outdoor recreation decisions

Mauchly's W	p-value	Huynh-Feldt Epsilon
0.603	<0.01	0.787*
Omnibus Test	F-Statistic	p-value
	316.537	<0.001
Scale Mean Comparisons	Mean Difference	p-value**
Perceived Risk-Social Norms	0.310	<0.001
Perceived Risk-Orders from Authority	-0.586	<0.001
Perceived Risk-Health Benefits	-0.706	<0.001
Perceived Risk-Substitution	0.226	<0.001
Social Norms-Orders from Authority	-0.878	<0.001
Social Norms-Health Benefits	-1.016	<0.001
Social Norms-Substitution	-0.084	0.398
Orders from Authority-Health Benefits	-0.138	<0.001
Orders from Authority-Substitution	0.795	<0.001
Health Benefits-Substitution	0.932	<0.001

*Huynh-Feldt correction utilized due to violation of assumption of sphericity

**Bonferroni adjustment applied to account for multiple comparisons

When making outdoor recreation decisions (e.g. where to go, group size, activity), respondents rated the importance of benefits to mental and physical health significantly more than any of the other measured factors. Orders from authority, both from land managers as well as from state and federal governments, were rated significantly less important than health benefits but significantly more important than all other factors. Perceived risk was rated significantly less important than health benefits and orders from authority but significantly more important than social norms and substitution behaviors. Social norms and substitution behaviors were not significantly different than each other and were rated less important than all other factors when making outdoor recreation decisions.

Likelihood of Returning to Preferred Outdoor Recreation Behavior and Patterns.

Table 19: How likely are you to continue or return to your preferred recreation behaviors/patterns when you perceive the threat of COVID-19 has become minimal?¹

	Frequency	Percent
Not at all likely	11	1.2
Slightly likely	37	3.9
Moderately likely	97	10.3
Very likely	219	23.2
Extremely likely	582	61.5

¹Statistically significant between specialized and non-specialized recreationists

The vast majority of respondents reported that they are very or extremely likely to return to their preferred recreation behaviors and patterns once they perceive the threat of COVID-19 has become minimal (Table 19). Specialized recreationists are significantly more likely to return to their preferred behaviors and patterns than non-specialized recreationists.

Perceived Long-Term Changes in Recreation Behavior.

Table 20: Do you perceive that your outdoor recreation behavior (i.e., where, when, how, and with whom) will change in the long-term following the World Health Organization's official announcement ending the COVID-19 pandemic?

	Frequency	Percent
Yes	356	37.7%
No	588	62.3%

Table 21: If yes, please respond by indicating your agreement or disagreement with the following statements.

Following the World Health Organization's official announcement ending the COVID-19 pandemic, my long-term outdoor recreation participation will change from how I recreated before the pandemic by...	Mean	Standard Deviation
...traveling further than I previously did to recreate.	3.07	1.23
...utilizing my local public lands more often.	3.69	1.05
...participating in more types of outdoor recreation.	3.66	1.09
...participating in more fitness-based outdoor recreation activities.	3.44	1.12
...changing the types of outdoor recreation I participate in.	3.13	1.12
...changing the time of day I recreate.	3.09	1.08
...changing the days of the week I recreate.	3.19	1.10
...recreating alone more often.	3.12	1.24

*Scale: 1 = Strongly disagree, 5 = Strongly agree, 3 = Neither agree nor disagree

Just over one third of respondents perceive that the COVID-19 pandemic will have long-term impacts on their recreation behavior (Table 20). Of those who perceive long-term personal changes, the most highly rated changes include utilizing local public lands more often, participating in more types of outdoor recreation, and participating in more fitness-based outdoor recreation activities (Table 21).

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