The Economic Value of Trails in Arizona

A Travel Cost Method Study

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Outline

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- Background
- Data Sources
- Descriptive Statistics
- Results
- Discussion & Conclusions
- Questions



About the Study

- Complement to Arizona State Parks 2020 Trails Plan
- Estimates economic value (consumer surplus) from non-motorized & motorized trail use by Arizona residents
- Estimates total annual trail use (visits) for nonmotorized & motorized recreation, presenting results in an origin-destination matrix
- Examines importance of trail amenities to Arizona residents in deciding where to live & travel for leisure



Defining Economic Value / Consumer Surplus (CS)

- Monetary measure of 'well-being' from consuming a good or service
- Measured as difference between willingness to pay for a good & actual amount paid (prevailing market price)
- For individuals willing to pay more than prevailing market price, they derive a 'surplus' from consuming the good or service
 - If I'm willing to pay \$10.00 for a movie ticket but it only costs me \$7.50, I have a consumer surplus of \$2.50
 - The movie was worth AT LEAST \$7.50 to me, or else I wouldn't buy it
 - A challenge with trails is that we don't observe a market price...

Valuing Non-Market Goods

- *Non-market goods* are goods or services not traded in a market system, therefore do not have directly measurable prices
 - Examples: Access to clean air or water; Proximity of housing to desirable open spaces
- Value of non-market goods can be estimated using "shadow prices" (effects of non-market goods on related market goods)
 - Example: Home prices near parks or rivers may be higher than prices of similar homes farther away from these amenities
- The value trail users get from using trails can be measured indirectly using individuals' travel costs (time & money) which could otherwise be spent on other activities or goods, known as *travel cost method*

Why Estimate Consumer Surplus?



Estimating economic value associated with use of natural resources & amenities...

- Helps us understand how society is impacted by changes in quality of or access to resources
- Can help guide public policy & investments by quantifying benefits & costs of actions affecting natural resources & amenities valued by public

Economic Value vs. Economic Impact

Economic Value

- Measures value people derive from activities, goods, & services
- Can be used for in-state or outof-state populations
- Well suited for non-market goods that may not require users to spend much to use or participate

Economic Impact

- Measures impacts of spending in economy & multiplier effects
- Best suited for out-of-state visitor spending (bringing "new" money into economy)

Travel Cost Method

- Assumes that if we choose to use a trail, the value we get from using that trail is at least equal to or greater than cost of traveling to and from trail
- <u>Travel Cost</u> = <u>Cost of Time</u> + <u>Vehicle Operating Expenses</u>
 - Upfront costs not included (OHV purchase, hiking boots, etc.)
- Using economic models, we estimate demand for trail use as a function of travel cost, individual characteristics, & trail area characteristics; using the results, we estimate consumer surplus (CS) per visit

Background

Travel Cost Method



Survey Data

- Data from Arizona 2020 Trails Plan stratified random sample survey of Arizona residents 18 + years of age
 - Frequency of respondents' non-motorized & motorized trail use in past year
 - Location of **favorite**, **most frequently-used**, & **furthest** trails
 - Selected to provide range of travel distances
 - Frequency of trail use for favorite, frequent, and furthest
 - Individual demographics (income, age, gender, education, etc.)
 - Respondent home zip code

Data Sources

Travel Cost

Trail Area Attributes

• Distance from respondent home zip code to trail use areas

• Respondent reported annual household income

• AAA vehicle operating cost estimates

• Topography (average slope, standard deviation of slope)

- Temperature (min. & max.)
- Land cover vegetation type
- Miles of trails (nonmotorized & motorized)

Individual Attributes

- Age
- Gender
- Race & Hispanic origin
- Education
- Income
- Employment status

Descriptive Statistics

Distance Traveled to Trails



Distributions – Travel Cost



	Range	Non-Motorized	Motorized
	Once or a few times	27.5%	28.2%
	Every couple of months	29.0%	31.9%
Overall	Once a month	13.5%	13.8%
	Every few weeks	14.5%	14.9%
	Once a week	8.3%	7.6%
	More than once a week	7.2%	3.6%

			Not at all	Once during	Every couple	Once a	Every few	Once a	More than
			not at an	the year	months	month	weeks	week	once a week
	Non	Favorite	2.7%	15.3%	31.5%	17.6%	9.1%	11.5%	6.1%
_	NON- Motorizod	Frequent	1.3%	11.1%	28.4%	19.0%	10.2%	13.1%	8.9%
By	Motorized	Furthest	8.3%	39.0%	27.0%	12.1%	4.6%	4.6%	2.6%
Trail		Favorite	2.9%	14.7%	28.1%	22.2%	7.9%	12.9%	7.2%
	Motorized	Frequent	1.4%	11.3%	26.1%	21.5%	11.4%	15.4%	7.9%
		Furthest	5.3%	25.0%	29.6%	17.8%	8.1%	7.5%	4.6%

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	Once or a few times	27.5%	28.2%
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Trail		Favorite	2.9%	14.7%	28.1%	22.2%	7.9%	12.9%	7.2%
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	Motorized	Frequent	1.4%	11.3%	26.1%	21.5%	11.4%	15.4%	7.9%
		Furthest	5.3%	25.0%	29.6%	11.8%	8.1%	7.5%	4.6%
Irall	Motorized	Frequent Furthest	2.9% 1.4% 5.3%	14.7% 11.3% 25.0%	28.1% 26.1% 29.6%	22.29 21.5% <u>11.8%</u>	1.9% 11.4% 8.1%	12.9% 15.4% 7.5%	

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			Not at all	Oı	nce during the year	Every couple months	Once a month	Every few weeks	Once a week	More once a	than week
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Descriptive Statistics





Descriptive Statistics



	N	on-Motoriz	zed	I	Motorized	
Variable	Favorite	Frequent	Furthest	Favorite	Frequent	Furthest
Percent Forested	16.0%	13.7%	19.2%	13.5%	12.7%	16.7%
Avg. Slope	6.3	5.9	6.7	6.1	6.1	6.3
St. Dev. Slope	7.6	7.5	8.0	7.5	7.4	7.5
Avg. Max Temp	77.2	77.9	75.3	78.2	78.2	76.9
Avg. Min Temp	48.2	49.0	46.2	49.3	49.3	47.8
Non-Motorized Trail Miles	890.6	920.0	800.5	714.1	648.3	643.2
Motorized Trail Miles	1,832.1	1,771.7	2,196.3	2,156.0	2,114.0	2,315.1
Distance Traveled to Site (Miles)	59.6	45.8	121.5	78.6	77.3	113.7

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Avg. Slope	6.3	5.9	6.7	6.1	6.1	6.3		
St. Dev. Slope	7.6	7.5	8.0	7.5	7.4	7.5		
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Motorized Trail Miles	1,832.1	1,771.7	2,196 3	2,156.0	2,114.0	2 315 1		
Distance Traveled to Site (Miles)	59.6	45.8	121.5	78.6	77.3	113.7		

Results



Summary of Arizona In-State Trail Use & Value

Estimate	Non-Motorized	Motorized
Participation Rate	59.2%	24.4%
Est. Participants	3,073,100	1,263,600
Avg. Visits per Year	27.0	15.9
Consumer Surplus per Visit	\$100.06 (\$90.32 to \$128.03)	\$259.17
Statewide Consumer Surplus (Annual)	\$8.3 billion (\$6.2 to \$10.6 billion)	\$5.2 billion

Origin-Destination Matrix

Share of **non-motorized** trail use visits by county of origin in each destination county

< Origin Destination 	Apache	Cochise	Coconino	Gila	Graham	Greenlee	La Paz	Maricopa	Mohave	Navajo	Pima	Pinal	Santa Cruz	Yavapai	Yuma
Apache	54%	0%	1%	0%	0%	39%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Cochise	1%	71%	1%	0%	0%	4%	0%	0%	0%	0%	0%	0%	11%	1%	0%
Coconino	3%	1%	31%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%
Gila	0%	0%	0%	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Graham	8%	1%	0%	1%	49%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Greenlee	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%
La Paz	0%	0%	0%	0%	0%	0%	79%	0%	0%	0%	0%	0%	0%	0%	0%
Maricopa	11%	9%	31%	70%	6%	51%	4%	98%	7%	52%	2%	49%	6%	61%	0%
Mohave	1%	0%	5%	0%	0%	0%	0%	0%	89%	0%	0%	0%	0%	1%	0%
Navajo	4%	0%	3%	0%	1%	0%	0%	0%	0%	31%	0%	1%	0%	0%	0%
Pima	15%	12%	18%	5%	45%	0%	0%	0%	1%	14%	94%	7%	36%	2%	2%
Pinal	0%	1%	1%	5%	0%	0%	5%	1%	0%	1%	1%	41%	0%	1%	0%
Santa Cruz	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	46%	0%	0%
Yavapai	4%	0%	7%	1%	0%	0%	0%	0%	2%	1%	0%	0%	0%	29%	0%
Yuma	0%	4%	2%	0%	0%	0%	11%	0%	0%	0%	0%	2%	1%	1%	98%

Origin-Destination Matrix

Share of **non-motorized** trail use visits by county of origin in each destination county

< Origin Destination 	Apache	Cochise	Coconino	Gila	Graham	Greenlee	La Paz	Maricopa	Mohave	Navajo	Pima	Pinal	Santa Cruz	Yavapai	Yuma
Apache	54%	0%	1%	0%	0%	39%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Cochise	1%	71%	1%	0%	0%	4%	0%	0%	0%	0%	0%	0%	11%	1%	0%
Coconino	3%	1%	31%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%
Gila	0%	0%	0%	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Graham	8%	1%	0%	۱%	49%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Greenlee	0%	0%	0%)%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%
La Paz	0%	0%	0%	1%	0%	0%	79%	0%	0%	0%	0%	0%	0%	0%	0%
Maricopa	11%	9%	31%	7 %	6%	51%	4%	98%	7%	52%	2%	49%	6%	61%	0%
Mohave	1%	0%	5%	1%	0%	0%	0%	0%	89%	0%	0%	0%	0%	1%	0%
Navajo	4%	0%	3%)%	1%	0%	0%	0%	0%	31%	0%	1%	0%	0%	0%
Pima	15%	129	18%	5%	45%	0%	0%	0%	1%	14%	94%	7%	36%	2%	2%
Pinal	0%	1%	1%	5%	0%	0%	5%	1%	0%	1%	1%	41%	0%	1%	0%
Santa Cruz	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%	46%	0%	0%
Yavapai	4%	0%	7%	1%	0%	0%	0%	0%	2%	1%	0%	0%	0%	29%	0%
Yuma	0%	4%	2%	0%	0%	0%	11%	0%	0%	0%	0%	2%	1%	1%	98%

Origin-Destination Matrix

Share of **motorized** trail use visits by county of origin in each destination county

< Origin < Destination	Apache	Cochise	Coconino	Gila	Graham	Greenlee	La Paz	Maricopa	Mohave	Navajo	Pima	Pinal	Santa Cruz	Yavapai	Yuma
Apache	4%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Cochise	1%	39%	0%	0%	0%	0%	0%	0%	1%	0%	4%	1%	8%	0%	0%
Coconino	0%	0%	31%	0%	0%	0%	1%	3%	1%	0%	0%	2%	3%	5%	0%
Gila	1%	11%	1%	28%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Graham	1%	0%	0%	0%	29%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Greenlee	2%	0%	0%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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Maricopa	50%	16%	57%	69%	3%	95%	14%	87%	12%	10%	16%	71%	59%	57%	2%
Mohave	3%	0%	2%	0%	0%	0%	2%	0%	77%	0%	0%	2%	2%	0%	0%
Navajo	3%	0%	2%	1%	0%	0%	0%	0%	0%	39%	0%	2%	0%	1%	0%
Pima	10%	33%	3%	0%	67%	1%	31%	1%	0%	44%	70%	4%	13%	3%	46%
Pinal	17%	0%	1%	1%	0%	0%	0%	3%	0%	3%	3%	16%	5%	3%	1%
Santa Cruz	6%	0%	0%	0%	0%	0%	6%	1%	3%	0%	5%	1%	9%	0%	0%
Yavapai	1%	0%	1%	0%	0%	0%	0%	3%	5%	1%	0%	2%	0%	30%	0%
Yuma	2%	0%	1%	0%	0%	0%	5%	0%	1%	1%	0%	1%	0%	0%	50%

Top Destinations

Based on survey responses, top trail use destinations include:

Non-Motorized

- Phoenix
- Tucson
- Sedona
- Apache Junction
- Scottsdale
- Flagstaff
- Prescott

Motorized

- Apache Junction
- Yuma
- Buckeye
- Black Canyon City
- Carefree
- Arizona City
- Flagstaff



Photo credit: Kyle Krause & Bill Holcomb

Trails' Influence on Where Arizonans Live & Visit

Importance of trails in Arizonans' decision of where to live and visit

In deciding where to *live*...

- 77% of non-motorized trail users &
- 80% of motorized trails users

...report trail proximity as somewhat important or very important

In deciding where to visit...

- 83% of non-motorized trail users &
- 85% of motorized trails users

...report trail proximity as somewhat important or very important

Even among Arizonans that that do not participate in trail-based outdoor recreation regularly, more than **two-thirds** report trail proximity as important in deciding where to live and visit

Conclusions

- Non-motorized trail users in Arizona...
 - **83.1 million** visits in past year (range: 48.6 m to 117.6 m)
 - Per-visit consumer surplus **\$100.06** (range: \$90.32 to \$128.03)
 - **\$8.3 billion** annual statewide consumer surplus (range: \$6.2 billion to \$10.6 billion)
- Motorized trail users in Arizona...
 - 20.1 million visits in past year
 - Per-visit consumer surplus **\$259.17**
 - **\$5.2 billion** annual statewide consumer surplus
- Large majority of Arizonans consider trail access *important* or *very important* in deciding where to live & visit, even those who don't use trails regularly

Study Limitations



Photo credit: Jeff Prince

- Scope of study limited to capturing value of trail use in Arizona to Arizona residents over age 18
- The study does <u>not</u> capture:
 - Non-use values
 - Consumer surplus of out-of-state residents
 - Consumer surplus of people under 18 years of age

For More Information

Full report & executive summary can be accessed at:

https://azstateparks.com/ publications/





Method Study

and any of the can be been to indevidual, communities, and our that individuals place on amendate like traits can be sources that the second second second second second second traits and the second second second second second second to for groups that are not bought and sold in unarbets, such be estimated individuals used in time and money to travel to associated with word or natural resonances and amendies to traits of the quality of or access to those resources. It can be wolds:

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enotorized recreation an estimated 85,110,000 (inaes, and 07,3100 Arizonasa) engaged in mon-motorized trail use in alton (1,265,000 Arizonans) engaged in motorized trail use storized and motorized trail users averaged 15.9, in past year, and motorized trail users averaged 15.9, motorized Sammery af Arizona In-State Trail Use & Value

midpoint	Estimate	Non-Motorized	Motorized
es ranging	Participation Bate	59,2%	24.4%
consumer w in state	Est. Participants	3,075,100	1,265,600
in marc	Avg. Visits per Year	27,0	15.9
se ranged	Consumer Surplus per Vitit	\$100.05 (\$90.52 to \$128.03)	\$259.17
estimated	Statesvide Consumer Surplus (Annual)	\$8.5 billion (\$6.2 to \$10.6 billion)	\$5.2 billion

Cooperative Extensi

Discussion & Conclusions



Questions

Contact

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