



**INTERNATIONAL**

# Journal of Wilderness

December 2022 | Volume 28, Number 3 | [ijw.org](http://ijw.org)

**In This Issue of** 

Virtual Reality Wilderness | Social Pressure on Rock Climbers  
Living With the Yawanawá | Remembering Dave Foreman

# International Journal of Wilderness

December 2022 Volume 28, Number 3

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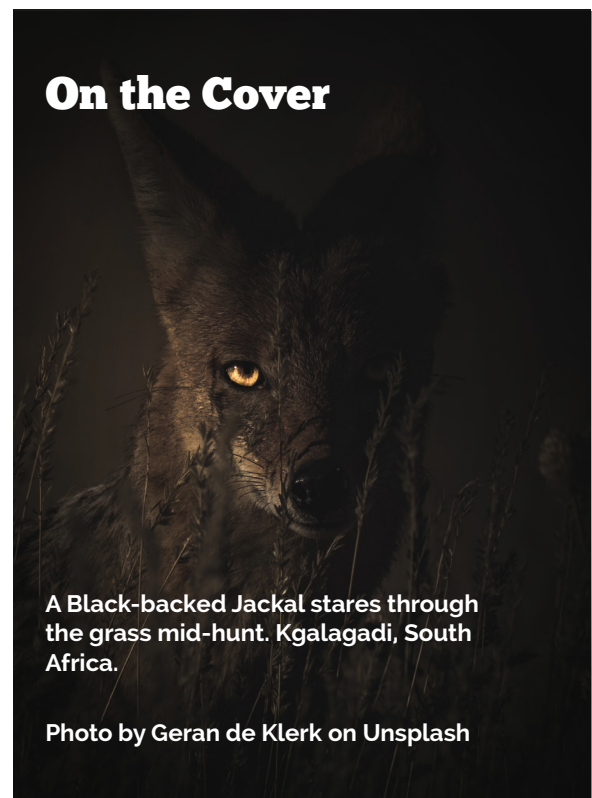
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IJW Editor-in-Chief Emeritus



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# International Journal of Wilderness

The International Journal of Wilderness links wilderness professionals, scientists, educators, environmentalists, and interested citizens worldwide with a forum for reporting and discussing wilderness ideas and events; inspirational ideas; planning, management, and allocation strategies; education; and research and policy aspects of wilderness stewardship.

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International Journal of Wilderness (IJW) publishes three issues per year (April, August, and December). IJW is a not-for-profit publication.

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SUBSCRIPTION RATES (PER VOLUME CALENDAR YEAR): Subscription costs are in U.S. dollars only -- Online subscriptions for individual subscribers \$30; group online subscriptions for 50 people or less \$100; group online subscription for 100 people or less \$200; for agency-wide subscriptions or group rates of 100 people or more, contact [adam@wild.org](mailto:adam@wild.org). No print journals will be available in 2020. No refunds.

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The sun sets over Nature Valley in South Africa. **Photo credit:** redcharlie on Unsplash

# Reconnecting and Reengaging Wilderness Stewardship

by **ROBERT DVORAK**

Each fall, my colleague Jordan Bruursema and I teach a workshop to introductory university students called "Disconnect to Reconnect." It is an opportunity for these students in the first few weeks of their university experience to visit a community nature park (Deerfield Nature Park) and consider how disconnecting from technology and societal pressures can give them the ability to reconnect with themselves. Over several hours, these students can explore nature, listen to the sounds of a river and forest, and share time with their peers. It is certainly not a novel idea, but it highlights how we need to be reminded of nature's ability to provide peace, solitude, and connection.


Following the discussions with students during this year's workshop, it encouraged me to contemplate what else might need reconnecting? Students reminded me of how disjointed and chaotic the learning experience has been for these young adults. Many of them spent several years of their education experience in some form of electronic online learning. Pedagogy has shifted as self-directed learning on personal laptops becomes more commonplace. Presentations and projects are engaged, completed, and submitted online through cloud-based applications. And students can focus their learning on strictly completing tasks and achieving outcomes, instead of immersing themselves in experiences and opportunities. It demonstrates a scenario where students might be trying to hurry up and finish the race, instead of enjoying the journey.



**Robert Dvorak**

Such ambitions are not uncommon, but worth further consideration in our postpandemic world searching for a "new normal." How might such perspectives have an impact on the engagement and participation of younger generations in conservation and stewardship? What concepts and values might need further exposure and enforcement in the development of new professionals? Wilderness conservation has been a profession driven by service, volunteerism, and activism. These values must be demonstrated and nurtured if they are to be passed on to the next cohort. And for this to happen, it might require reengaging on a greater scale.

We all adapted to changes, some societal and many personal, over the past several years. These changes impacted our engagement and opportunities in both positive and negative ways. Now comes the opportunity to reconnect and reengage in our passions for wilderness and wild nature. We close 2022 with the opportunity to strengthen our networks, build collaborations, and foster a constituency energized for positive change. As we lead by example, we can strengthen our commitments to wilderness stewardship and reconnect people to our vital natural world.

In this issue of *IJW*, we remember Dave Foreman as a father tree for wilderness. Carol Lee and Tanya Dreizin investigate peer-driven social pressures for behavior in rock climbers. Keely Fisher examines virtual reality and the impact of wilderness conceptualizations. Gracie Dunlap describes living alongside the Yawanawá. And John Shultis uses creative expression and the arts to demonstrate the impact of wild places. 

**ROBERT DVORAK** is editor in chief of *IJW* and professor in the Department of Recreation, Parks, and Leisure Services Administration at Central Michigan University: email: [dvora1rg@cmich.edu](mailto:dvora1rg@cmich.edu)





Wooded Lake Island. **Photo credit:** Juan Davila on Unsplash

# Temagami

## by JOHN SHULTIS

### EDITOR'S NOTE:

The International Journal of Wilderness (IJW) invites contributions pertinent to wilderness worldwide, including inspirational articles and creative expression. This contribution of poetry represents the enduring power and spirit of wilderness.

### Author's Introduction

I was 14 or 15 years old. My parents drove many hours to get me to the isolated camp, with the help of a float plane near the end. I liked playing outside, so I assume they thought a four-week canoe trip in the Temagami area of northern Ontario, Canada, seemed like a good idea. It also had the added benefit, no doubt, of getting an angst-filled young teen out of the house. After a few days at camp getting ready for the trip, off went about 15 newly introduced boys with little or no previous experience. No cell phones, seeing less than a handful of other people until we returned more than three weeks later. Just a few maps and two camp counselors to guide us.

After a few days of getting into sync with this very new environment, I was hooked. The beauty of the Canadian Shield was stunning; and there were more lakes and rivers – not to mention mosquitos, portages, mud, and beaver dams! – than I ever thought possible. It was spellbinding. Wake up, breakfast, break camp, paddle/portage for about four hours, lunch, paddle/portage another four hours, find



**John Shultis**



**Figure 1** - Photo by Andrew Ridley on Unsplash.

a place to set up camp, dinner, talk around the campfire, sleep under the stars, weather permitting, and repeat/repeat/repeat.... How could you do the same thing every day and still be challenged and fulfilled? The tiny but exquisite joy of hearing the loons' call and response, of discovering the "perfect" camp, and the tired contentedness of finishing that hard-to-find, extra-long and muddy portage with a canoe above your head and a heavy, uncomfortable pack on your back.

This canoe trip was my first and most powerful wilderness experience: I only later realized that in many ways I was my best self in the wilds, and the ascetic simplicity of this way of life made me feel whole in ways I had never imagined.

# Temagami

We started as strangers, young and so naive; we had no skills, just learned on the way  
Pushed off from camp, by Temagami; the adventure began, in the wilds  
As the days went by, time was different; our muscles flexed, our minds reacting  
To a new way of being, escaping society; becoming more in tune with timeless days

Gut Sucker Lake, Lady Evelyn, Wanapitei and Red Squirrel  
Abitibi, Anima Nipissing, Moose and Montreal River

On Native lands, paddling in unison; we passed Echo Lake, screaming like madmen  
Voices bouncing off, a wondrous sound; the sky was perfect, endless blue horizon  
We beached ourselves at the foot of the mountain; found a trail to take us up to the top  
Spent the day on land, a change of vision; at the top we saw, a bigger world

Gut Sucker Lake, Lady Evelyn, Wanapitei and Red Squirrel  
Abitibi, Anima Nipissing, Moose and Montreal River

Endless forests and water everywhere; a matrix of our own, with no boundaries  
It had become my home, merging into wilderness; I felt a jolt when I sensed the great oneness  
A spring we found, high on Maple Mountain; so clear and cold, I can still taste it  
How was it so high, what was the hydrology; it was a mystery, maybe genius loci

Gut Sucker Lake, Lady Evelyn, Wanapitei and Red Squirrel  
Abitibi, Anima Nipissing, Moose and Montreal River

The stillness of the Shield, granite beauty everywhere; no communication with the outside world  
Complete immersion, each river was everything; I felt a peace deep down in my spirit  
But all things end, back to the beginning; returning to the world was quite a shock  
Oh to return, to feeling in harmony; to feel our youth in such a time and place  
Oh to return, paddling in unison; to feel the connection to such a place

Gut Sucker Lake, Lady Evelyn, Wanapitei and Red Squirrel  
Abitibi, Anima Nipissing, Moose and Montreal River

*- John Shultis*

The "song" version of the poem, "Temagami," can be found  
at <https://soundcloud.com/user-64088723/temagami>



**Figure 2** - Photo by Andrew Montgomery on Unsplash.

**JOHN SHULTIS** is a retired adjunct professor at the University of Northern British Columbia in Canada and served as book review editor for the IJW for many years. He now has more time for visiting wilderness rather than writing about it!





Photo credit: veeterzy on Unsplash

# Dave Foreman: Remembering a Father Tree

by JOHN DAVIS

The wilderness community and the global rewilding movement pay tribute to a founding father. In his three-quarters of a century, Dave Foreman changed and expanded the way we do conservation in North America and inspired conservation activists and biologists to think big, wild, and connected throughout the world.

Since Dave Foreman's death from interstitial lung disease on September 19, 2022, the last group he founded, The Rewilding Institute (<https://rewilding.org>) has been flooded by fond remembrances and glowing tributes to his vast influence. A common theme in these grateful messages is Dave Foreman changed my life. I saw him give a speech in (whatever the city or university or wilderness conference) and from then on, I dedicated my life to wild things and places.

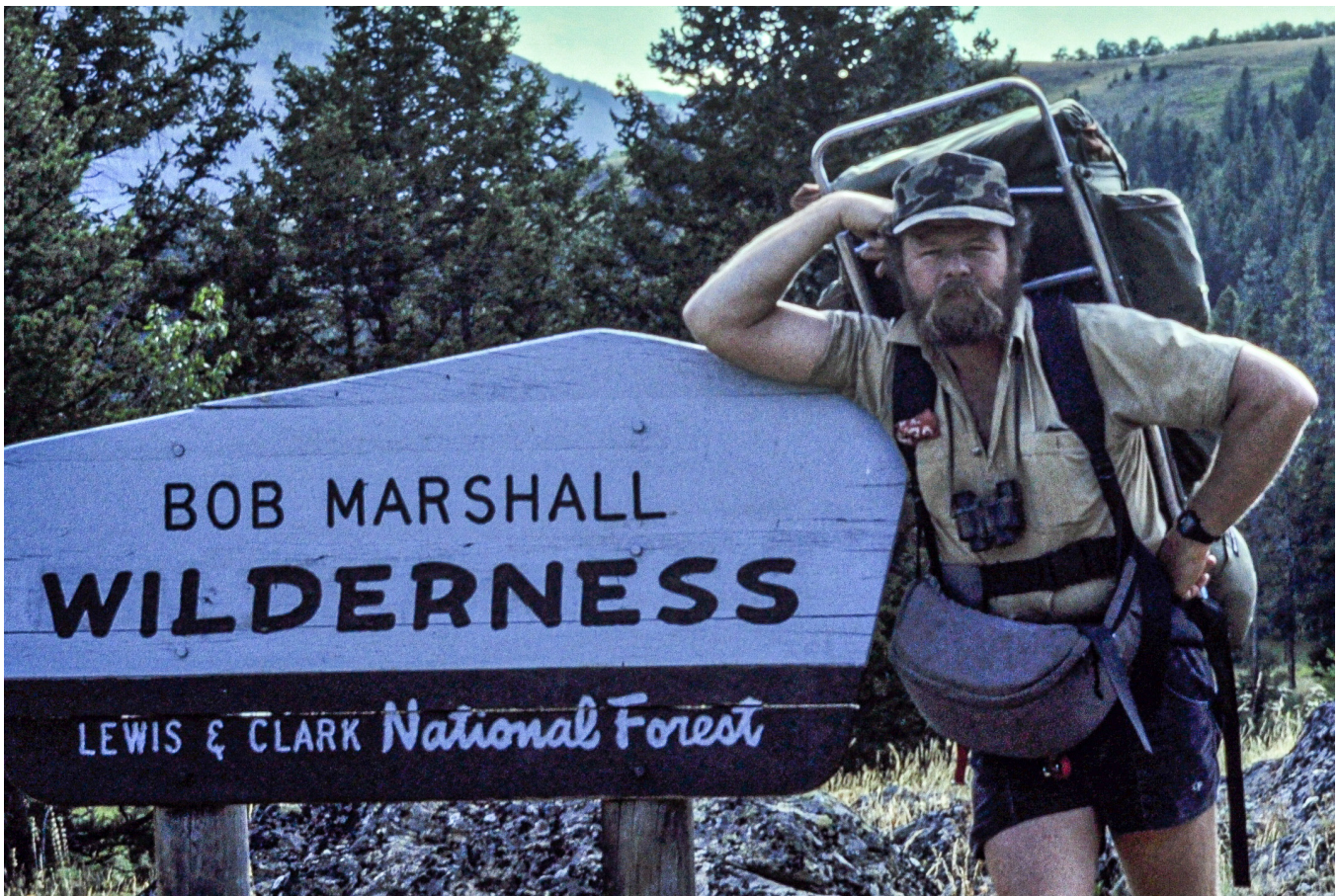
Some of these messages from Dave's close friends and colleagues have compared him to a giant tree in an old-growth forest. This metaphor I find particularly heartening, for as we all know now, big dead trees, standing or fallen, are as life-giving as are green trees. Dave is now like a mighty oak fallen in an old-growth gallery forest along the Gila River, southwest New Mexico, nurturing new generations of trees and their defenders, and guiding us as we work to protect and restore the Mogollon Wildway, linking the Gila Wilder-



John Davis

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**“Dave gave his storied life to protecting and restoring a wild Earth, for wildeors of all sizes, from small songbirds to giant redwoods. The mighty oak that was Dave Foreman has fallen to nourish new generations of rewilding leaders.”**



**Figure 1** - Dave Foreman in the Bob Marshall Wilderness Area. Photo by Nancy Morton.

ness with Grand Canyon National Park, as part of the Spine of the Continent Wildway.

My own little conservation story hints at Dave's influence. In college, I saw Dave and his fellow Earth First! cofounders Bart Koehler and Howie Wolke give hellfire and brimstone wilderness speeches at a rally for unprotected wildlands. The week I finished college, I hitchhiked across the country to volunteer in the Earth First! Journal office in Tucson, Arizona. I thought I'd do a year of service, then go back to school. Dave's vision was too compelling. I could not leave. For nearly four decades now, I've been trying to help Dave implement his vision for rewilding North America. Thanks to Dave, I've lived a life incredibly rich in experiences, if occasionally lean in resources. Dave's numerous friends and colleagues constitute a powerful community – like an old-growth ecosystem – of wildlands activists, biologists, and writers, and I've had the honor of meeting many of them, often at the home of Dave and his beloved wife, Nancy Morton (affording me the opportunity to wash dishes for some of the finest people in the world!).

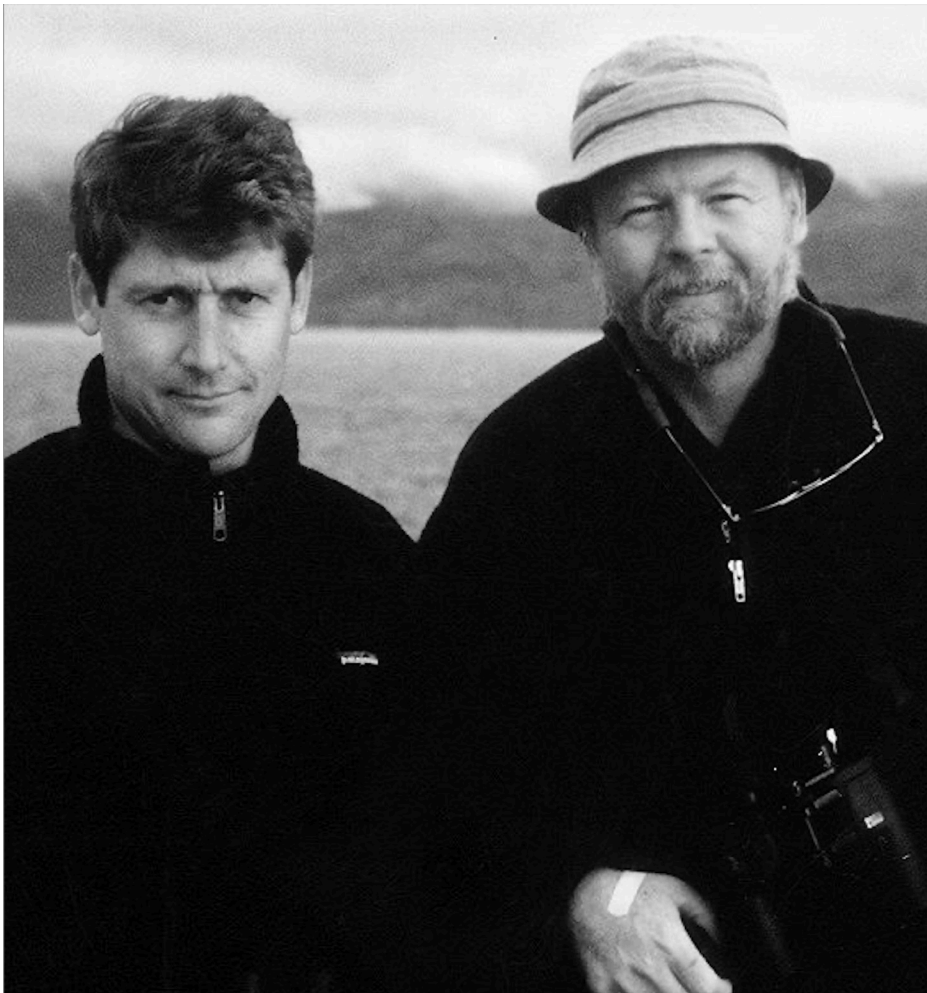
I was fortunate to get to know the soft side of Dave, as well as the more distant, heroic side. As a living legend, Dave could be intimidating. He had an encyclopedic memory for conservation and natural history and for public lands geography. He could name and describe virtually every species exterminated by our forebears in North America. He stopped timber sales on more national forests than most Americans ever even have a chance to walk. With Howie Wolke, he

completed the most comprehensive US roadless area inventory ever conducted (subject of their book *The Big Outside*). As a friend, though, and for many of us as a mentor, too, he was generous, funny, warm, and one of the best storytellers we had ever heard.

Part of Dave Foreman's great legacy will be courage. Dave was fearless in the face of bulldozers threatening ancient forests, critics falsely accusing him of not caring about people, and government agents who infiltrated Earth First! when the Reagan administration perceived us as a threat to economic growth. Dave taught us to speak boldly for

what wild Nature really needs. He was not a revolutionary, however. Indeed, Dave was deeply conservative, believing that protecting our natural heritage and learning to coexist with our wild neighbors are core values shared deep-down by most thinking, feeling people. Dave always argued that conservation should be nonpartisan – that folks from all political parties and walks of life should embrace wildlands and wildlife conservation.

Dave Foreman was famously controversial at times. His book *Man Swarm: How Overpopulation Is Killing the Wild World* was a blunt look at how excess human numbers, in terms of



**Figure 2** - John Davis and Dave Foreman. Photo courtesy of the Doug Tompkins archives.

population and consumption, are driving the extinction and climate crises. Other examples of Dave's writings were almost uncomfortably frank in how they criticized mainstream, foundation-supported conservation and environmental groups. Dave was sometimes an iconoclast, like his older friend Ed Abbey had been, and every movement needs that, discomfiting though their words can be. Perhaps the most enduring part of Dave Foreman's legacy will be the rewilding movement. Dave coined the term "rewilding" about a quarter century ago. His short definition of "rewilding" was "wilderness recovery," but he

explained it at length in his landmark book *Rewilding North America* – the closest thing to a blueprint for how to achieve what are now called Half Earth goals on the most affluent continent. Dave grumbled often and laughed occasionally at how his neologism "rewilding" had been adopted by manifold interest groups, ranging from drumming circles to folks seeking spiritual enlightenment to alternative medical practices teaching gut biome health. He occasionally chafed at the suggestion of some conservationists that rewilding start at small-scale levels, like restoring native plants to our yards. He practiced such heal-




**Figure 3** - Dave on the Sheenjuk River, Arctic National Wildlife Refuge, AK. Photo by Nancy Morton.



**Figure 4** - Dave releasing Luna the black-footed ferret. Photo provided by Katie Shepard.

ing local work himself but did not see it as rewilding. Big, Wild, and Connected were the basic descriptors of rewilding for Dave, and he wanted to see projects protecting big core reserves and protecting or restoring the full range of native wildlife, including apex predators such as wolves, big cats, bears, raptors, and sharks.

Like most brilliant people, Dave Foreman was complex and paradoxical, though, and I believe in the main, he was pleased to see work for other species expanding under the rubric of rewilding. The final test for Dave on whether work lives up to the rewilding label was whether it served wild creatures – “wildeors,” or self-willed beasts, as Dave liked to call our furred, feathered, finned, and flowering neighbors.

Dave gave his storied life to protecting and restoring a wild Earth, for wildeors of all sizes, from small songbirds to giant redwoods. The mighty oak that was Dave Foreman has fallen to nourish new generations of rewilding leaders. Dave Foreman did not, in the flesh, live to see the day wolves, pumas, and grizzly bears in Mexico would have unbroken lineages north along the Spine of the Continent into Canada, but may the young rewilding leaders he will inspire achieve such big, wild, connected visions here and around the world. 

For more on Dave Foreman's life, please follow the link from the Resource Renewal Institute, <https://vimeo.com/235470442>, which brings Dave "to life" in an interesting way.

Special thanks to Magnus Sylven of the Wild Foundation and Katie Shepard, managing editor and cofounder of Essex Editions for providing additional photographs, editing, and materials for this tribute.

**JOHN DAVIS** is the executive director of The Rewilding Institute, rewilding advocate, and member of the Adirondack Council; email: [john@rewilding.org](mailto:john@rewilding.org); [jdavis@adirondackcouncil.org](mailto:jdavis@adirondackcouncil.org).





Red Rock Canyon National Conservation Area, Las Vegas, United States. **Photo credit:** Brook Anderson on Unsplash..

# Testing the Effect of Peer-Driven Social Pressure on Leave No Trace Behaviors in Rock Climbers

by **CAROL S. LEE** and **TANYA DREIZIN**

PEER-REVIEWED

## ABSTRACT

As outdoor climbing has increased in popularity, so has the potential for negative environmental impacts in the areas where climbing occurs. The present between-subjects experiment thus examined the impact of peer-driven social pressure on Leave No Trace (LNT) adherence in rock climbers. The results indicated that climbers were more likely to adhere to LNT behaviors when climbing partners encouraged LNT behaviors than when climbing partners were neutral. Findings also indicated that while climbers perceive themselves to be knowledgeable about LNT practices, there is a gap in understanding how LNT specifically relates to the sport.

Rock climbing is a rapidly growing sport, leading more individuals to recreate in outdoor settings. The growth of indoor climbing gyms throughout the United States grew 8.24% in 2021, showing higher rates of increase from 2019 (5.07%) and 2020 (5.41%), and between 1,000 and 1,500 people try climbing for the first time every day (Access Fund 2020; Climbing Business Journal 2020). Popular outdoor climbing and recreation areas have also seen notable growth, with Calico Basin in Red Rock Canyon National Conservation Area reporting a 340%



Carol S. Lee



Tanya A. Dreizin

increase in visitors since 2003, and New River Gorge setting a visitor record in 2021 (Bureau of Land Management 2019; Tate 2022). Recent estimates indicate that more than 2.5 million climbers climb outdoors in over 30,000 climbing areas (Climbing Business Journal 2020; Ellison 2020; Outdoor Industry Association 2018). As outdoor climbing increases in popularity, so does the potential for negative environmental impacts in the areas where climbing occurs. Many popular climbing areas exist within protected conservation areas and national parks, and in more remote wilderness areas. Thus, high impact climbing practices (such as excessive bolting, removal of vegetation, littering, disruption of breeding areas, etc.) can lead to potentially harmful impacts to fragile and important ecosystems. For example, many climbing areas face environmental issues such as erosion, increases in micro trash, poor disposal of human waste, negative impacts to species diversity and abundance on the rock, and disruption of breeding habitats, along with social impacts such as overcrowding and excessive noise (McMillan et al. 2003; Burgin and Hardiman 2012; Clark and Hessel 2015; Covy et al. 2019; Access Fund 2006; 2021).

One method of addressing these impacts has been to apply Leave No Trace (LNT) principles. The LNT principles are a framework of seven principles, often used by land managers and educators to promote minimal impact practices for those recreating in the outdoors (Leave No Trace 2015; 2021). The seven principles of LNT are as follows: plan ahead and prepare, travel and camp on durable surfaces, dispose of waste properly, leave what you find,

minimize campfire impacts, respect wildlife, and be considerate of other visitors (Leave No Trace 2015; 2021). These seven principles have been adapted to address the impacts that rock climbers have on the natural environment by creating guidelines such as: be considerate of others; stay on trails whenever possible; respect wildlife, sensitive plants, and soil; park and camp in designated spaces and pack out all trash (Access Fund 2006; 2021). Despite the creation and dissemination of these activity-specific guidelines, difficulties remain regarding the promotion, education, and adherence to LNT behaviors in rock climbers, pointing to the need to better understand the factors leading to LNT behaviors.

One potential framework for understanding the factors leading to LNT behaviors is the Theory of Planned Behavior (TPB) (Ajzen 1985; 1991; 2005), one of the most widely applied models of human behavior (Hasbullah et al. 2014). The TPB posits three covarying predictors of behavior: positive attitudes about the behavior (the extent to which an individual values or approves of the behavior), social pressure (the extent to which an individual is aware of behavioral norms and the value placed on those norms by organizations and peers), and self-efficacy (the belief in one's ability to enact the behavior). The TPB has been previously applied to a variety of environmental and conservation behaviors (e.g., predictors of recycling, energy conservation, outdoor recreation, etc.), including climbing-specific LNT behaviors (Schwartz et al. 2019; Taff et al. 2016). For example, previous studies examining the impact of positive attitudes about LNT on climbing-specific LNT behaviors

in rock climbers have found that greater outdoor climbing experience was associated with more positive attitudes toward climbing-specific LNT behaviors (Schwartz et al. 2019), and that climbing-specific LNT behaviors were more likely to occur when participants had positive attitudes toward the behaviors (Taff et al. 2016).

While other studies do not explicitly apply the TPB to LNT in rock climbing, their findings are still consistent with the TPB. For example, Clark et al. (2020) conducted a survey study and found that greater awareness and knowledge of LNT principles was associated with greater self-reported application of these practices. Similarly, a survey study by Sharp and colleagues (2018) found that greater knowledge of LNT principles was associated with improved LNT adherence. Additionally, surveys conducted by the Access Fund, a leading climbing organization, indicate that organization-driven social pressure to protect the natural environment has resulted in greater stewardship efforts (Access Fund 2021; Maples et al. 2017). Consistent with the TPB, these findings support greater awareness of LNT behavioral norms and organization-driven social pressure as correlates of climbing-specific LNT behaviors. Taken together, the literature thus far indicates that LNT behaviors are more likely when rock climbers have greater education and awareness of the behaviors, experience organization-driven social pressure, and have more positive attitudes toward climbing-specific LNT behaviors.

To expand on our understanding of climbing-specific LNT behaviors, the present study examined peer-driven social pressure

(social pressure exerted by peers and community members, rather than organizations and governing bodies) as a predictor of climbing-specific LNT behaviors. There is particularly good reason to consider peer-driven social pressure when examining reported LNT behaviors in rock climbers. Apart from its inclusion as a predictor of behavior in the TPB, there is a large literature base indicating that social pressure directly impacts human behavior, with peer-driven social pressure having a greater impact on reported behavior than organizational social pressure (for a review, see Cialdini and Goldstein 2004). Additionally, the nature of rock climbing can make it a social activity, as many types of climbing require a partner to belay or spot for safety. Climbing communities can also self-govern climbing behaviors, rules, and norms via social sanctions and rely on community and peer-driven influence to adhere to these norms (Carter 2019). For example, in a recent incident a climber found a route bolted over petroglyphs in Utah's Arches National Park (Johnson 2021). In this incident, the climber removed the bolts, informed the climbing community, and reported the incident to the Moab Bureau of Land Management. The ensuing community disapproval and condemnation of the route developer's behavior exerted peer-driven social pressure on the route developer to apologize and to repair the damage to the rock, as well as reinforced the rule of not climbing on petroglyphs to the larger climbing community. A second example examines route developing ethics in Ten Sleep, Wyoming (Gartner 2019), in which the route developers manufactured holds into the

natural rock. In response, a group of climbers who determined the practice unethical defaced the manufactured routes, leading to condemnation of both parties by the greater climbing community. This condemnation resulted in ongoing discussions between climbing organizations and the National Forest Service to create a management plan for future development ethics. It is thus possible that the nature of climbing, and the climbing community make peer-driven social pressure a particularly important factor leading to climbing-specific LNT adherence.

In sum, land managers experience continued challenges with LNT adherence in rock climbers. To address this, further research is necessary to better understand the factors leading to LNT adherence in rock climbers. As such, the present study aimed to expand our knowledge of climbing-specific LNT behavior by examining the impact of peer-driven social pressure on climbing-specific LNT behaviors experimentally. The study utilized a between-subjects experimental vignette study to better establish directionality. We hypothesized that, controlling for outdoor climbing experience, preferred climbing type, and LNT principles knowledge, individuals would rate themselves as more likely to adhere to climbing-specific LNT behaviors when climbing partners encouraged LNT behaviors (peer-driven social pressure condition), than when climbing partners were neutral about LNT behaviors (neutral pressure condition).

## Methods

### *Participants*

We advertised this Institutional Review Board (IRB)-approved study by engaging climbing organizations (e.g., Access Fund, regional climbing coalitions, The Common Climber, Flash Foxy, Kanaka Climbers, etc.) to post about the study on email newsletters, Instagram, Facebook, and LinkedIn. We used non-statistical convenience sampling to choose these partners based on community partner willingness and availability, as there is no population census of climbing-related organizations. The online Qualtrics study was advertised as examining "outdoor ethics and recreation behaviors in rock climbers," and was open to all individuals meeting the inclusion criteria of being over 18 and being a rock climber of any type. All participants were randomly assigned by Qualtrics to one of two conditions: the peer-driven social pressure condition or the neutral pressure condition. Participants in the peer-driven social pressure condition received vignettes where climbing partners encouraged LNT behaviors; participants in the neutral pressure condition received vignettes where climbing partners were neutral about LNT behaviors. A total of 406 participants (peer-driven social pressure = 203; neutral pressure = 203) participated in the study. Of the 406 participants, 35 participants (peer-driven social pressure = 15; neutral pressure = 20) did not complete at least 80% of outcome measures and were thus dropped from the analysis. Our final sample was 371 (peer-driven social pressure = 188; neutral pressure = 183). The demographic characteristics and climbing preferences of our sample can be seen in Tables 1 and 2, respectively. Of note, we utilized a non-statistical convenience sample due to the lack of any population census of the climbing community.

Demographic	Peer-Driven Social Pressure. <i>n</i> (%)	Neutral Pressure <i>n</i> (%)	$\chi^2$ ( <i>df</i> )	Total Sample <i>N</i> (%)
<b>Gender Identity</b>				
			3.34 (4)	
Man	95 (50.53%)	90 (49.18%)		185 (49.87%)
Woman	90 (47.87%)	87 (47.54%)		177 (47.71%)
Transgender	0 (0.00%)	1 (0.55%)		1 (0.27%)
Non-Binary	2 (1.06%)	3 (1.64%)		5 (1.35%)
Self-Described <sup>a</sup>	0 (0.00%)	2 (1.09%)		2 (0.54%)
<b>Race</b>				
Alaskan Native/ Indigenous Native American/American Indian <sup>b</sup>	2 (1.06%)	1 (0.55%)	7.13 (8)	3 (0.81%)
Asian	24 (12.77%)	20 (10.93%)		44 (11.86%)
Black	0 (0.00%)	1 (0.55%)		1 (0.27%)
Latino (Not White)	0 (0.00%)	6 (3.28%)		6 (1.62%)
Latino (White)	13 (6.91%)	11 (6.01%)		24 (6.47%)
Pacific Islander/Native Hawaiian	4 (2.13%)	5 (2.73%)		9 (2.43%)
White	148 (78.72%)	148 (80.87%)		296 (79.78%)
Multiracial <sup>c</sup>	5 (2.66%)	8 (4.37%)		13 (3.50%)
Other <sup>d</sup>	4 (2.13%)	1 (0.55%)		5 (1.35%)
<b>Education</b>				
			7.33 (6)	
8th grade or less	0 (0.00%)	0 (0.00%)		0 (0.00%)
1–3 years high school	1 (0.53%)	1 (0.55%)		2 (0.54%)
12th grade, high school diploma	1 (0.53%)	4 (2.19%)		5 (1.35%)
Vocational school/other	5 (2.66%)	4 (2.19%)		9 (2.43%)
1–3 years college	27 (14.36%)	16 (8.74%)		43 (11.59%)
4-year college degree	74 (39.36%)	77 (42.07%)		151 (40.70%)
Master's degree	58 (30.85%)	49 (26.78%)		107 (28.84%)
Professional degree	22 (11.70%)	32 (17.49%)		54 (14.55%)
<b>Income</b>				
			3.13 (7)	
\$0–\$15,000	12 (6.38%)	8 (4.37%)		20 (5.40%)
\$15,001–\$25,000	9 (4.79%)	11 (6.01%)		20 (5.40%)
\$25,001–\$35,000	10 (5.32%)	11 (6.01%)		21 (5.66%)
\$35,001–\$50,000	19 (10.11%)	13 (7.10%)		32 (8.63%)
\$50,001–\$75,000	30 (15.96%)	31 (16.94%)		61 (16.44%)
\$75,001–\$100,000	25 (13.30%)	24 (13.11%)		49 (13.21%)
\$100,001–\$200,000	53 (28.19%)	61 (33.33%)		114 (30.73%)
\$200,000 +	23 (12.23%)	19 (10.38%)		42 (11.32%)

Note. *N* = 371 (Peer-Driven Social Pressure = 188, Neutral Pressure = 183). Mean Age = 38.69, *SD* = 12.78 (Peer-Driven Social Pressure:

Mean Age = 37.25, *SD* = 12.09; Neutral Pressure: Mean Age = 40.14, *SD* = 13.32)

<sup>a</sup> Self-Described Genders disclosed: 85% woman/15% nonbinary; whatever; fluid

<sup>b</sup> Tribal Affiliations disclosed: Diné (Navajo)

<sup>c</sup> Identities disclosed: Asian/white; Asian/Ashkenazi; Black/white; Hispanic/white; Korean/white; Chinese/Thai/Native American/Irish/others; white/Brazilian

<sup>d</sup> Identities disclosed: European, Filipino, Middle Eastern, unsure

**Table 1** - Demographic Characteristics

Category	Peer-Driven Social Pressure <i>n</i> (%)	Neutral Pressure <i>n</i> (%)	$\chi^2$ (3)	Total Sample <i>N</i> (%)
<b>Climbing Type Experience</b>				
Indoor top rope, lead, auto belay, bouldering	154 (81.91%)	138 (75.41%)		292 (78.71%)
Outdoor top rope, sport, or bouldering	171 (90.96%)	161 (87.98%)		332 (89.49%)
Traditional, ice, Alpine, or Mountaineering	95 (50.53%)	88 (48.09%)		183 (49.33%)
Other <sup>a</sup>	1 (0.53%)	2 (1.09%)		3 (0.81%)
<b>Preferred Climbing Type</b>				
			11.93 (3)	
Indoor top rope, lead, auto belay, bouldering	14 (7.45%)	20 (10.93%)		34 (9.16%)
Outdoor top rope, sport, or bouldering	110 (58.51%)	96 (52.46%)		206 (55.53%)
Traditional, ice, Alpine, or Mountaineering	56 (29.79%)	64 (34.97%)		120 (32.35%)
Other <sup>b</sup>	7 (3.72%)	2 (1.09%)		9 (2.43%)

Note. *N* = 371 (Peer-Driven Social Pressure = 188, Neutral Pressure = 183)

<sup>a</sup> Aid, rope solo

<sup>b</sup> All of the above, all forms of lead, sport and trad, indoor and outdoor, free solo

**Table 2** - Climbing Experiences

	Peer-Driven Social Pressure Condition	Neutral Pressure Condition
1	Imagine that you and your friends want to go climbing at a popular crag. Your schedule is flexible, but the only time everyone can go is on Saturday morning - when the crag is typically the busiest. You and your friends discuss this and your friends want to reschedule for a time when there are less people at the crag. <b>How likely are you to reschedule that day?</b>	Imagine that you and your friends want to go climbing at a popular crag. Your schedule is flexible, but the only time everyone can go is on Saturday morning - when the crag is typically the busiest. You and your friends discuss this and your friends are neutral about rescheduling for a time when there are less people at the crag. <b>How likely are you to reschedule that day?</b>
2	Imagine that you come across the perfect line and are excited to develop a new route. However, you notice several plants growing on the route that would need to be removed to make the route flow. Your friends tell you it's better to leave the plants even if it means the route does not flow as well. <b>How likely are you to leave the plants on the wall?</b>	Imagine that you come across the perfect line and are excited to develop a new route. However, you notice several plants growing on the route that would need to be removed to make the route flow. <b>How likely are you to leave the plants on the wall?</b>
3	Imagine that you and your friend are working a route and discover a hidden jug that will help you send. You tick the hold with chalk to help you find the jug again later. After another burn or two on the route, you and your friend agree to come back to try the route again in a few days. Your friend starts to clean other tick marks that they've left. <b>How likely are you to clean your chalk tick?</b>	Imagine that you and your friend are working a route and discover a hidden jug that will help you send. You tick the hold with chalk to help you find the jug again later. After another burn or two on the route, you and your friend agree to come back to try the route again in a few days. <b>How likely are you to clean your chalk tick?</b>
4	Imagine that you got a late start, and you and a climbing partner are hoping to do a classic route before the sun goes down. Getting to the route requires an hours-long hike on a designated switchback trail. Taking a social trail that cuts through the switchbacks would significantly reduce the amount of time it took to get to the route, but your partner says it's better to stay on the designated trail. <b>How likely are you to stay on the designated trail?</b>	Imagine that you got a late start, and you and a climbing partner are hoping to do a classic route before the sun goes down. Getting to the route requires an hours-long hike on a designated switchback trail. Taking a social trail that cuts through the switchbacks would significantly reduce the amount of time it took to get to the route. <b>How likely are you to stay on the designated trail?</b>

**Figure 1** - Vignettes. Note: All questions were answered using a 1 (Not at All Likely) to 7 (Very Likely) Likert scale.

### Vignettes and Scoring

Participants were presented with a total of four vignettes (Figure 1), each describing a situation in which a climbing LNT-consistent behavior could be taken. The four situations were taken from a study conducted by Taff and colleagues (2016), which identified them as the four behaviors that climbers were least likely to engage in. Following a description of the situation, participants were provided information indicating that their climbing partners either encouraged or were neutral about the LNT behavior. Participants randomized to the peer-driven social pressure condition only received information indicating that their climbing partners encouraged the LNT behavior, while participants randomized to the neutral pressure condition only received information indicating that their climbing partners were neutral about the LNT behavior. To keep the vignettes and LNT behaviors realistic, encouragement in the peer-driven social pressure consisted of climbing partners realistically modeling or suggesting the LNT behavior. The neutral pressure condition consisted of climbing partners expressing no preference and deferring to the participant.

## Self-Report Measures

*Demographics Questionnaire.* Although demographic variables are not central constructs in this study, we asked participants to identify the following characteristics to aid us in accurately describing our sample: age, gender identity, race, education, and household income. These items were chosen based on models of cultural identity, which indicate these factors as important identities to account for in understanding humans (Hays 2001).

*Climbing Experience Questionnaire.* Given previous findings that climbing experience and climbing type may impact LNT adherence (Taff et al. 2016; Schwartz et al. 2019), we asked participants to provide data on years of outdoor climbing experience and their preferred climbing type. Outdoor climbing experience was measured in years as a continuous variable and preferred climbing type was measured as a categorical variable.

*Likelihood.* After each vignette, participants were asked to rate how likely they were to take the LNT behavior using a 1 (not at all likely) to 7 (very likely) scale. The sum of these ratings was used to create a score for likelihood to adhere to LNT behaviors.

*LNT Knowledge and Attitudes Subscales (LNT-KAS)* (Schwartz et al. 2019). To control for LNT knowledge, we adapted Schwartz's 14-item LNT-KAS for our study. The original LNT-KAS asks respondents to rate the perceived appropriateness of 13 climbing-specific LNT behaviors, as well as their perceived expertise on general LNT principles, to create two subscales (climbing LNT and global LNT). Respondents rate items using a 1 (very inappropriate, none) to 7 (very appropriate, expert) scale. Our adapted LNT-KAS (Figure 2) asked respondents to rate the four climbing-specific LNT behaviors represented in our vignettes, as well as their perceived expertise on general LNT principles, to create two subscales (climbing LNT and global LNT), for a total of five questions. Climbing LNT was a four-item subscale that consisted of the sum of the vignette ratings. Global LNT was a single-item subscale that consisted of the perceived expertise rating.

LNT-KAS						
<b>Part 1.</b>						
How appropriate or inappropriate is each behavior for you to engage in while climbing or recreating outdoors? Use the scale below:						
Very Inappropriate						Very Appropriate
1	2	3	4	5	6	7
1. Scheduling a visit during times of high use						
2. Leaving tick marks when done climbing						
3. Removing/cleaning lichen, moss, or plants from a wall to establish a new route						
4. Traveling off designated trails to access boulders						
<b>Part 2.</b>						
5. How would you rate your knowledge of Leave No Trace Principles?						
None						Expert
1	2	3	4	5	6	7

Figure 2 - LNT-KAS

Measure	Peer-Driven Social Pressure Mean (SD)	Neutral Pressure Mean (SD)	t (df)	Total Sample Mean (SD)
Years Outdoor Climbing	4.94 (1.41)	5.01 (1.58)	0.45 (368)	4.97 (1.49)
LNT_KAS	13.26 (4.28)	13.11 (4.10)	-0.32 (367)	13.19 (4.19)
LNT_Global	5.60 (0.96)	5.70 (0.93)	1 (367)	5.65 (0.95)
Likelihood	22.20 (3.99)	19.16 (4.35)	-6.97 (364)*	20.70 (4.44)

\* $p < .001$

Note.  $N = 371$  (Peer-Driven Social Pressure = 188, Neutral Pressure = 183). Years Outdoor Climbing = Number of years of experience climbing outdoors, LNT\_KAS = Climbing LNT knowledge and attitudes subscale total, LNT\_Global = General LNT knowledge rating, Likelihood = Likelihood of taking a climbing LNT behavior rating total

**Table 3** - Descriptive Statistics

## Procedures

After completing informed consent on via Qualtrics, participants were randomized to either receive vignettes in which a climbing partner encouraged LNT behaviors (peer-driven social pressure condition) or vignettes in which a climbing partner was neutral about LNT behaviors (neutral pressure condition). Participants then completed the Demographics Questionnaire, Climbing Experience Questionnaire, and the LNT-KAS.

## Statistical Analysis

We hypothesized that, controlling for outdoor climbing experience, preferred climbing type, and LNT principles knowledge, individuals would rate themselves as more likely to adhere to climbing-specific LNT behaviors when climbing partners encouraged adherence to LNT behaviors (peer-driven social pressure condition), than when climbing partners were neutral about LNT behaviors (neutral pressure condition). To test this hypothesis, we conducted an ANCOVA. The independent variable was condition (peer-driven social pressure versus neutral pressure), and the dependent variable was Likelihood. The LNT\_KAS, LNT\_Global, outdoor climbing experience, and climbing preference were entered as covariates.

## Results

### Preliminary Analyses

Table 3 provides the descriptive statistics for all continuous outcome variables and covariates. All skewness and kurtosis values were within acceptable ranges. To examine differences in covariates and demographics between conditions, we conducted t-tests for continuous and chi-square analyses for categorical variables. Age, gender, race, education, income, LNT\_KAS scores, LNT\_Global scores, outdoor climbing experience, and preferred climbing type did not significantly differ between groups ( $ps = .15-.75$ ). Likelihood scores between groups also did not differ between age, gender, race, income, and education ( $ps = .15-.84$ ).

## Primary Analysis

The results indicated that participants in the peer-driven social pressure condition had significantly higher Likelihood ratings than those in neutral pressure condition with a large effect ( $F(1, 357) = 61.65, p < .001, p2 = .15$ ). Of the covariates, only LNT\_KAS was significantly associated with Likelihood (positive association) with a large effect ( $F(1, 357) = 95.40, p < .001, p2 = .21$ ). Climbing preference ( $F(1, 357) = 1.76, p = .19, p2 = .01$ ), outdoor experience ( $F(1, 357) = 1.40, p = .24, p2 < .01$ ), and LNT\_Global ( $F(1,357) = .82, p = .37, p2 < .01$ ) were not significantly associated with Likelihood.

## Discussion

Despite the publication and dissemination of climbing LNT guidelines, land managers continue to experience difficulties with LNT adherence in rock climbers, pointing to the need for better understanding of the factors leading to LNT adherence (Access Fund 2006; 2021; Leave No Trace, 2015; 2021). As such, the purpose of this between-subjects experiment was to examine the impact of peer-driven social pressure on LNT adherence in rock climbers. We hypothesized that, controlling for outdoor climbing experience, preferred climbing type, and LNT principles knowledge, individuals would rate themselves as more likely to adhere to climbing-specific LNT behaviors when climbing partners encouraged LNT behaviors (peer-driven social pressure condition), than when climbing partners were neutral about LNT behaviors (neutral pressure condition).

The results indicated that, controlling for outdoor climbing experience, preferred

climbing type, and LNT principles knowledge, participants in the peer-driven social pressure condition rated themselves as more likely to engage in climbing LNT behaviors than those in the neutral pressure condition. This finding is consistent with the literature on peer-driven social pressure, which indicates that peer-driven social pressure to enact a behavior increases the likelihood of that behavior (Cialdini and Goldstein 2004). Given these results, it is likely that capitalizing on the social nature of the climbing community to encourage our peers to take climbing-specific LNT behaviors will increase adherence to climbing-specific LNT behaviors.

Of all the covariates in our model, only knowledge of climbing-specific LNT was significantly associated with a greater likelihood to engage in climbing LNT behaviors. Strikingly, participants' perceived knowledge of general LNT principles was not significantly associated with a likelihood to engage in climbing LNT behaviors. These results indicate that, despite individuals being familiar with general LNT principles, they are unfamiliar with the specific applications of LNT principles to rock climbing. As such, it is likely that individuals are unaware of what is and is not a climbing-specific LNT behavior. Such findings point to the importance of educating community members about climbing-specific LNT behaviors so as to increase both individual and community adherence to the principles.

Notably, with all variables in the model, participants' preferred type of climbing and years of outdoor climbing experience were not significantly associated with a likelihood to engage in climbing LNT behaviors. The find-

ings here are initially surprising, when considering Schwartz and colleagues' findings that greater outdoor bouldering experience was associated with more positive attitudes about climbing LNT behaviors in boulderers (2019). The discrepancy in findings here may be a result of differences in measurement, in that our study only controlled for years of outdoor experience, whereas Schwartz and colleagues (2019) utilized a composite score examining both years of outdoor experience and bouldering ability. Additionally, it is possible that these trends, while present in boulderers, are absent when examining rock climbers in general. However, it is also likely that although greater experience is associated with positive attitudes toward LNT, it is neither

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**Given these results, it is likely that capitalizing on the social nature of the climbing community to encourage our peers to take climbing-specific LNT behaviors will increase adherence to climbing-specific LNT behaviors.**

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associated with greater knowledge nor likelihood of enacting climbing LNT behaviors. This conclusion is supported by post-hoc analyses indicating that, although years of outdoor experience knowledge was positively associated with greater perceived knowledge of general LNT principles ( $r = .19, p < .001$ ), neither were associated with actual knowledge of climbing-specific LNT behaviors ( $r = .00, p = .94; r = .00, p = .93$ , respectively). Taken together, the findings here indicate that although climbers with more years of outdoor experience tend to perceive themselves as having greater LNT knowledge, they do not have greater actual knowledge of climbing-specific LNT behaviors. These findings may be the result of shifting norms as LNT research is updated (e.g., the shift toward using wag bags from catholes), as well as lack of education on climbing-specific LNT behaviors.

## Limitations and Future Directions

Our study should be considered in the context of several limitations. First, our use of vignettes may have resulted in participants overestimating their likelihood to take the LNT behaviors because they thought that they should, rather than would, adhere to LNT. While the moderate mean (mean = 20.69, SD = 4.44) and wide range of scores (6 to 28) in our data likely control for the presence of such a ceiling effect, future research should aim to examine the effects of social pressure on LNT.


Additionally, our measures of likelihood were not formally evaluated for reliability and validity.

However, based on ratings by a team of research assistants, the measures possessed good face validity. In addition, each of the items was taken from, or slightly adapted from, established measures of those constructs. To address this limitation, future studies should more formally evaluate the reliability and validity of measures.

Finally, our sample predominantly consisted of white, college-educated, upper-middle-class, cisgender men and women. While this lack of diversity is similarly present in the current US climbing population, the lack of representation of minoritized identities is striking and worth addressing both in terms of research and community access to the sport. As such, future research and climbing organizations could build partnerships with affinity groups created by minoritized climbers, to better represent their voices and to increase access. Additionally, because our sample was a non-statistical convenience sample (due to the lack of a population census), our sample may not be an accurate representation of the climbing population. As such, it is possible that our findings do not generalize to the greater climbing population.

## Implications

As our results indicated, participants in the peer-driven social pressure condition rated themselves as more likely to engage in climbing-specific LNT behaviors than those in the neutral pressure condition. Given these results, it is likely that capitalizing on the social nature of the climbing community to encourage our peers to take climbing-specific LNT behaviors will increase LNT adherence, thus likely leading to less instances of rock climbers straying from designated trails, improperly disposing of waste and trash, and more instances of climbers utilizing minimal-impact climbing practices such as cleaning chalk, respecting wildlife, and choosing to avoid climbing in areas more susceptible to ecological harm. This data provides support for the promise of peer-to-peer engagement opportunities, mentorship, and on-the-ground encouragement or modeling, along with top-down approaches such as introducing climbing-specific signage in relevant areas or engaging in climbing stewardship programs to promote on-the-ground education and positive enforcement of LNT behaviors.

Additionally, the results indicated there is a gap in knowledge of what LNT is and how it can be applied to outdoor climbing. This provides opportunities for stakeholders such as climbers, land managers, climbing gyms, and local climbing organizations to collaborate on setting conventional, place-based norms and to promote educational efforts that specifically center climbing-related LNT practices in order to minimize potentially harmful and impactful behaviors. In sum, our results suggest that implementing aspects of social pressure to LNT messaging, outreach, and education, along with increasing climbing-specific LNT knowledge may promote better adherence to LNT by climbers, in particular those who engage in climbing outdoors in protected areas and in backcountry settings, and thus decreasing the negative ecological impacts the sport has on outdoor spaces. 

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Grand Canyon National Park. **Photo credit:** Jason Thompson on Unsplash.

# Virtual Reality and the Movement Toward New Conceptualizations of Wilderness

by KEELY FISHER

Virtual reality (VR) is a computer-simulated environment using graphics and specialty hardware that allows a person to control their point of view, creating a "completely immersive and realistic experience" (Meta Quest 2021). It is through this technology that people can access wilderness and natural spaces without ever having to physically enter those areas or, in many cases, even leave their homes. VR also allows us to perceive and experience wilderness without having to endure the dangers and physical challenges it presents. This technology creates a more physically, financially, and temporally accessible wilderness and opens remote spaces to those who without this technology would not be able to access these protected areas.

Despite these sharing capabilities and the semi-realness of experiences in VR, many push back against the idea that VR wilderness could be comparable to an experience in an all-natural setting. VR is an interesting contrast to wilderness precisely because of this argument: that VR wilderness is not real wilderness, no matter how real it feels.



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**VR's experience-sharing capabilities have changed and will continue to fundamentally change how people conceptualize wilderness, and how they choose to interact with both real wilderness and VR wilderness.**

But why is this? Characterizations of wilderness such as "grand" or "peaceful" can be matched by VR; the visualizations that this technology can create allow users to stand in grand environments, perceiving themselves as completely alone with the natural world. Technology has changed how people have interacted with wilderness in the past, and VR's experience-sharing capabilities may fundamentally change how people conceptualize wilderness and how they choose to interact with both real wilderness and VR wilderness.

To understand how the advent of VR is changing our conceptualizations of wilderness, this article addresses several questions:

- *What are the experiences of people entering into the natural world using VR?*
- *Are people satisfied with VR wilderness experiences?*
- *Does VR challenge or augment our previous conceptions of wilderness?*

VR wilderness allows for users to experience feelings often associated with real wilderness and grants access to notions of wildness, grandeur, and other ideals usually reserved for those who can physically, financially, and temporally make their way into real wilderness spaces. This capability of VR wilderness reiterates the societal need for preserving real wilderness spaces in perpetuity and connects us with deeper ideals about wilderness, culture, and, perhaps, ourselves.

## **Defining Wilderness**

The definition of wilderness is nebulous. It is shaped by time, culture, and many other things. Narrowly defining wilderness is unproductive because wilderness is an idea that reflects the ever-changing ideals of society. Roderick Nash's book, *Wilderness and the American Mind*, examined how Americans' perceptions of wilderness changed throughout the 19th and 20th centuries (Nash 2014). Nash discussed Ralph Waldo Emerson, John Muir, and Aldo Leopold, and introduces us to the relationships and disagreements between these thinkers. Bryan McDonald, who wrote *Considering the Nature of Wilderness: Reflections on Roderick Nash's "Wilderness and the American Mind"* in 2001, critically reviews Nash's book and the continued relevance and impact of his ideas (McDonald 2001). McDonald notes that something missing from Nash's discussion is a conversation about the negative effects of American conceptualizations of wilderness on Indigenous peoples (McDonald 2001, 193; Spence 1999). McDonald also notes that Nash does not completely explore more modern conceptions of wilderness (McDonald 2001, 197). Additionally, Catanzano (2020), critiques the fact that it was "written from a perspective that privileges well-off highly-educated city-dwelling white males and has a general disregard for religion's role in fostering wilderness appreciation."

Nash and his critics, however, are not the sole contributors to this conversation. Hawes and

Dixon (2020) argue for a definition of wilderness that focuses on recognizing wilderness's experiential and ecological values, as well as the value imbued in it by Indigenous people. They take their argument a step further by making remoteness a defining characteristic of wilderness (Hawes and Dixon 2020, 23). Their argument takes us to a past definition of wilderness that focuses on solitude and a distinct lack of people but augments it with the recognition that wilderness is not synonymous with "untouched" (Hawes and Dixon 2020, 29).

What appears to be the case throughout these works is that the definition of wilderness changes over time, but many have tried to root their understandings of wilderness in notions of solitude, physicality, grandeur, beauty, and a distinct lack of humanness. Despite the nebulousness of its definition, however, it is generally agreed that wilderness is outside. This is one of the ways that VR wilderness augments our understanding of wilderness: technology has evolved in such a way that a clarification of wilderness as a space that requires physicality and being outside is necessary. Real wilderness is not necessarily something that you can fully experience from your living room couch. It impacts your body and requires a commitment of time beyond just putting on and taking off a headset. However, VR gives people access to feelings associated with being in wilderness and can imbue its users with notions of beauty, grandeur, and awe that are deeply attached to experiences in real wilderness. This is part of how VR challenges our conceptualizations of wilderness: it allows anybody (that is, anybody who can afford the technology) to access wilderness spaces, albeit secondhand and virtual wilderness spaces, from their living room and experience feelings often associated with real wilderness.

## **Progressing Technologies and Wilderness**

VR is not the first time that wilderness has been challenged by a new technology. Consider, for example, the automobile. In *Windshield Wilderness: Cars, Roads, and Nature in Washington's National Parks*, Louter (2006) guides us through how automobiles changed national parks in Washington State. He discusses how conceptualizations of wilderness have changed from something that was scenic and roadless to something that necessitates the use of roads to allow people to access the scenery (Louter 2006). He argues that cars have been an integral part of how people experience national parks and how these experiences impact the degree to which national parks are considered wilderness by the public (Louter 2006). Similarly, Sutter's (2007) *Putting Wilderness in Context: The Interwar Origins of the Modern Wilderness Idea*, discusses how automobiles (in ways like VR) made wilderness more accessible and in some ways changed how people understood and conceptualized natural spaces. These two works introduce us to the ways that technology, specifically the automobile, can impact our understanding of wilderness; however, technology that allows us to access these spaces has since advanced and requires our attention.

Video games, for example, are an important first step into understanding how people are accessing secondhand wilderness using technology. They give us insight into how technology

can allow access to a wilderness experience that is unlike those from paintings or photographs. Specifically, Brooks (2021) points out that video games were one of the first secondhand experiences that allowed the user to be an active participant. Sheu (2019) argues that video games are simply a different way of experiencing nature. She focuses on how players of *The Strike*, a fishing video game, were able to use the game to experience nature in ways that were previously unavailable to them (either due to inaccessibility of natural spaces or a desire not to be outside) or to augment their participation in sport fishing (Sheu 2019, 802).

VR takes the virtual wilderness experience a step further by creating a fully immersive, multidimensional trip into a version of the natural world. These capabilities can connect people both to VR wilderness and, importantly, real wilderness. For example, Yeo and contributors (2020) suggest that VR was the best way of "delivering nature" to participants via technology. They discovered that participants were more likely to feel as if they were in each location if they were in simulated nature using a VR experience versus on a television or through 360 video (Yeo et al. 2020). VR was also the technology that increased people's connection to the natural world the most, meaning that after a VR experience, users were more likely to feel at one with nature (Yeo et al. 2020). Chan et al. (2021) also argue that a VR nature walk (in their case, a walk through the forest) can increase one's connection to the real natural world. White, one of the authors of the 2021 paper, notes in an interview that VR might "help encourage a deeper connection to nature in healthy populations, a mechanism which can foster more pro-environmental behaviors and prompt people to protect and preserve nature in the real world" (Kingsland 2020).

## **Experience and Emotions with VR**

Emotions associated with people's wilderness experiences are an important part of how we connect to the natural world. When someone thinks back to their experience on the rim of the Grand Canyon, or at the top of Pikes Peak, they will remember their encounters with wilderness as being tinged with feelings of awe, wonder, and inspiration at the grandeur of such spaces. These feelings may be inextricable from experiences with real wilderness. It is the ability to replicate these feelings that make VR important. This technology can and has been used to replicate wilderness experiences and, importantly, the feelings associated with those experiences by allowing people to be active participants in a more accessible, albeit virtual, wilderness space. These emotions are important because feelings such as awe and wonder, the feeling of being so small in such an important and grand place, can connect people with themselves, with their culture, with wilderness, and with the world.

Emotions resulting from their experiences in wilderness are an integral part of how people interact with the natural world. These feelings are not reserved for experiences in real wilderness. Users of VR wilderness have been found to experience feelings such as those felt in real wilderness. Harrison et al. (2015) examined risk perceptions in wilderness and found that people can and do perceive risk when in VR simulations. Stepanova (2021) also found that

those in VR wilderness can experience feelings of awe and connection and changes in their perspective.

VR wilderness, however, can do more than just elicit emotions. Several authors have discussed the healing possibilities of VR wilderness. Aubrey (2019) outlined how VR wilderness has been used to change how patients were perceiving pain and to lessen their overall pain levels. Carey (2019) further suggests that VR nature can not only make wilderness experiences more accessible, but that VR can be like real nature in its ability to heal. Browning et al. (2020) argue that VR wilderness scenes can benefit mental health, and Gordon (2020) discusses the reductions in anxiety, confusion, hostility, and depression that patients using VR wilderness can experience.

## **Older Adults and the Disabled Community**

The experiential and healing capabilities of VR create a virtual wilderness that appears to be like real wilderness in terms of its ability to generate a memorable experience. VR wilderness can grant people access to feelings and emotions that have typically been reserved for those who have been able to make their way into real wilderness spaces. Older adults and people with disabilities are two communities whose presence, experiences, thoughts, and attitudes are prevalent in conversations about how VR can be used to increase accessibility to wilderness spaces.

George Hetrick, an 87-year-old man, had dreamt about seeing the Grand Canyon ever since he was a kid (VR Scout 2021). Unfortunately, the COVID-19 pandemic, health issues, physical impairments, and his age prevented Hetrick from being able to see the canyon in real life (VR Scout 2021). VR, however, granted him access to a version of the Grand Canyon which not only "felt real" but was a memorable experience for him and his son (VR Scout 2021). When reflecting on his experience, Hetrick said, "I think that VR technology gives people from around the world shared experiences and hopefully a mutual appreciation of the beauty of the planet. As far as transporting people, it made it possible for me to visit the views and grandeur of the Grand Canyon. Given my physical limitations, this would not have been possible without a VR experience" (VR Scout 2021). Other people in the elderly community expressed similar sentiments. Tom Norris, a 70-year-old military retiree who experiences chronic pain, uses VR to experience activities such as swimming with dolphins or walking through the wilderness (Aubrey 2019). He said that these experiences not only make him feel like he is fully immersed in a natural space but also help him feel at peace and relaxed, which can mitigate his pain (Aubrey 2019). The feelings Norris associates with these secondhand experiences can remain for several days after his encounter with VR natural spaces (Aubrey 2019). VR wilderness allows older adult populations to go to wilderness areas and natural spaces that may be inaccessible for a variety of reasons and allows them to experience new places or activities that elicit feelings of awe and wonder like what one might experience in real wilderness.

For those in the disabled community, real wilderness can be inaccessible. Worries about entering natural spaces due to physical limitations are incredibly prevalent. Paul Martin commented on the fact that his crutches could cause him to fall on certain terrains, making these areas hazardous for him (Brooks 2021). Valerie Johnson must always remain aware of the weather and temperature in outdoor spaces, as these components of many nature-related experiences can trigger migraines, throw off her body's temperature, and be physically painful (Brooks 2021). VR, however, removes dangerous terrain, weather, and temperature (Brooks 2021). It allows for people such as Martin and Johnson to experience secondhand wilderness in a safe and controlled environment and grants them access to ideals and feelings about wilderness that are usually available only for people who can make their way into real wilderness spaces (Brooks 2021).

## A Tale of Two Hikes

The first time that I hiked over the Silver Bridge and then into Bright Angel Campground and Phantom Ranch at Grand Canyon National Park, I remember feeling my backpack weighing down on my shoulders and my hips and trying to match my companion's speed as they moved ahead, appearing incredibly confident as the bridge swayed back and forth over the



**Figure 1** - The view from the Silver Bridge

Colorado River. I remember a misstep as I tried to balance on the grates of the bridge and trying not to look down to the Colorado River rushing below my feet (Figure 1). And I remember listening to our nervous laughter as we crossed the halfway point of the bridge and sped toward solid ground. The next three times that I hiked over the Silver Bridge were much the same.

The fifth time that I hiked over the Silver Bridge, however, was distinctly different. My fifth time was using an Oculus headset in the basement of the Weitz Center for Creativity at Carleton College (Figure 2). The water below me was at a standstill, the Colorado River captured and stilled so that I could wander across the Silver Bridge from Northfield, Minnesota. If I wanted to, I could have quickly hopped down from the bridge and stood in the middle of the Colorado River. I was not

surrounded by the people I had grown close to on this trip, rather the humming of the pipes and chatting of the technology assistants were the sounds that accompanied me during my VR hike.

The view was similar. It was grand, gorgeous, and awe-inspiring. What was markedly different with the view during my VR hike of the Grand Canyon, however, was that everywhere I looked was Google's copyright symbol claiming these images.

As I continued to hike over the Silver Bridge and into the Bright Angel campground, Google heavily restricted my access. The VR headset told me where I could move, and whether or not I could physically enter a space. The spaces that were inaccessible had not been mapped by Google, and I was unable to visit them on the Google Earth VR app. For example, the campground where I had



**Figure 2** - The left side of the image is a screenshot of what I was seeing in VR. The right side is me in the Weitz Center for Creativity at Carleton College.

originally stayed the first night during the real hiking trip was unavailable to me during my VR experience.

Even though I could access places I had not dreamt of during my real foray into the Grand Canyon, it was impossible for me to get lost while using the VR headsets because Google had mapped out the exact paths I could take. The programmers determined exactly how I was going to see the plateaus and trails, including the type of weather, the time of day, and the angles I could see. During my time in the real Grand Canyon, getting lost would have been a bit easier. I was always conscious of where I was, how I had gotten there, and who was with me. In the virtual version of the Grand Canyon, I did not need to think about these things. I could jump from the Black Bridge to the Silver Bridge to Havasupai Garden and know that I would always be able to take off my headset and return to the Weitz Center for Creativity in Minnesota in much the same condition that I had been before the hike, with the addition of some headset goggle marks.

My feet hurt throughout the entirety of my hike in real wilderness, and even after I had left the real Grand Canyon, they remained a little sore and very calloused. In the virtual hike through the Grand Canyon, nothing hurt, especially not my feet. I was, however, slightly nauseous due to my ability to zoom in and out of scenes and to fly over the Grand Canyon like a bird.

The final place I traveled to during my VR hike was situated at the top of the Devil's Corkscrew. In real life, I had made sure to turn around and glance down to the trails, thinking that it might be my last chance to look into the very bottom of the Grand Canyon. I had thought about the California condor we had seen just an hour before and the chill of the creek that we had hiked through just before starting up the switchbacks. Then I had turned around and continued to Havasupai Garden with the rest of the group. VR gave me another chance to look out over the Devil's Corkscrew and many other places that I remember fondly. The VR hike through the Grand Canyon made me smile because it reminded me of all the memories and emotions I felt during my real hike through the Grand Canyon. VR gave me the chance not only to relive something that will impact me for the rest of my life but also to experience it in a new way and from a different point of view.


## **Conclusion**

Those who love real wilderness immediately hesitate when a VR experience is mentioned as a possible alternative to an experience in the natural world. They push back against the idea that VR wilderness could be comparable to an experience in a natural setting. This hesitation is understandable because what could be less engaging than sitting (or standing) inside, sliding on a pair of VR goggles, and selecting a random wilderness location to enter? Real wilderness requires preparation. The natural world requires some discomfort and for those engaging with it to be physically present, challenging their bodies and ensuring that they are actively in this space. VR cannot require its users to physically challenge themselves, nor can it exclude those who cannot financially or temporally access wilderness spaces.

Finding these differences might lead us to continue analyzing which elements of real wilderness are preserved in VR wilderness, investigating whether VR is a suitable substitute for its natural counterpart. Thinking about VR wilderness as a direct challenge to real wilderness, however, is not productive. Trying to figure out whether VR wilderness can ever be considered wilderness will only result in challenging discussions and will limit how we think we can connect with wilderness. A comparison, therefore, is not the best way to think about how VR impacts our conceptualizations of wilderness.

VR's experience-sharing capabilities have changed and will continue to fundamentally change how people conceptualize wilderness, and how they choose to interact with both real wilderness and VR wilderness. This technology allows for a more accessible wilderness and opens remote spaces to people who without this technology would not have been able to access these outdoor spaces. VR also, and perhaps more importantly, allows those entering virtual natural worlds to experience emotions that are deeply entwined with how people experience wilderness. An experience in wilderness, even VR wilderness, can fundamentally and positively change a person or impart lifelong memories that hold incredible value.

VR experiences have proven to be impactful. They arouse feelings of awe and joy and can inspire in people a connection to nature. At its core, VR wilderness shares wilderness and some of the cultural ideals that we associate with the natural world with a larger segment of the population. This is important. Wilderness experiences need not be reserved for the limited number of people that can physically, financially, and temporally access what tend to be remote, physically challenging, and potentially dangerous natural spaces. Although it will likely never be a perfect replica, VR wilderness allows for many people to experience a version of wilderness. These experiences can inspire more people to preserve wilderness spaces in perpetuity based on the connection that VR allows nearly anybody to have with our ideals about wilderness.

As more and more people continue to engage with virtual natural space, our conceptualizations of wilderness will allow for VR wilderness experiences to be considered just as valuable as real wilderness experiences, but not as a replacement. This technology allows for a larger segment of the population to reflect on what it means to be in the wilderness, why wilderness and the associated experiences are important, and why natural spaces must be preserved in perpetuity for future generations. 

## Acknowledgments

I would like to thank George Vrtis (Carleton College) for his encouragement and advice throughout this project. Thank you for showing me the power of wilderness and for allowing me to explore the limits of our current conceptualizations of wilderness. I appreciate the time that you put into the American Wilderness Seminar and will never forget our hike into the Grand Canyon.

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Amazon jungle. **Photo credit:** Ben Janis on Unsplash.

# Living Alongside the Yawanawá: Two Months in the Brazilian Amazon

by **GRACIE DUNLAP**

The Yawanawá people live in western Brazil, close to the Peruvian border. Once decimated in number through enslavement by rubber barons, and their culture badly fragmented by missionaries, the Yawanawá are now 1,300 people stewarding their homeland of 500,000 acres of tropical forest, 95% of which is intact. The Yawanawá culture revolves around their strong relationship with nature.

I have always considered myself close to nature, having grown up on a farm in Virginia. However, after a three-day journey from the small town of Rio Branco to the Yawanawá community within the state of Acre, Brazil, I was welcomed into a way of life so intertwined with the Amazon rain forest that community members consider the natural world a partner in everything they do.

The Yawanawá community hosted me for my internship that was facilitated by the WILD Foundation in the summer of 2022. For seven weeks I learned about how they maintain and protect their forest home. But perhaps even more importantly, I learned about their way of life and cultural values that foster a deep connection and respect for the forest. I was tasked with



**Gracie Dunlap**



**Figure 1** – The Yawanawá Community.

the editing and formatting of certain English proposals that aimed to bolster the livelihoods of the Yawanawá communities. These proposals and research projects enabled me to better understand the economic systems that the Yawanawá utilize. I was also shown several pilot projects being carried out within the communities that involved unique uses of their resources. It was exciting to see the communities' innovation of existing materials to create a product or service that would contribute to their economy and sustain their way of life.

During the past few decades, the Yawanawá have emphasized female autonomy and

empowerment. For example, in business, the Yawanawá women are all very skilled in jewelry creation. Their skill combined with a holistic perspective of their resources has resulted in their using acai seeds – a remnant of the fruit you and I might know to show up in smoothie bowls – in jewelry craftsmanship. The Yawanawá harvest the acai berry and extract the nutritious juice, but each acai berry contains a very small amount of fruit with a large seed, resulting in many leftover seeds after the acai berries are pulped. The women's innovation is a new craft, creating beautiful pieces of jewelry and handbags made from what is essentially a byproduct. The



**Figure 2** – Gracie Dunlap in the Yawanawá community.

Yawanawá recognized a unique opportunity to use the entirety of the acai fruit and create a sustainable and profitable product that is representative of their respect for their life source: nature.

Throughout my internship, I saw several completed projects and goals from the "Yawanawá Life Plan" as they were carried out in the communities. Projects included women's craftsmanship, the school construction, and the reintroduction of a transfer of traditional knowledge from elders to younger members of the community. The Yawanawá Life Plan, published in 2016, is a comprehensive history and proposal of economic activities and methods of cultural revival for the Yawanawá communities. Female empowerment, increased education, and governance

structure are just a few of the plan's main goals that stood out to me. The Life Plan has been a true asset to the communities because of its emphasis on cultural revitalization and governance structure. Not only is their current Leadership Council representative of the people, but the very creation of the Life Plan was a long, meticulous process. During its creation, several conferences were held to ensure that all members had a voice to advocate for the histories and policies they thought necessary for inclusion.

Halfway through my stay with the Yawanawá, I attended a community meeting where an "outside" organization came to discuss the biodiversity of the Yawanawá land and potential ways to measure how the communities conserve this biodiversity. Around 100 people

came to this meeting. Observing the conference, I noticed a dedication to allowing every leader from each community (14 total, with two leaders elected from each community, one woman and one man) to voice their opinions, questions, and concerns. Furthermore, young men and women

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**In spirituality, medicine, infrastructure, ancestral knowledge, and food resources, the forest is their life. Their necessary engagement with nature allows them to use resources efficiently and utilize an agroforestry system that does not interfere with their successful protection of biodiversity.**

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were asked to voice their thoughts as well. It was clear that the leaders of the Yawanawá communities value the younger generations' input, particularly in situations that concerned the care of their land and environment.

The longevity and strength of the Yawanawá people is reflected in the recent recovery and explosive expansion of their culture and commitment to traditional knowledge being transferred to the Yawanawá youth. I saw genuine love and appreciation of Yawanawá culture from all the younger members. Furthermore, they were also extremely patient and generous when sharing their culture with non-Yawanawá people such as myself or any of the visitors who stayed in the communities. Closing out my stay, I was lucky enough to be in the communities during the annual Yawanawá Festival, which was their first festival in two years due to the pandemic. Their strong unity, celebration of their culture, and connection to nature were a privilege to observe and participate in. The festival is also an opportunity for visitors to participate in Yawanawá culture, experience their worldview, and hopefully gain knowledge and perspective on the Yawanawá's close relationship to nature.



**Figure 3** – Gracie Dunlap and Chief Tashka Yawanawá.

From my perspective, the Yawanawá (and other Indigenous groups) have a unique and powerful approach to addressing climate change based on their close daily engagement with their land in every aspect of life. In spirituality, medicine, infrastructure, ancestral knowledge, and food resources, the forest is their life. Their necessary engagement with nature allows them to use resources efficiently and utilize an agroforestry system that does not interfere with their successful protection of biodiversity. The connection to their land, particularly from a spiritual perspective, fosters respect and a sense of guardianship over their wilderness – as the life source for their health, livelihood, and spirit.

In the future, I hope to see Yawanawá's lifeways and philosophy continue to grow and spread across the globe. They not only represent all Indigenous peoples but also stewardship of the Amazon, a vastly important ecosystem for the globe that needs more protection by people like the Yawanawá. I am extremely grateful for the hospitality of both Tashka and Laura Yawanawá and the community as a whole. Their generosity and openness allowed me to see the inner workings of a community with a deep understanding of nature and how they preserve it. I look forward to following the Yawanawás' future projects and the spread of their influence in matters of environmental stewardship and climate change action. 

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Photo Credit: Mohamed Hassan from Pixabay .

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WILDERNESS DIGEST

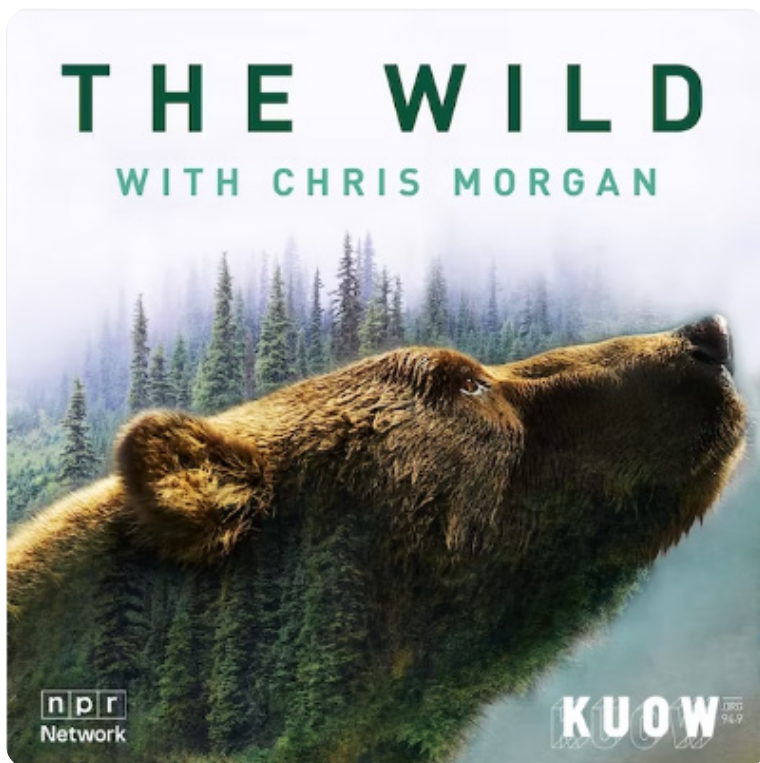
# Digital Reviews:

**Patrick Kelly, Media And Book Review Editor**

## THE WILD PODCAST

Hosted by Chris Morgan. Available on Apple Podcasts and Spotify.

<https://www.kuow.org/podcasts/thewild>



The world of podcasting has exploded in the last 15 years, and today there are shows on nearly any topic imaginable. Podcasts are convenient, often free, and offer a great way to learn more about something of interest to listeners. Fortunately, this powerful and relatively new medium is being utilized more and more within the wilderness and conservation community. Continuing a review of some of the more solid options available, this issue of *IJW* looks at *The Wild*, a podcast hosted by Chris Morgan and produced by Seattle-based National Public Radio affiliate KUOW.

*The Wild* bills itself as an exploration of how "nature survives and thrives alongside (and often despite) humans." This exploration aims at educating listeners about "wildlife and the complex web of ecosystems they inhabit," while along the way telling stories of "people working in and protecting the wild around us." In addition to a heavy focus on wildlife, the show also serves up a refreshing and often eclectic mix of topics. Though often centered on the Pacific Northwest region of the United States, *The Wild* also offers listeners the chance to learn about wildlife and conservation in far-flung corners of the globe. From Morgan's own backyard forest in northern Washington State, to Siberia and the Norwegian Arctic, *The Wild* gives listeners a wide array of interesting topics and adventures to choose from. Part classic PBS nature show, and part National Geographic expedition, *The Wild* has something for all nature lovers.

Host Chris Morgan is an ecologist whose past research focused primarily on bears and other large carnivores. In addition to his experience as a wildlife researcher, Morgan also spent time as a wilderness guide, making for content that is both exciting and informative. Combined with Morgan's mastery of science communication, as well as the skill of the show's producers, *The Wild* is a high-quality offering in the world of nature and science education podcasts.

Stand-out episodes include a search for the "quietest place on Earth." Accompanied by Gordon Hempton, a "sound tracker" and advocate for quiet places, Morgan walks into a rain forest on the Olympic Peninsula of Washington State until he reaches a place of perfect natural silence. As he absorbs the quiet around him, Morgan's reaction is unexpectedly moving and quite profound. Equally profound, though perhaps for different reasons, is a fascinating episode following scientists who study feces to better understand and protect wildlife.

Compared to many of the podcasts previously reviewed here, *The Wild* is less straightforwardly focused on activism and advocacy, making it more "mainstream" and thus slightly more neutral when it comes to engaging with the political side of conservation. This need not count against the show as a whole, and Morgan's passion, contagious enthusiasm, as well as his clear personal devotion to the natural world function as a very powerful form of advocacy. I encourage you to put on an episode of this excellent podcast and find out for yourself. 

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# International Journal of Wilderness

**December 2022** Volume 28, Number 3



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