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National park Bayerischer Wald, Alemanha. Photo by Gustavo Leighton on Unsplash

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IJW Editor-in-Chief Emeritus

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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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EDITORIAL PERSPECTIVES

Generation X, Millennials, Gen Z, or Alpha . . . We Just Need Gen Wild

by Robert Dvorak

Robert Dvorak

Welcome to the 32nd year of the International Journal of Wilderness.

Our lexicon includes many iterations of the phrase "generational": generational wealth, generational talent, once in a generation. But it might be true that generational is most used in the classification of human cohorts: the Baby Boomers, Generation X, Millennials, Gen Z, and Alpha. The concept invites comparison between generations. Sometimes this is driven by shifting social and cultural norms. Other times by significant technological advancements. As a member of Gen X, we are the cynical, self-reliant "middle child" that has grown up with the emergence of cellphones, the internet, and "arguably" the best music.

Recent experiences and interactions with university students have led me to reflect on the classification of generations and their impact on wilderness conservation and protection. In recent conversations, we have acknowledged the "next generation" and the responsibility they will have to shape significant global impacts. We have also discussed the immense contributions to wilderness and protected area conservation across recent generations. Specifically, in the context of the International Journal of Wilderness, the efforts and enthusiasm over the past 32 years of Dr. John Hendee, Dr. Chad Dawson, Dr. Alan Watson, Vance Martin, and so many others have created an opportunity for professionals to engage in conservation. I am one who has benefited from their leadership, mentorship, and generosity. Together, they have created an outlet for us to share our voice, passion, and knowledge

across a global community. And with that comes an inherent responsibility to provide for the "next generation" of young people tasked with preserving and protecting wild places.

But what if we could ignore the linear progression of generations and develop a generation that intrinsically prioritizes nature? A generation in which the value of wilderness protection and nature conservation became normative and expected. A "wild" generation. We have long sought to develop environmental values and grow environmental education. And whereas progress has been made to instill the importance of protecting nature, restoring ecosystems, and rewilding the planet, greater goals still exist. To meet these goals, it will require the combined efforts of all of us to address the current and future challenges of global climate destabilization, species loss, habitat degradation, and technological intrusion.

Thus, we typically strive to provide the next generation with the opportunity to be the one that is most equipped to address upcoming challenges. However, this does not need to be a task reserved for the next generation. Instead, we have an opportunity across all current generations to "opt in" for wilderness—to add passion, experience, and knowledge to a movement that is needed now more than ever. An opportunity where we should all be part of Gen "Wild."

In this issue of IJW, William Funk suggests new ways of seeing in Bryce Canyon. Richard Discenza and others discuss risks from global climate change and consolidated ski resorts. Will Rice and others examine measuring and mapping confinement in wilderness. Camille Royer and Lydie Doisy consider the social representations of nature in free evolution. And Tina Tin and others show the subjective perspectives of the Antarctic Wilderness. IJW

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Photo credit: Bryce Canyon National Park. Photo by Jota Lao on Unsplash

Bryce Canyon and New Ways of Seeing

BY WILLIAM H. FUNK

William H. Funk

In 1992, during the tentative summer between college and grad school, I served as a US National Park Service interpretive ranger at Bryce Canyon National Park, a surreal landscape in southwest Utah renowned the world around for its vertical "hoodoo" rock formations—thick and jagged vertical turrets of bright red and purple limestone reaching 80 million years into the staring desert sky. I'd applied to work at nearby Arches National Park in order to follow the parched path of my writerly exemplar, Edward Abbey, whose subjective assessment of desert life is painstakingly told in his pivotal book, Desert Solitaire.

Hikes through the canyon trails brought visitors into direct contact with these freestanding rock formations, with some dangerously violating the law by trying to climb the hoodoos; illegally bouldering these fragile towers can break off the ragged, jutting spires of stone that evolved over agonized eras of rain and drought, thawing and freezing, crumbling and tumbling them to the canyons below. Despite the constant warnings of rangers to obey safety restrictions, dozens of determined thrill seekers during my tenure apparently assumed their prowess could conquer geology. Alas, irregular but steady ambulance traffic to the principal lookout points proved otherwise.

Figure 1 - Bryce Canyon National Park represents the world's largest concentration of hoodoos—tall, colorful rock spires created by millions of years of erosion. Photo by Jen Milius on Unsplash.

But Bryce Canyon's visitors were mainly curious, cautious onlookers amid a supernatural landscape they'd come to enjoy and perhaps even learn from. The onsite research I'd done to prepare the daily lectures, slideshows, and hikes I was hired to perform was generally received with authentic interest and attentive questions.

Yet something within seemed to dissuade my audiences from believing that a place this beautifully bizarre and isolated really existed and was actually, tangibly available for the enlightenment of the entire world. I recall a palpable sense of awe each evening after a late tour, as the bloody sun soured and sank behind the westernmost ridges and the day's heat was drawn from the dust up into the illimitable eternity of starry night. Couples would silently hug each other, rowdy kids quickly became still and huddled close to their parents, and elderly visitors held one another securely, quietly surveying the black sparkly sky for whatever might lie ahead. It was silently acknowledged by one and all that we were in the presence of something hallowed, eternal, a hushed cemetery of the past, all rock and dust and dying light.

Most park rangers I met there were in it for the almost unfathomable opportunity to earn a living wage in one of the country's most beautiful and important landscapes, but that's not to say we didn't occasionally grow weary of the daily routine (we referred to the Rim Walk—the park's shortest, dullest, and most bus-accessible guided tour—as the "Grim Walk," the province of newbies like myself). Then there were the interminable identical questions, the rude few whose noisome chatter ruined it for everyone, and the necessity of policing a park's wildlife and natural features against those blithe mentalities that would likely have been equally entertained at Disneyland.

"This is the lasting gift of America's national parks–you take them with you when you leave, and you keep them in your heart forever."

Figure 2 -Thor's Hammer formation in Bryce Canyon National Park. Photo by Mike Newbry on Unsplash.

So occasionally, we'd pull a prank or two. Purely to escape the stress, of course.

My most successful escapade, judging from the audience's reaction, was on a hike along a wooded ridgeline that rose high above the red rock desert, a relatively cool and breezy sojourn perfumed by evergreens. About 30 minutes before the tour, I'd poured half a bag of Nestlé Raisinets in a pile a few feet off the trail. Later, leading a group of a dozen or so visitors down the same footpath, I called their attention to the mound of little brownish pellets half hidden in the brush. I stopped and stared with furrowed brow at the pile for a minute, then hunkered down next to it and asked if anyone knew what it was. Embarrassed silence and shuffling boots were the only responses until I remarked on our incredible luck in stumbling upon a pile of fresh pronghorn antelope dung, as these graceful mammals were not usually found at higher elevations. Among growing murmurs of unease, I carefully poked a stick into the pellets, spread them around a little, then picked up a handful, examined them thoughtfully, took a deep whiff, and emptied them into my mouth.

Shouts of disbelief and disgust rang out as I rolled the candied raisins around with my tongue. I then informed my audience, with all the scientific modesty I could summon, that a pregnant female antelope of about five feet in length recently deposited these mortal residues here, that she weighed around 110 pounds, and given the temperature and consistency of her stool, that she was still likely in the general vicinity.

A stunned speechlessness was the response, followed by some muttered imprecations about the standards for hiring federal workers. Some of the less sanguine actually turned around to retreat back to our bus, tugging their protesting children behind them. But one guy, an impish Australian about my age who had witnessed my satire with a knowing grin, demanded that I let him inspect my breath. Already on the last legs of maintaining this charade with a straight face, I

smiled a chocolate-stained apology at my tourist friends and admitted to the farce. The enervating tension of being on an isolated desert ridge with a dung-eating uniformed federal officer instantly evaporated, and I made sure that every kid in the group received their fair share of the leftover candy.

Other experiences made that a season to remember. There was the stroke patient whom I gaspingly helped carry all the way up the ridge to a waiting medical helicopter practically invisible in its raging dust; young and healthy as I was, I thought I might have a heart attack myself. There was the little girl from Kentucky who asked me why we couldn't hear any wolves howling at night and wouldn't stop crying when I explained that they'd all been exterminated long ago. There was an ornery hermit who camped way back in the outback for weeks at a time, contrary to official regulations, and who returned looking like a wizened Moses fresh off Sinai. Then there were romantic nighttime liaisons among the oblivious hoodoos, a thumping cowboy bar down the road, and occasional invitations to cocktails or a meal when I checked on campgrounds at night. There were lectures to organize, emergencies to prepare for, and my tiny log cabin amid a grove of ponderosa pines that, after a rainfall, would smell just like fresh steaming butterscotch.

And then there was that single sego lily, white with a yellow smile, alone and unafraid, that grew directly in the middle of the dirt road leading from the rangers' cabins to park headquarters. It was the most beautiful flower I can still recall. In my last week at the park, I noticed that someone had carefully erected a protective rampart of small stones around it, just low enough for a truck to pass above.

In my experience at Bryce Canyon National Park, as with any wholehearted commitment to a place, was life-altering, a reaffirmation of natural allegiances I'd already felt but was now ready to act upon. In a few days, I would be exchanging the limitless desert vistas and holy hoodoos of Utah for the close cloistered hills of New England, but I knew that Bryce would be part of me forever, a spare and silent refuge for the mind and soul that I could draw upon in times of need.

This is the lasting gift of America's national parks—you take them with you when you leave, and you keep them in your heart forever. All they ask is to be allowed to continue giving their precious freedoms to future generations, century after century, before we all inescapably become stacks of dust. Like horizontal hoodoos. ijw

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Photo credit: Image by chipset85 from Pixabay.

STEWARDSHIP

Wilderness Risks from Global Climate Change and Consolidated Ski Enterprises

BY RICHARD DISCENZA, ROBERT DVORAK, and HOWARD L. SMITH

Abstract

Diminishing snowfall associated with climate change threatens winter sports, local communities, and snow-related enterprises. In response, small- and mid-sized ski areas have been consolidating, which may offer a meaningful strategy to attain sustainability. Consolidated ski enterprises (CSEs) are analyzed in view of their growing prevalence in the ski industry and impact on federally designated wilderness. The environmentally protective qualities of ski areas as wilderness buffers are diminishing as they evolve into resorts that intensify land use and create ever-higher visitation. Global climate change exacerbates this problem. There is a tangible risk that as ski areas transform into CSEs, wilderness will diminish and its essence as a refuge will be compromised. Several lines of research are considered, which could provide evidence useful both for setting policy and enhancing forest management practices.

Richard Discenza

Robert Dvorak

Howard L. Smith

Skiing in North America flourished during the 1960s and 1970s due to postwar economic growth nurturing a surge in resort construction (Weintraub 2025). Lately, this trend has reversed, with 65% of ski areas in the United States and 31% in Canada having closed (Moscovici 2022). Many factors are associated with the growth and subsequent demise of ski resorts, including the state of the economy, environmental and legal regulations, transportation infrastructure, insurance expenses, financing issues, and social trends, among others (Beaudin and Huang 2014). However, climate change is the leading factor contributing to ski area closures and the decline of winter sports (Walker 2022).

Climate Central, an independent nonprofit group made up of scientists, journalists, and advocates, indicates that of 2,041 global measuring locations, 64% (n=1,306) now receive less snow than in the early 1970s, although 31% (n=371) have seen higher snowfall totals (Climate Matters 2024). Dwindling snow, variable accumulation patterns, and shorter seasons ultimately threaten winter sports as along with their recreational and socioeconomic dimensions. Even the best resort settings situated at high elevations or those favorably located in historically productive storm tracks are susceptible to climate change (Wobus et al. 2017).

Wilderness areas near ski resorts experience the same climatic influences on wildlife, biodiversity, forest health, habitat loss, and water resources. However, the climate's impact on ski areas has repercussions on wilderness health that may not be immediately apparent. As ski resorts adjust to shorter snow seasons, many are gravitating toward four-season resort models that can adversely influence wilderness. Less snow translates into more intense development of ski areas as year-round recreation parks. This trend presents a direct threat to wilderness as wilderness character can gradually bleed out due to pressures for development, increased visitation, unanticipated pollution spillovers, and other effects (Smith 2007).

Ski areas are abundant across federal Forest Service lands. There are 122 ski areas across National Forest System lands that represent 60% of the capacity of all downhill skiing in the United States. However, estimates of ski-area proximity to designated wilderness are imprecise at best. When investigating numerous databases using artificial intelligence, about 80% (± 10%) of public lift-served US ski areas reside within 50 miles of designated wilderness areas (ChatGPT.com September 14, 2025). An even higher estimate—90% (± 5%)—applies to private ski areas located within 50 miles of federal wilderness. These include examples such as the Jackson Hole Mountain and Snow King Mountain resorts in proximity to the Bridger, Gros Ventre, and Teton Wilderness Areas in Wyoming, and the Aspen, Colorado, ski areas in proximity to the Maroon Bells-Snowmass Wilderness area of the White River National Forest. In short, most wilderness areas are located quite close to ski resorts, which increases the probability of incursions from higher visitation, development compromising wilderness resources (e.g., water, noise/quiet, visual integrity, wildlife habitation and migration, fire risks, air pollution, etc.), and pressure for expansion toward wilderness boundaries.

This article explores possible long-term effects resulting from consolidating small- and mid-sized ski areas as a strategy to sustain snow sports, the local economy, and mountain communities. It also considers the potential impact on nearby wilderness areas. Few insightful studies have focused on small- and mid-sized ski areas compared to extensive research on larger resorts

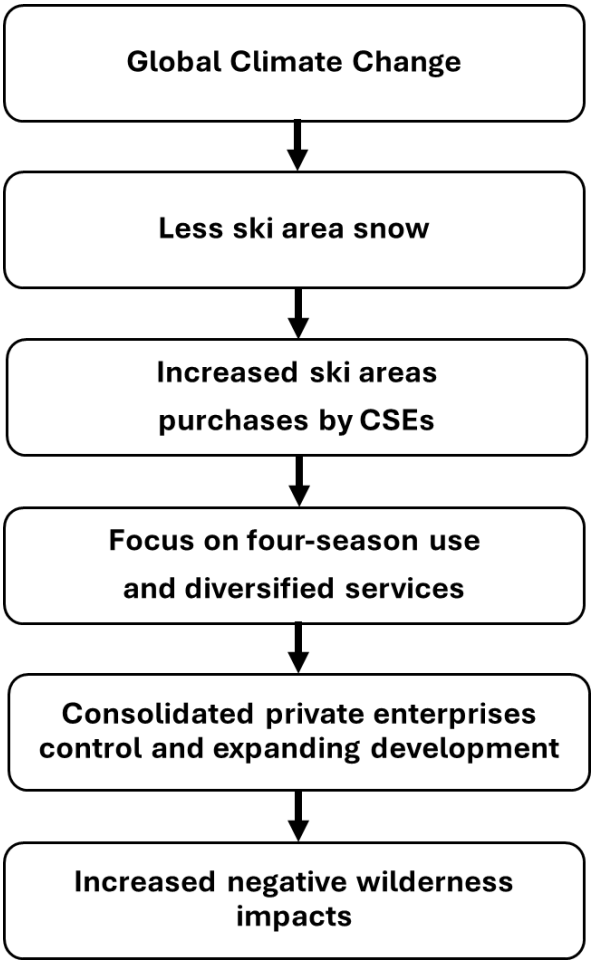
Figure 1 - Image by Danor Aharon from Pixabay.

within the ski industry (Cholakova and Dogramadjieva 2023; Moscovici 2022). Opportunities to systematically investigate the merits of consolidating small- and medium-sized ski resorts and their implications for wilderness are proposed.

Conceptual Framework

An important starting point is to examine the impact of climate change on the growth of consolidated ski enterprises (CSEs), their prevalence in the ski industry, and their ability to maintain sustainability despite seemingly uncontrollable environmental forces. Conceptually, the interactions can be portrayed as follows:

Climate change produces warmer temperatures, resulting in less snow for ski areas, especially small- and mid-sized resorts. As climate change persists, community ski areas increasingly experience years with reduced operations and, in some cases, complete



closures during particularly bad seasons. Unable to operate and generate revenue to cover fixed and variable costs, owners consider selling. CSEs offer an option for owners to sell property, albeit at a discount price, because the lack of snow is generally well documented.

Many CSEs have valuable snowmaking assets and experience and are ready to integrate a four-season approach to diversify revenue streams. Gradually, with each ski-area purchase, the CSE acquires enough properties to exert influence over both leased and owned land and to wield—whether intentionally or not—influence over mountain communities (e.g., inflationary prices, overcrowding, and loss of local identity and charm). As a resort expands, so too do the pressures upon nearby wilderness (e.g., development, higher visitation, plus environmental and wildlife impact).

As ski areas respond to climate changes, consolidation is rising. Historically this trend has created very large corporate entities such as Vail Resorts and Alterra controlling 53 ski areas, or about 14% of all ski areas (Winchester 2025). Winchester's (2025) analysis also shows that 24 CSEs own or operate a total of 140 ski areas in the US. These enterprises are facilitated by multiresort pass systems, such as the Epic Pass and Ikon Pass. In comparison, small- and mid-sized ski areas are particularly vulnerable to climate change, especially those at lower elevations with fewer resources, less experience, and diminished capacity to adapt. A general rule of thumb suggests that ski resorts need 100 days of operation to achieve an economic balance where revenues meet expenses (Konkel 2012). This may not be a problem for large resorts that typically operate 150 to 180 days by virtue of careful snow grooming, consistent snowmaking, and favorable locations at higher elevations. However, as Scott, Steiger, Rutty, and Pons (2020) point out, small- and mid-sized ski areas often lack these resources and advantages.

Consolidated Ski Enterprises

Ski resorts are frequently bundled under a corporate umbrella to capitalize on economies of scale and to address problems caused by reduced snowfall (e.g., shorter seasons or an inability to diversify services). Consolidation is compelling for several reasons. It allows a set of resorts to share snowmaking equipment and expertise, staff resources, and essential operating assets. Without the assistance of a CSE's experience, skills, capital muscle, and resources, marginal properties face pressures to close their slopes.

Snowmaking is usually prescribed to save ski resorts struggling with limited snowfall. However, this intervention requires caution, as artificial snow is not a perfect solution. Snowmaking is complex and generally appropriate only under favorable circumstances. With the right combination of elevation, temperature, humidity, water availability, and energy affordability, snowmaking can be a promising strategy. Even so, many ski resorts may not be able to secure these conditions and resources. Table 1 further highlights the limitations of snowmaking as an adaptive strategy

Snowmaking can produce additional ecological concerns and negative impacts. Wang (2017) discusses how snowmaking can affect soils and microorganisms by increasing soil pH levels. Runoffs from artificial snow can also include chemical additives used in ice crystal formation that persist in the ecosystem. Snowmaking also required pumping and redirection of water resources from streams, rivers, aquifers, and reservoirs that can have negative impacts on plants and animals across wilderness ecosystems, especially those

Constraint	Explanation
Economic affordability	Equipment investments and operating expenses raise ticket prices, which reduces demand
Sustainable water supply	Water must be acquired from ponds, wells, reservoirs, rivers/streams, which are also challenged in drought conditions
Infrastructure	Investments in equipment, water storage (tanks and ponds) and distribution piping must be operated by staff as well as maintained, which raises operating expenses
Regulatory limits	Downstream users and applications such as agricultural, environmental (e.g., to maintain endangered species) and municipal entities may have prior water rights
Enabling temperature	Snowmaking requires specific humidity and temperature targets that may not materialize in warmer winter temperatures

Sources: Christy (2015); Sussman (2020); Wobus et al. (2017).

Table 1 - Constraints limiting snowmaking efficacy

already negatively impacted by climate change.

CSEs can capitalize on mutual resources to address the needs of allied resorts by sharing equipment (snowcat machines, snowmaking machines, lifts), qualified staff to run operations, and experienced management to oversee operations. CSEs can also improve the ability to: operate for only a limited time period (e.g., a single weekend or a couple of weeks after good snowfall); share management and staff personnel and transport them to ski areas as conditions dictate; cultivate a target market seeking a good skiing experience at low cost without intensive investments typical to elite resorts; and to focus on operations rather than lodging—a substantial revenue source at the large ski areas.

CSE Example–Mountain Capital Partners

Mountain Capital Partners (MCP) is a representative example of an evolving consolidated ski enterprise. A privately held firm, it is a "ski area management company" that has operated resorts since 2000 (MCP 2025). Per its website, MCP owns 15 ski destinations worldwide, serves 2 million guests annually, consists of more than 3,000 team members, and promotes that "Kids 12 & under ski free." MCP also operates 12 other sports-related entities, including golf courses and bike parks that are not focused on skiing. Midway through 2025, MCP announced its intention to acquire two more ski areas in Chile, where it already owns La Parva and Valle Nevado (Winchester 2025)

James Coleman, managing partner and CEO has stated: "We are definitely a skiing-first company—not real estate-first" (Kelly 2023). Based on the ski resorts MCP has acquired, this statement could be questioned. Approximately 50% of the small- to mid-sized ski resorts that MCP owns appear to be at high risk due to low-snow years or insufficient snow accumulations. Regardless of how much capital is invested in these ski areas (e.g., in snow machines and snow-producing assets), without snow, the viability of skiing operations remains challenging. Snowmaking is not guaranteed, even with below-freezing temperatures. There must be an adequate water supply and the correct combination of humidity and temperature to produce artificial snow. Running snowmaking machines is an expensive proposition given their energy consumption. Over time, as a resort's poor snow base becomes evident, the ability to build a brand and reputation for quality skiing can be compromised.

Figure 2 - Vail, Colorado, USA. Image by VladoZg from Pixabay.

Coleman also expressed: "To me, elevation is more important than whether you're in the desert," he said. "All our resorts are at least 8,000 feet or higher. I'm not overly concerned with it" (Slothower 2015). Sandia Peak Ski Area in New Mexico, an MCP property, has a base elevation of 8,678 feet and a summit elevation of 10,378 feet. Nonetheless, in recent years, Sandia Peak routinely had insufficient snow to operate. Sandia Peak also lacks the water necessary to make snow due to its small water reservoir. However, the Peak's valuable property is heavily forested and offers magnificent views, making it an ideal candidate for a resort community of condos and custom homes while also offering diversified recreation options for property owners and tourists.

Thus a more convincing rationale for MCP's strategy emerges. Acquiring resort-quality ski areas at a discount due to climate impact can be a wise investment from a real estate perspective.

Figure 3 - Telluride, Colorado, USA. Image by Jeff Chabot from Pixabay.

If low-to-marginal snow conditions continue long term, several MCP properties could eventually cease their ski operations. In this scenario, the cost of sustaining the resorts for snow-related recreation would become untenable, and the firm would have to consider other uses to derive revenue for covering capital expenses.

An alternative would be to expand sports and entertainment activities throughout the year to generate the desired income. Rather than concentrating on winter sports–related revenues, snow-deficient resorts might diversify their off-season recreational and entertainment offerings. Table 2 provides examples of diversifying off-season activities to enhance revenue and meet capital costs of acquired property. This activity-based approach could have limitations, as summer recreation income for ski resorts typically represents only a small percentage of total annual revenues—around 12% (Borodaeff 2025). It is also important to keep in mind that climate change can adversely impact summer activities as well (e.g., severe storms that hamper events) (Probstl-Hoider, Mostegl, and Damm 2021). A transformation to such an activity-based approach would undoubtedly require Forest Service approval for development on federal public lands originally developed for ski development.

As illustrated by Powder Mountain in Utah, the capital asset value of ski resort properties should not be underestimated. Netflix cofounder billionaire Reed Hastings acquired North America's largest ski resort because "he loved the place" (Raymond 2023). It was originally planned for the development of 500 homes in a village at 9,000 feet (2.74 km). At Powder Haven's Overlook development, 57 lots were sold for between $560,000 and $2.16 million each, generating both initial home fees and subsequent annual fees (Jag 2023). Powder Mountain's build-out plan envisions 650 homes (Jag 2025). In effect, 650 home sites at $2 million each would generate $1.3 billion in capital plus the annual homeowners' fees ranging from $30,000 to $100,000 per

Scenic chairlift and gondola rides	Cowboy/rodeo dinners
Educational programs and skills classes	Dining
• Arts	Musical entertainment & concerts
• Cooking	Hiking
• Wine-tasting	Trampolines
• Culinary experiences	Horseback riding
Events	Go-karts
• Weddings	Alpine slides/coasters
• Festivals	Tubing
• Business meetings/retreats	Water sports & rafting
• Races and contests	Fishing (ponds and rivers)
Mountain biking	Golf & disc golf
• Lift served	Zip lines
• Cross-country	Playgrounds
Climbing	Rope Courses
• Walls	Bungee jumping
• Guided trips	Camping
Canopy walks	

Sources: Saminfo.com (2025); S. Borodaeff, (2025).

Table 2 - Diversified off-ski-season activities to enhance revenue flow

site annually—potentially totaling $19.5 to $65 million per year at full build-out (Pitts 2024). These are estimates only (and susceptible to change without notice) given available predictions and publicly disseminated information.

Outlook for Ski Resorts and CSEs

A variety of business strategies can enable ski- and snow-focused enterprises to succeed in their turbulent environment. Few, if any, ski enterprises can succeed by standing still in terms of strategy (Hetzenauer, Pikkemaat & Albinsson 2022). Without four-season expansion, ski resorts could easily fall short of meeting market needs and expectations. In this context, consolidation looks very attractive. However, consolidation has several facets, one of which is primarily related to real estate and private ownership.

MCP and other CSEs are corralling impressively valuable properties, which could affect public access and create adverse externalities for des-

ignated wilderness areas. Perhaps inadvertently, CSEs create an opportunity to control how these owned and leased assets are managed. Consider a hypothetical situation where Sandia Peak Ski Area in New Mexico (or any of the other myriad MCP properties) has no snow for one or more years. Sandia Peak does not have enough water to produce snow. MCP might decide that, given the lack of snow and greatly shortened winter seasons, it needs to invest in expanding summer recreation at Sandia Peak rather than focusing on winter sports. How quickly could MCP shift plans to develop the owned and leased property? Will these development plans mesh with public access and interest? Will government regulators protect these fragile mountains from development? Will a diversity of values and multiple use still be considered across adjacent and proximate public federal lands?

Alternatively, CSEs might choose a path of innovation that redefines mountain recreation. They could diversify the sports and recreation activities shown in Table 2. For example, MCP's Power Pass—an annual pass purchased to gain access to ski runs—might not only provide ski access, but also access to year-round activities to encourage cross-sports experiences (e.g., golf, yoga, biking, water sports, motorized use, and other recreational initiatives) at its properties. MCP could also redefine public access fees to allow use by a controlled or limited number of public subscribers without property ownership. Thinking imaginatively could positively address climate-driven change for ski resorts, creating opportunities and solutions rather than problems.

What Are the Implications for Wilderness?

Global climate change will ultimately modify many dimensions of environmental and human recreation activities. Already destabilized weather trends and temperatures have created a cautionary forecast for winter sports (Malott 2025). Ski resorts are working to maintain operations using artificially made snow, giant thermal blankets to retain snow (Ruggeri 2023), re-engineered expert grooming to strengthen base layers, and other similar innovations. All indications suggest that ski resorts are becoming unable to successfully mitigate climate change indefinitely.

Although CSEs might be good for winter sports and mountain communities, a much less optimistic outlook surfaces for designated wilderness. The very strategies that might ensure sustainability for ski resorts will inevitably affect wilderness areas— conceivably in a negative way (Smith 2007). Consequently, as CSEs evolve and thereby expose designated wilderness to potential impacts, several lines of research could provide evidence that would be useful in setting policy as well as in enhancing forest management practices.

Environmental Impacts from CSEs

What are the primary environmental impacts of the growth of CSEs? Studies are needed to fully assess the positive and negative effects of CSEs on wilderness, given their proximity. We have suggested that various forms of pollution—water, air, noise/quiet, visual integrity, degradation of wildlife habitation and migration, fire risks—can occur. Future studies could systematically document both the negative and the positive impacts of ski resort proximity to designated wilderness

"The environmentally protective qualities of ski areas are diminishing as they evolve into resorts that intensify land use and create ever-higher visitation. Climate change has exacerbated this problem by providing an incentive for them to consolidate. There is a tangible risk that as ski areas transform into CSEs, wilderness will diminish, and its essence as a refuge will be compromised."

and other federal public lands. Existing databases and information sources might serve as a foundation for documenting and quantifying the CSE environmental impacts.

Research could also identify the governmental and regulatory entities best positioned with the missions and resources necessary for meaningful collaboration, mitigating negative impacts, and capitalizing on positive benefits from CSE involvement. The challenge is to help CSEs embrace a culture of wilderness responsibility and environmental sustainability that may not be consistent with the values or mind-sets of their private owners. But adopting such a culture would help both CSEs and public agencies focus on positively highlighting that wilderness proximity can benefit CSEs—and vice versa.

Novel Solutions and Best Practices for CSEs

Wilderness is a rare and therefore valuable resource, where use can exceed supply, and controls are needed to prevent overuse (Bowker, Cordell, and Poudyal 2014). Laitos and Gamble (2008) underscore that wilderness degradation occurs because of open access, tensions associated with differing intentions about use (e.g., preservation versus recreation), inability to increase supply, and inability to influence those who abuse wilderness through overuse.

Many problems are often accompanied by opportunities, and in the case of remediating CSE impacts on wilderness use, greatly expanding studies that explore novel solutions may yield fruitful results. For example, Laitos and Gamble (2008) propose establishing individual transferable permits that would enable market forces to operate (Maechler and Boisvert 2024), thereby making overuse more expensive (i.e., as use soars, the market cost for permits increases correspondingly). This suggestion reflects the idea of "heritage vouchers" (Smith, Discenza, and Dvorak 2021), where every citizen receives one transferable use permit for each park, national forest, and associated natural area. A downside of these imaginative strategies is that they allow CSEs to avoid responsibility and externality costs, which governmental agencies must bear in managing such permit systems. Agencies would be required to administer and monitor such systems long term, whereas CSEs would act only as beneficiaries and not responsible partners or collaborators.

Research could also be expanded into defining best practices for CSEs and their communities to protect and enhance wilderness as compensa-

tion for its depletion and degradation by proximity to ski areas. CSEs have been encouraged to operate in sustainable ways, not only with respect to environmental protection (Scott, Steiger, Rutty, and Johnson 2020) but also in terms of socioeconomic issues concerning personnel and community impact (Colby 2022). Additional studies should explore how CSEs can extend beyond the obvious self-centered responsibility of achieving sustainable operations. CSEs can do better than simply achieving sustainable operations, especially if research helps define more aspirational best practices.

Expanding the knowledge base about CSE best practices to protect wilderness can be guided by addressing several compelling questions. Exactly which initiatives have CSEs attempted that are most effective vis-à-vis wilderness enhancement? How are these initiatives funded? What critical resources are needed to ensure that initiatives will succeed and thus provide a base for expanding wilderness protection? What lessons have been learned from failed initiatives? Research using a corporate social responsibility lens (Scott, Steiger, Rutty, and Pons 2020) would articulate ways in which CSEs can raise the bar in responding to mountain community and public needs regarding ski resort operations and mitigating wilderness impacts.

Toward a Balance of Seemingly Irreconcilables

The Wilderness Act of 1964 has been a watershed as far as preserving wild lands and ecosystems. Now, more than 60 years later, we marvel at the foresight of its framers and the act's ability to stand the test of time. For much of the past 60 years, ski areas were seen in a positive light as buffers and transitional zones that protected the integrity of wilderness (Shafer 1999) and reduced pressure from snow vehicles (Stewart and Cole 2001). In contrast, others have cited issues with ski areas and their proximity to wilderness resources, such as degradation of vegetation as adverse effects on key indicator species (, Signorell, and Arlettaz 2008), and effects on fauna (Sato, Wood, and Lindenmayer 2013).

The environmentally protective qualities of ski areas are diminishing as they evolve into resorts that intensify land use and drive ever-higher visitation. Climate change has exacerbated this problem by providing an incentive for them to consolidate. There is a tangible risk that as ski areas transform into CSEs, wilderness will diminish, and its essence as a refuge will be compromised. Several paths exist to prevent this trend, which could reduce wilderness qualities to below those in 1964. As a society, we need enlightened discourse and informed leaders (supported by insightful research) who are willing to forge imaginative paths to address the wicked problems surrounding global climate change, ski area consolidation, and wilderness protection.

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Photo credit: Sign in the Maroon Bells–Snowmass Wilderness, indicating various camping regulations.

SCIENCE + RESEARCH

Are Wilderness Recreation Experiences More Regulated?

Measuring and Mapping Recreation Confinement in Wilderness and Other Protected Areas in Colorado

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PEER-REVIEWED

Abstract
Federally designated wilderness in the US is to be stewarded to provide, among other qualities, outstanding opportunities for unconfined recreation—or recreation generally free from rules and regulations. However, compared to other wilderness character qualities, measurement and monitoring of unconfined recreation is often considered less formally. This research seeks to understand the spatial distribution of unconfined recreation across wilderness areas and other federal and nonfederal protected areas in Colorado, and to answer questions related to comparative levels of confinement within and across wilderness-administering agencies. We find that, across all three wilderness-administering agencies in Colorado, wilderness areas are more confined, on average, than the other lands managed by these respective agencies.


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Outdoor recreation, and particularly wildland recreation, is an experience largely defined by freedom (Abbey 1977). Wildland recreation is often used as a vehicle to free individuals from everyday responsibilities, the tethers of digital connectivity, the stress of the workaday world, and other markers of society (Dorman 2019; Lang and Borrie 2021; Nash 2014). But people also go into wildlands to experience the unique freedoms of the outdoors: the freedom to roam, to explore, and to sleep under the stars without physical barriers blocking their connection to nature (Nash 2014). However, often in public land management this freedom is confined, or restricted, for a variety of reasons (Dorman 2019). These confinements most often take the form of rules or regulations, which may involve visitors "losing the internal locus of control" (McCool 2004, p. 16) over their ability to freely select campsites, design their own travel routes, have campfires, determine how long they stay, or determine their date of entry (Griffin 2017).

Recreation Confinement in Wilderness

Wilderness character, in the context of federally designated wilderness in the US, is defined by four primary qualities: (1) natural—containing ecological systems that are substantially free from the effects of modern civilization; (2) undeveloped—retaining its primeval character and influence, essentially without permanent improvement or modern human occupation; (3) untrammeled—essentially unhindered and free from the actions of modern human control or manipulation; and (4) solitude or a primitive and unconfined type of recreation—providing opportunities for solitude and unconfined recreation. There is scholarship questioning whether "solitude," "primitive" and "unconfined" were conceptualized by lawmakers as a singular concept under wilderness character or three different concepts (Engebretson and Hall 2019). However, in practice, recreation managers conceptualize the recreation mandate as three somewhat distinct ideas. Research has also conceptualized the wilderness recreation experience as three separate facets: "solitude," characterized by being alone and away from others (or alone with others; Lee 1977); "unconfined," characterized by unrestricted access and minimal management regulations; and "primitive," characterized by a traditional, nonmechanized means of travel (e.g., walking or canoeing) and reliance on personal skills with a spartan management setting (e.g., limited directional signage or structures such as bear boxes) (Seekamp and Cole 2009).

Honoring the recreation mandate in wilderness challenges managers, as there is a tension between the three concepts. For example, limiting use in a wilderness area through a permit system may increase opportunities for solitude, but it degrades the unconfined element of the wilderness experience (Seekamp and Cole 2009). And as Behan (1974) notes, unconfined recreation (i.e., nonrationed use) could be maintained through hardening trail surfaces and campsites, installing toilets, widening trails, and other means of development that could "mitigate user impact" and "increase the carrying capacities" (p. 99). However, such actions have implications for the primitive facet of the wilderness recreation

"This research provides a baseline of recreation confinement at the present moment across Colorado and offers consideration of the question: How many opportunities for unconfined recreation are we willing to cede in favor of other wilderness character qualities?"

experience and the overarching undeveloped quality of wilderness. Additionally, the unconfined portion of the recreation mandate may threaten other elements of wilderness character outlined in the Wilderness Act. Lucas (1983) notes that the act "requires managers to protect and manage wilderness 'so as to preserve its natural conditions'—an almost impossible mandate if uncontrolled recreational use is allowed" (p. 6). For example, allowing visitors to camp on tundra plants directly next to an alpine lake may provide an unconfined camping experience in a wilderness area, but it would likely degrade the natural conditions over time. In fact, preserving the natural quality of wilderness may be the primary justification for ceding aspects of the unconfined quality.

The wilderness recreation mandate has three facets, yet in the more than 60 years since the passage of the Wilderness Act, solitude has been prioritized above the other two by both the management and research communities. Cole (2011) alludes to the historical focus: "'solitude' is the one word, beyond the mandate to provide for primitive and unconfined types of recreation, used to describe the type of experience wilderness should provide" (p. 68). More contemporarily, the focus on solitude is evident in the formal US Forest Service (USFS) effort on wilderness stewardship performance, in which managers of every wilderness area administered by the Forest Service select and track quantifiable "elements" related to wilderness character. With regard to wilderness recreation, managers must track at least one of the two related elements: (1) "opportunities for solitude," and (2) "opportunities for primitive and unconfined recreation." Arguably, the decision to combine the primitive and unconfined components is, in and of itself, an indication that solitude is prioritized; the selection of the recreation-related elements reinforces our suggestion. In fiscal year 2025, an internal USFS database showed that, out of 448 wilderness areas, 332 (74%) selected "opportunities for solitude" as a performance metric, whereas 163 (36%) selected "opportunities for primitive and unconfined recreation." And for the selected element related to "opportunities for primitive and unconfined recreation," only about 20%

appeared to focus on the unconfined aspect of wilderness recreation.

Behan (1974) expressed concern long ago that confining the wilderness experience and limiting recreation use in wilderness through permit systems was amounting to a "police state wilderness" (p. 98), and he argued that the unconfined quality of wilderness is seen as expendable compared to the primitive or undeveloped qualities. Indeed, Griffin (2017) finds that 59% of the wilderness areas administered by the Bureau of Land Management (BLM) or USFS have at least one recreation rule, whereas 27% of the wilderness areas administered by these agencies have more than five recreation rules. Some wilderness areas have many more. For example the Maroon Bells-Snowmass Wilderness was found to have no fewer than 26 recreation rules. Among the wilderness areas analyzed (669 in total), the most common rules included group size limits, stock restrictions, length of stay limits, and camping restrictions. Nearly 14% of wilderness areas were found to require permits (Griffin 2017). Preserving naturalness is a primary motivation of these regulations.

A more holistic consideration of the recreation mandate in wilderness is likely beneficial for two notable reasons. First, the importance of unconfined recreation is well documented; indeed, the virtue of wildness has been associated with the freedom of the walker who can journey wherever they please (Thoreau 2013, p. 253), and, as Abbey (1977) plainly states: "We cannot have freedom without wilderness" (p. 235). As Roderick Nash (2014) articulates in his classic book Wilderness and the American Mind: "Because wilderness is a state of mind, the conditions under which one enters it are vital to the overall wilderness experience. Quotas, permits, lotteries, waiting lists, prescribed itineraries, and campsite assignments devastate the feeling of wilderness" (p. 340). He continues, "For some persons just the knowledge that they visit a wilderness by the grace of, and under conditions established by, civilization can destroy the wilderness experience before it begins" (p. 340). Second, research has consistently found a weak relationship between the number of people encountered in wildland recreation and the quality of someone's experience (Stewart and Cole 2001). Consequently, the degree to which solitude is in tension with unconfined recreation is questioned, particularly given the multidimensionality of solitude as a concept (Lang and Borrie 2021), and the general adaptability of recreationists (Cole 2007).

Study Purpose

In certain areas of the US, confinement, especially confinement via permit systems, in wilderness appears to be increasing. As visitor use increases in these wilderness areas, managers are opting to increase confinement as a means of preserving natural conditions and maintaining or increasing solitude. In Colorado, this trend is particularly evident. By 1973, Rocky Mountain National Park required permits for backcountry camping and the use of existing backcountry campsites in most locations. The Indian Peaks Wilderness—near Boulder and within a reasonable distance for a day trip from Denver—began requiring permits for overnight camping in 1985. In 2020,

the National Park Service (NPS) instituted a use limit in Rocky Mountain National Park, allocating access via a timed-entry reservation system that included day users seeking to hike in the park's wilderness areas. More recently, in 2023, the USFS instituted a reservation-based use-limit for multiple heavily visited areas within the Maroon Bells–Snowmass Wilderness.

In response to this recent perceived uptick in confinement, we seek to understand how recreation confinement varies across all public lands in Colorado and explore the following research questions. First, how does recreation confinement vary by managing agency? Second, how does recreation confinement vary between designated wilderness and other federal public lands, and how does it compare between wilderness-administering agencies?

Methods

Mapping Confinement

To understand how confinement varies across Colorado's public lands, we combined data from the Colorado Trail Explorer (COTREX) and the US Geological Survey Protected Areas Database of the US (PAD-US) to create an index of confinement using methods adapted from those put forward by the Wilderness Character Monitoring Technical Guide (WCMTG; Part 2, section 5.5.1) for measuring confinement. This index measure represents the "relative degree of imposition or inconvenience of certain visitor management restrictions as well as the geographic extent of those restrictions" (WCMTG, p. 307) across public lands included in the PAD-US within Colorado. Using the WCMTG as a guide, we included 10 categories of regulations considered most likely to impact the visitor's perception of unconfined recreation: area closures, camping restrictions, restrictions on dogs and domesticated animals, campfire restrictions, fees, group size limits, human waste regulations, length of stay regulations, stock use limitations, and mandatory permits. When the type or level of permitting was not specified (i.e., voluntary vs. mandatory), mandatory was assumed and a value of 3 assigned. Deviating from the WCMTG, for this study, swimming and bathing restrictions were omitted because data on these restrictions were uncommon and inconsistently reported. Data on each of these regulation categories were primarily extracted from COTREX and PAD-US; however, in instances when data were not available through these platforms, data were gathered from agency websites or Wilderness Management Record Reports on IWeb for the most recent year available (in most cases, 2023 or 2020).

Following the WCMTG, we assigned the prescribed impact rating from 0 to 3 for each regulation category on rasterized cells of all public lands in Colorado, in which higher ratings indicated stricter regulations that significantly affected visitor activities. For instance, prohibiting all stock in a particular cell (an impact rating of 3) may have required visitors to change their trip plans or may even have precluded some from visiting altogether. Alternatively, stock feed restrictions (an impact rating of 2) may also have required visitors to make advance plans but still allowed permitted recreation with stock animals. If a

particular cell was subject to more than one impact rating within a particular category, the most restrictive rating was assigned. To account for the geographic extent of each impact rating, a weight was assigned based on whether the restriction applied to a subarea of the PAD-US unit (a weight of 1) or to the entire PAD-US unit (a weight of 2). To produce the final index value, we began by calculating a component score for each regulation category by multiplying the impact rating by its assigned geographic weight. Then, the component scores for all 10 restriction categories were summed to produce an index value for each cell, where a higher index value indicates a higher degree of confinement. We compiled the final index values to produce a raster of confinement with cells of 200 hectares spanning all Colorado protected areas found in the PAD-US (see Figure 1).

Results

Table 1 summarizes the geographically weighted average confinement index scores by managing agency across Colorado. The NPS has the highest average confinement index score, managing relatively more confined areas such as Rocky Mountain, Mesa Verde,

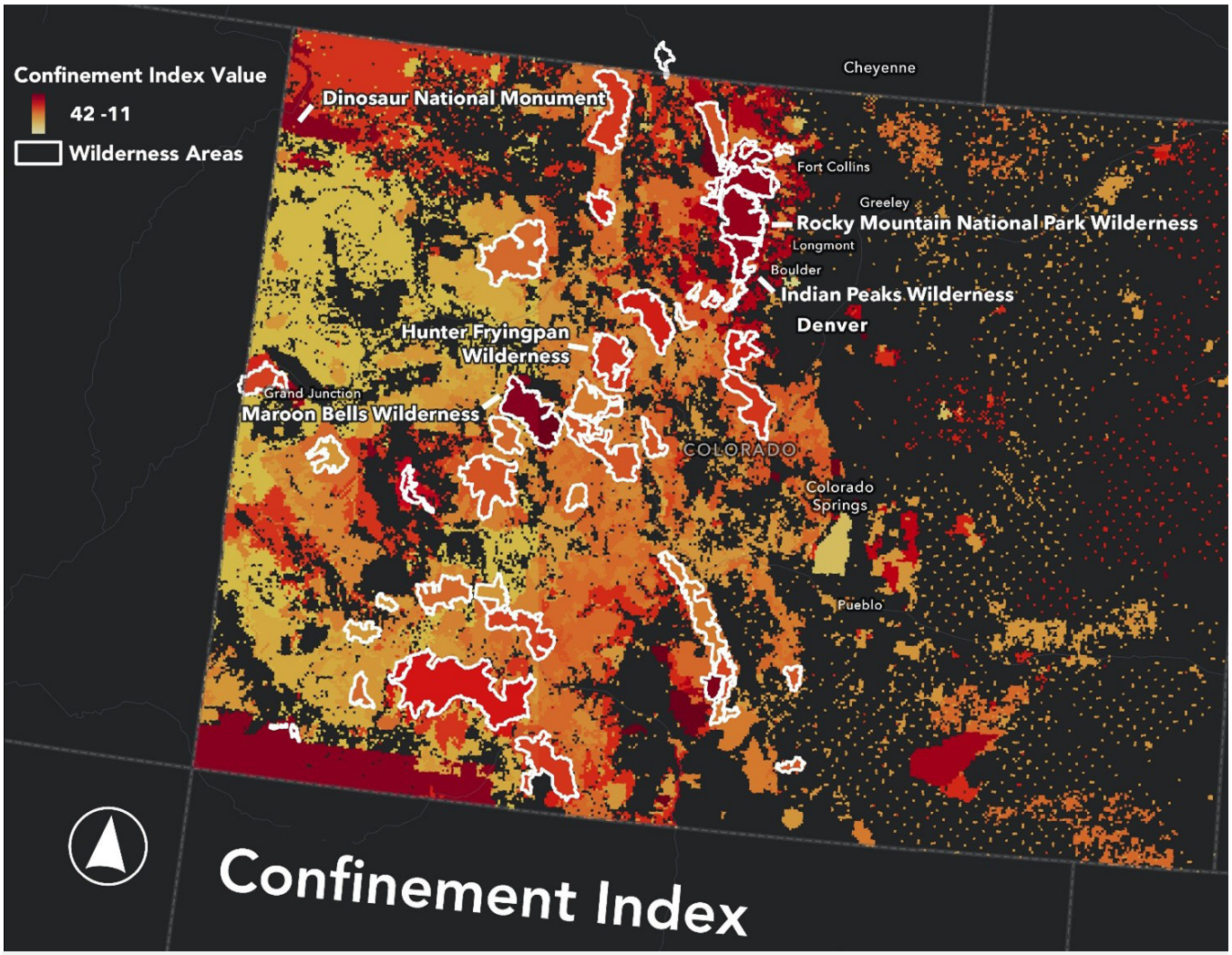

Figure 1 - Confinement Index Values across Colorado (wilderness areas highlighted in white). Darker colors indicate more confinement.

Agency	Minimum	Maximum	Average	Hectares Administered
National Park Service	12	42	26.8	293,116
US Fish and Wildlife Service	12	32	18.4	70,876
US Forest Service	9	32	16.1	5,857,034
Bureau of Land Management	10	44	15.2	3,360,728
State agencies	8	32	14.8	708,764
Local agencies	9	44	14.3	726,865

Table 1 - Confinement Index Scores by Managing Agency in Colorado

Agency	Minimum	Maximum	Average	Hectares Administered
National Park Service	17	42	27.9	197,358
US Forest Service	14	32	18.9	1,283,742
Bureau of Land Management	11	36	17.6	317,100

Table 2 - Confinement Index Scores by Managing Agency in Federally Designated Wilderness in Colorado

and Black Canyon of the Gunnison National Parks, among others. The US Fish and Wildlife Service (USFWS), managing National Wildlife Refuges across the state, is the second-most confining agency, on average. It is important to note that both the NPS and the USFWS have largely preservationist-based mandates, as compared to the largely conservationist-based mandates of the USFS and BLM, which is likely reflected in their index scores. Three federal agencies administer federally designated wilderness areas in Colorado. The geographically weighted average confinement index scores for the wilderness areas they administer are listed in Table 2. For each of these agencies, their respective average confinement index scores across wilderness areas are higher than their overall average index scores (see Table 1 and Figure 1).

Discussion

The finding that confinement in wilderness is generally higher than those federal public lands not designated as wilderness runs counter to the notion of wilderness as areas with minimal "management" presence and outstanding "opportunities for solitude or a primitive and unconfined type of recreation." However, this result also highlights the trade-offs present in wilderness stewardship, wherein confinements are instituted to support other wilderness character qualities such as solitude and naturalness in the face of increasing recreation demand. Reassessing generally highly confined areas (such as those near population centers, such as Denver) provides an opportunity to diversify the recreation portfolio, so that highly confined recreation experiences are complemented with proximate low confinement experiences.

This would provide opportunities for both recreationists who prioritize solitude and are willing to sacrifice some of the unconfined quality in order to obtain it, as well as those who prioritize unconfined recreation and are willing to forgo some degree of solitude.

Considerations for Wilderness Stewardship

A Regional Approach to Unconfined Recreation

One philosophy for managing our public lands, and recreation in particular, is to consider management decisions at the regional level. That is, management decisions around confinement can be supported by considering both the unique circumstances of an individual public land unit and the level of confinement within the broader, regional system, at a minimum. This was articulated 40 years ago by Schreyer (1985) in the context of river permitting: "Managers and planners have begun to talk about the need to plan for use regulation on a given river by viewing it as part of a larger system of recreational opportunities. . . . Our resources are becoming too precious to plan and manage as isolated entities" (p. 16).

Whereas some may argue that a perfect recreation world would be one without any confinements, such an idea is unrealistic (in all places and at all times), given public land is a highly demanded resource supporting a broad range of preferences and needs (Nash 2014). For instance, a requirement to keep dogs on leash may benefit those afraid of dogs or those interested in wildlife watching. But

Figure 2- Wilderness permit sign seen when entering the Rocky Mountain National Park Wilderness.

Figure 3 - Sign in the Indian Peaks Wilderness indicating that stoves are required for cooking.

implementing confinements is often framed as a last resort, given visitors are drawn to wild places to experience freedoms often lacking in their everyday lives (Dorman 2019; Nash 2014). "Thinking and acting regionally" in the recreation management context can accommodate the various preferences that recreationists have across the broader landscape (McCool and Cole 2001).

Pursuing a regional approach to recreation management is challenging, however, because all four wilderness-administering management agencies have different mandates and priorities, coordination is limited, and managers are often unaware of how particular actions impact surrounding areas (McCool and Cole, 2001). The confinement map presented herein provides, first and foremost, awareness concerning the current state of confinement across the entire state of Colorado, which can support management decision-making by highlighting the levels of confinement around each individual unit. For example, three proximate wilderness areas within Colorado offer varying degrees of confinement: Maroon Bells–Snowmass (average confinement score = 32), Holy Cross (18), and Hunter–Fryingpan (14). The Maroon Bells–Snowmass Wilderness requires reservation permits for overnight stays in the Maroon Bells. The Holy Cross Wilderness requires registration for overnight camping, but with unlimited access. The Hunter–Fryingpan Wilderness has no such requirements for registration or permits. Although managers are incentivized to prioritize the area under their own jurisdiction before considering other areas (McCool and Cole 2001), there may be an opportunity, with increased awareness (as provided by the maps herein), for managers

to clearly justify and communicate their decisions to confine or not confine areas based on the regional situation. For instance, if the Hunter–Fryingpan Wilderness experienced increased use, and managers felt compelled to consider implementing additional rules and regulations on recreation, there would be an opportunity to incorporate the knowledge that neighboring wilderness areas have higher levels of regulation and restriction.

Recognizing the Dynamic Trade-Offs Between Unconfined Recreation and Other Wilderness Character Qualities

This study offers an opportunity to recognize that the tensions, or trade-offs, between unconfined recreation and other facets of the recreation mandate and other wilderness character qualities (e.g., natural conditions) are dynamic. By dynamic, we are suggesting that the potential trade-off between facets of the recreation mandate and other elements of wilderness character is not static, but subject to change depending on three interrelated factors.

This first factor is the current level of confinement. In the years after the Wilderness Act, as areas were initially designated as wilderness and visitor use was generally lower, we can presume that, across the state of Colorado, the level of confinement was relatively low or nonexistent. But today, we find that wilderness lands in Colorado are, on average, more confined than the other public lands managed by the same federal land management agencies. This finding reinforces the assertion that nationally, solitude is being prioritized over unconfined recreation—"with preservation of solitude trumping unconfined" (Dorman 2019, p. 144). To be fair, the finding also suggests that wilderness areas in Colorado are among the most visited public lands in the state—as confinements, particularly permits, are typically implemented in a reactionary fashion (Rice et al. 2025). For these reasons, confinements can be used to maintain components of the natural (e.g., thriving tundra plant communities) and untrammeled (e.g., less need for restoration efforts) qualities of wilderness. Regardless, the current state of confinement in Colorado (and perhaps beyond) is, relative to 60 years ago, one of prevalence. Therefore, wilderness recreation managers are currently in a position where each additional confinement adds to an abundance of confinement, rather than creating a map free from confinement. As such, the point made by Lucas (1983) that maximizing wilderness experiences cannot be achieved through a homogenized stewardship regime, in which naturalness and solitude are prioritized over unconfined recreation appears even more salient today.

The second factor is the potential meaning and reframing of restricting or regulating recreation as a last resort. Limiting use, or confining recreation more generally, has traditionally been framed as an action to be avoided at all costs. Writing in 1974, Hendee records, "I think wilderness managers should regard across-the-board rationing of wilderness use as a last resort when all other measures have failed to control unacceptable impacts" (p. 32). All other measures presumably include educational efforts to reduce

visitor impacts and set expectations for the visitor experience, thereby decreasing feelings of crowdedness—and perhaps increasing feelings of wilderness solitude. These measures might also include development and trammeling actions (e.g., restoration efforts) to reduce recreation impacts to the natural quality of wilderness. This sentiment is echoed by Lucas (1983): "Don't regulate if there are effective non-regulatory alternatives. Establishing a regulation, by itself, achieves nothing out in the real world, although it may provide a sense of satisfaction that something is being done" (p. 8). Although there may be agreement that confining recreation should be treated as a last-resort action, the threshold for deciding when all other options have been exhausted is not agreed upon, nor is it a static threshold. For instance, in the face of increasing recreation impacts, it may have previously been considered adequate to pilot a Leave No Trace education campaign to reduce impacts prior to implementing confinements, but given the current level of confinements However, given the current level of confinements, there may be an opportunity to redefine the threshold of "last resort" to include additional efforts, such as making smaller sacrifices of undeveloped quality— hardening trail surfaces or developing hardened campsites to attract and concentrate use (Arredondo and Marion 2025).

The third factor influencing the dynamic nature of assessing trade-offs is our increased knowledge of the recreation experience. Over time, we have learned that all three facets of the recreation mandate (particularly solitude and unconfined) are normative concepts. That is, the meaning of solitude, for instance, depends on who you ask. It has long been established that solitude is normative (Lang and Borrie 2021). Research on the unconfined wilderness experience, albeit sparse, also points to the normative nature of the unconfined quality (e.g., Dorman 2019; Seekamp and Cole 2009). Recent research on norms related to wilderness solitude shows that, in three instances across the National Wilderness Preservation System (NWPS), tolerance for encounters with others has increased in recent decades (Kuentzel et al. 2020; Nettles et al. 2020; Rice and Armatas 2024). Although discussion regarding how to respond to this "shifting baseline" of solitude continues, when combining the normative nature of these concepts with research that questions the relationship between encountering people and experience quality (e.g., Lee 1977; Stewart and Cole 2001), we can begin to question the fundamental assumption that sacrificing confinement yields greater feelings of solitude. Returning to Behan (1974), it might prove healthy to question why solitude—and perhaps even the wilderness character qualities of undeveloped, untrammeled, and natural—is so often viewed as sacrosanct, while unconfined recreation is so often treated as sacrificial.

Two Vignettes Applying the Confinement Index

By way of demonstrating the usefulness of the confinement index in future research and management applications, we developed bivariate maps of recreation demand and

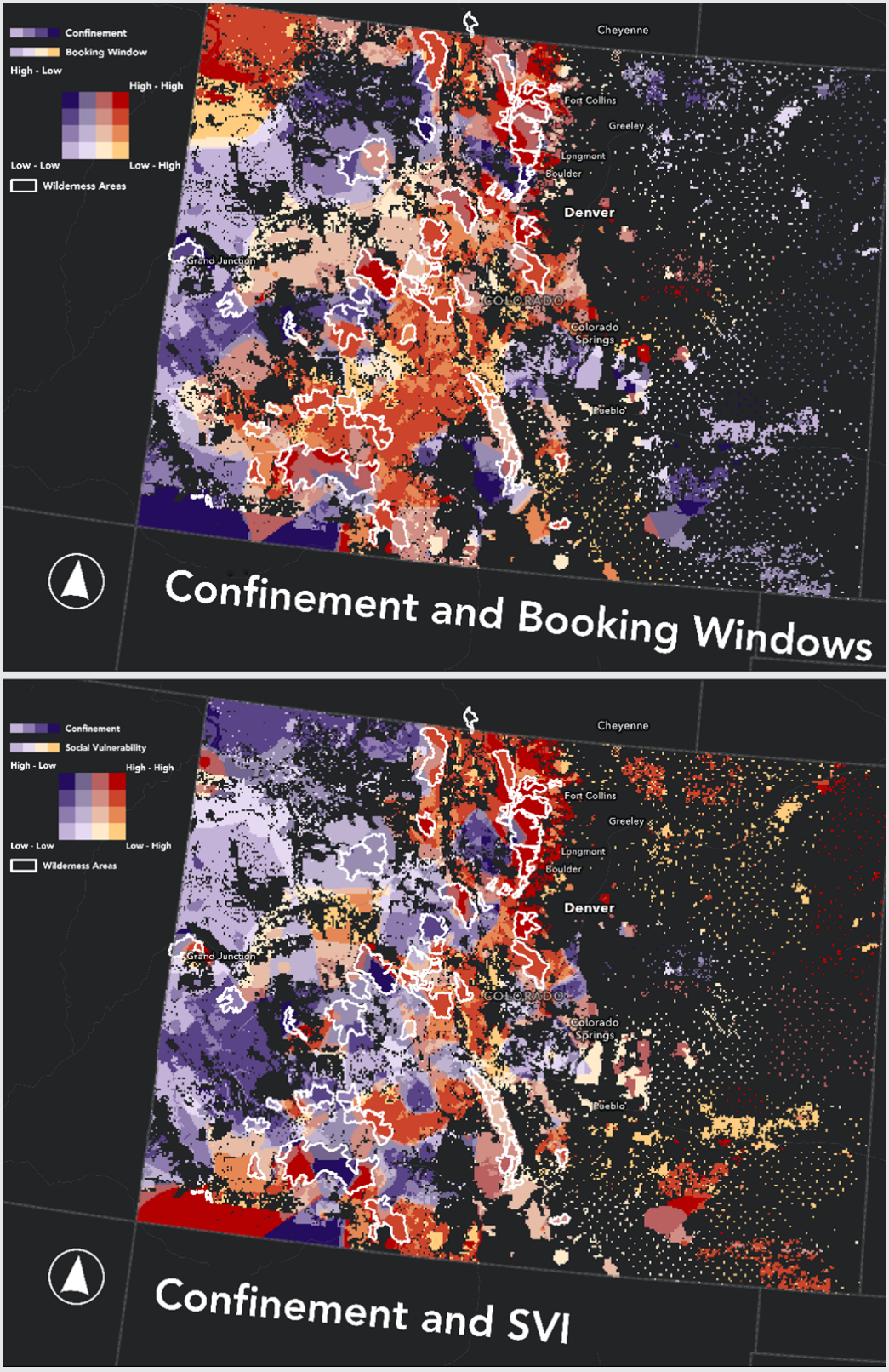

Figure 4 - Bivariate maps of Confinement and Demand (top, expressed as average booking windows for federal recreation amenities) and Confinement and Social Vulnerability (bottom, expressed as weighted-average SVI values of home ZIP Codes connected to proximate permits purchased.

social vulnerability (Figure 2). For exploratory and demonstrative purposes, we interpolated recreation demand using average booking windows (Rice and Park 2021) for recreation resources (e.g., wilderness permits, campsite reservations, timed-entry permits, etc.) across Colorado with data available through the Recreation.gov Recreation Information Database (RIDB). Because the majority of parks and protected areas (or recreation sites within vast protected areas such as national forests) do not have sites bookable through Recreation.gov, and thus do not have demand data available in RIDB, we used inverse-distance weighted interpolation to model a rough estimate for demand of specific points (e.g., a wilderness area or a campground) to the nearby protected parks and protected. ZIP codes available from reservation records in the RIDB allowed us to create a layer of social vulnerability. The Social Vulnerability Index (SVI) is calculated using data from the American Community Survey across four key areas: socioeconomic status, household characteristics, racial and ethnic minority status, and housing type and transportation. We matched each visitor's ZIP Code to their corresponding community's SVI score and created a weighted average SVI variable for each recreation area, resulting in a layer of estimated visitor SVI scores across Colorado.

These vignettes (Figure 4) present distinct patterns of bivariate relationships between confinement and these layers. In both maps, we see a broad distribution of values across Colorado, and in both cases, we find "High-High" bivariate values along the Front Range—stretching from Fort Collins to Colorado Springs. Farther away from the Front Range, we see a noticeable pattern wherein many popular recreation areas with relatively high confinement are visited by individuals with lower social vulnerability, such as the Green River through Dinosaur National Monument, the Maroon Bells, and Mesa Verde National Park. This pattern may suggest that these visitors with lower social vulnerability have an advantage in accessing these highly confined and highly demanded locations. In some areas, we see high levels of confinement and high levels of estimated demand (mapped in dark red). However, in other areas, we find relatively high levels of confinement and low estimated recreation demand (mapped in dark purple). These areas may represent potential opportunities to reassess their respective confinements, especially within wilderness areas, to see if unconfined recreation can be maintained or restored in the future.

Limitations

This research is subject to a number of limitations, including data availability, scale of analysis, and assumptions. It is not possible to obtain complete, authoritative data on all possible confinements across public lands in Colorado—even through the review of agency websites. Additionally, data used for recreation demand estimation was pulled from Recreation.gov, drawing only on those sites that are reservable through the platform. Relating to demand, our vignette of a simple bivariate analysis does not account for potentially confounding variables such as land cover, topography, or hydrology. Future

research should consider incorporating additional data into such estimation. Further, a cell size of 200 hectares may not provide a level of measurement precision required to inform management at the scale of recreation (e.g., campsites, trail sections, etc.). Finally, our discussion largely assumes that all wilderness character qualities are of equal importance in supporting the resource of wilderness. Although they are generally weighted equally in definitions of wilderness character, their practical weighting by managers may not be equal.

Conclusion

This study highlights that, in Colorado, there exists a mosaic of confined and unconfined recreation management. We also find that federal agencies offer different levels of unconfined recreation, on average, and that—in Colorado—federally designated wilderness is among the most highly confined public land. For each of the three federal agencies administering wilderness in Colorado, their respective wilderness areas are found to have higher levels of confinement as compared to their nonwilderness lands. This is unquestionably paradoxical, as the Wilderness Act defines wilderness (Section 2c) as having, among other qualities, outstanding opportunities for unconfined recreation. Importantly, however, we also find that there still exists a regional diversity of relative levels of confinement in certain key clusters of wilderness areas across the state. To this end, we offer implications regarding preserving this variety across the landscape and reassessing the trade-off between unconfined recreation and other wilderness character qualities, such as naturalness and solitude, across the NWPS. In short, this research provides a baseline of recreation confinement at the present moment across Colorado and offers consideration of the question: How many opportunities for unconfined recreation are we willing to cede in favor of other wilderness character qualities?

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Photo credit: The Farm of la Cauchetière in Livarot joined the PRELE network in 2022. Photo by Lydie Doisy.

The Social Representations of Nature in Free Evolution

BY CAMILLE ROYER and LYDIE DOISY

Editor's Note

How is wilderness represented in the French mind? In a 2020 survey of more than 4,000 people in France, 71% of the respondents expressed support for "allowing nature to develop, even if this may pose problems for human activities" (Commissariat general au développement durable 2020). In a 2014 survey of 1,000 people, nearly 70% of the respondents considered the conservation of pristine areas to be an important focus of natural area management (Farjon et al. 2016). In their review of survey studies of people's perceptions of forests and nature from the last two decades, Deuffic et al. (2021) concluded that studies generally provide few details of how naturalness is represented in respondents' minds. Within this context, the Regional Program for Areas in Free Evolution (Programme Régional pour les Espaces en Libre Evolution [PRELE]) of the Normandy Nature Conservancy (Conservatoire d'Espaces Naturels Normandie), in partnership with the University of Caen-Normandy, conducted a survey on the social representation of areas in free evolution in 2018 (PRELE 2018; Royer 2018). Social representations are systems of opinions, knowledge, and beliefs that are particular to a culture or a group. The social representations approach has been frequently used to study what is considered common-sense knowledge in different social groups (Rateau et al. 2011; Sammut et al. 2015). Free evolution (translation of the French term "libre évolution") is one of the strategies in favor of naturalness (Locquet 2024) that have emerged in the management of private and public lands in recent decades. An area in free evolution is generally considered to be a place where nature expresses itself spontaneously without any extractive or intrusive human activities (UICN 2023). More than 400 questionnaires and interviews were collected online and in person in Normandy, northwestern France, in 2018. Initial analyses of the acceptability of different landscapes according to participants whose jobs or studies were related to the environment (Group E) and those who were not part of this group showed little difference in their mean scores. Group E scores had a higher standard deviation (Doisy, personal communication, October 26, 2025). Free evolution was positively perceived by the majority of participants and more so by younger people. Although the study population is not representative of the population of France (67 million) or of Normandy (3.3 million) (INSEE 2019; Maillard and Roger 2019), these and other intriguing results capture a unique snapshot of representations of free evolution/naturalness/wildness in the French mind.

"Nature protection is not only an ecological issue, it is also associated with philosophical and anthropological considerations. To change human behavior toward nature, we will necessarily have to change the way we see the world to find our rightful place in it."

The Normandy Nature Conservancy (Conservatoire d'Espaces Naturels Normandie) is a nonprofit organization for the preservation of the natural and geological heritage of Normandy (region in northwestern France covering 30,000 km², or 11,500 square miles, with a population of 3.3 million). It manages more than 220 natural areas, including limestone hillsides, ponds, flood plains, marshes, and peat bogs, covering a total surface area of 30 km², or 11.5 square miles, through land purchase and conservation covenants with private and public partners (CEN Normandie, n.d.).

It created the Regional Program for Areas in Free Evolution (Programme Régional pour les Espaces en Libre Evolution [PRELE]) in 2017, bringing together 35 organizations to integrate free evolution into their approach to nature protection. For PRELE, free evolution is a method of land management that promotes the expression of all dynamic processes not directly influenced by human activity. It stems from a desire to allow natural dynamics to evolve freely, which parallels some of the motivations underlying wilderness designation in North America. However, sites in the PRELE free evolution network will not be judged solely on their degree of naturalness or their size; rather, one of PRELE's motivations is to question humans' place in nature and our role in the protection of nature: all nature—not just the pristine, rare, threatened, or vulnerable. PRELE aims to bring about: (1) a better understanding of the dynamic processes that occur in areas in free evolution, (2) a new way of relating to and interacting with these areas, and (3) long-term preservation of a network of areas in free evolution within a landscape of managed natural sites and ecological corridors. It is constructed around the three complementary axes of outreach, development of a network of freely evolving areas, and study of ecological dynamics (Doisy 2017). As part of its efforts to raise awareness of free evolution among landowners, managers, and the general public, PRELE conducted a survey on the social representation of areas in free evolution in 2018. The study results have been used to inform PRELE's partners in adapting their discourse to promote free evolution.

Methods

A survey and semidirective interviews were conducted in 2018 over a period of six months. The survey questionnaire consisted of 30 questions, mostly closed-ended, and many associated with images. It contained six sections: sociodemographic information, leisure activities and naturalness of sites visited, relationship between humans and nature, relationship with time, representations of freely evolving nature via text and images, and levels of professional and/or academic involvement with respect to the environment. Respondents were invited to provide more information through open-ended questions, including "What does nature in free evolution evoke for you?" and "What other emotions does this photograph invoke in you?" The questionnaire was developed collaboratively with partners of PRELE with feedback from the Normandy Nature Conservancy, the Coastal Conservancy (Conservatoire du littoral), and the Regional Institute for Sustainable Development. European and French studies conducted by de Groot et al. (2011), the Network of Environmental and Sustainable Development Education in Auvergne-Rhône-Alpes (GRAINE Auvergne-Rhône-Alpes n.d.), and others were used as bases for the questions.

The Google Forms questionnaire URL was sent to various partners and members of the Normandy Nature Conservancy and our private networks by email. We shared the link with our friends and family via social networks and encouraged them to do the same. We also administered the questionnaire in person at public events and in shopping malls.

We conducted semistructured interviews with survey participants who expressed interest in participating further in the study. Interviews lasted an average of 40 minutes per participant and were structured around five themes: relationship with nature, outdoor activities and naturalness of sites visited, understanding and valuing of freely evolving nature, importance of nature protection, and childhood experiences in nature. All interviews were transcribed. Limited by the study period of six months, we did not conduct thematic analyses of the qualitative data.

Results

We received 436 usable questionnaire responses, mostly via Google Forms. Facebook was the platform through which nearly one-quarter (108) of the respondents were recruited. We collected an additional 70 questionnaires in person at public events and places during nine days between May 19 and June 29. None of the participants who were recruited in person were interested in being interviewed. Ten online respondents accepted to be interviewed in person. The survey results are presented in the following section.

Sociodemographic Characteristics of Study Participants

Only 5% of the study participants were from outside Normandy or France; 59% of all participants identified themselves as female and 41% as male. The majority of the participants were between 25 and 49 years old (Figure 1), with 2 or more years of formal education after having

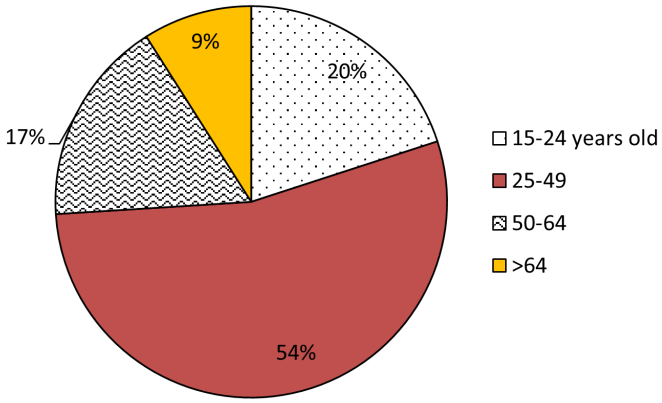

Figure 1 - Distribution of study participants' ages.

received their high school diploma (Baccalauréat) (82%). Participants mainly comprise students (15%), employees (23%), executives and professionals (28%), and retirees (11%). Sixty percent of the participants declared that their work and/or studies were related to the environment. Our sample was not representative of the socioprofessional categories of Normandy. For study results to be representative of the population of Normandy, it would have been necessary to collect responses from more than 1,000 people from diverse sectors.

Meaning of Free Evolution

Survey participants were asked, "What does nature in free evolution evoke for you?" The 471 responses to this question were categorized into a total of 10 identified themes. Fifty-nine of the 471 responses did not correspond to any of the themes and were left out of this part of the analysis. Themes 1–10 and the percentages of the remaining 412 responses corresponding to each theme are shown in Table 1. Theme 1, "without human intervention," had the highest percentage (27%), indicating that nearly one-third of the respondents interpret free evolution as meaning no human intervention—understood as nonaction. Themes 1, 3, 4, and 5 are closely related to the concept of wilderness and were supported by 56% of the respondents. Theme 3 represents respondents who equate freely evolving areas as spaces free of human presence. Overall, the impacts of human actions on the environment were considered highly negative, and human nature was not viewed positively. Discourses of nature reclaiming its rights (Theme 3) and the differentiation between real and fake (or artificial) nature (Theme 5) point to a clear dualism between humans and nature in the respondents' minds. Not all participants responded to the question (Theme 10): 12% of all survey participants and 20% of those who completed the questionnaire in person had no answers to this question, possibly reflecting a general lack of interest in questions with respect to nature.

Acceptability of Landscape Types

Survey participants were shown four images of freely evolving areas: a forest (Figure 2a), a fallow field (Figure 2b), a fallow field near a house (Figure 2c), and a field with a high concentration of dead wood (Figure 2d). For each image, they were invited to choose two or fewer answers to the following question:

Theme	Additional information	Percentage of participants supporting theme*
1. Without human intervention	Free evolution is equated with freedom from human intervention or activity. Intervention includes any act of management, development, or construction of infrastructure.	27%
2. With simple and benevolent human presence	Like Theme 1, Theme 2 also equates free evolution with freedom from human intervention, but integrates simple human presence, such as wildlife observation, scientific monitoring, walking, and contemplation. Human presence is acceptable but needs to be limited, minimal, or regulated.	11%
3. Free from humans	Free evolution is equated with freedom from humans. Human action on nature is generally negative. Free evolution allows nature to reclaim its rights.	17%
4. Wild, pristine, original nature	Free evolution is equated with wilderness and high degrees of naturalness.	9%
5. Real (opposite of fake) nature	Free evolution is equated with nature that is natural (considered as real nature) and not artificial (considered as fake nature).	2%
6. Elsewhere	Nature in free evolution is something that exists elsewhere, such as jungle, Chernobyl, or primary forests.	3%
7. Specific places or ecosystems	Nature in free evolution is associated with specific places or ecosystems, such as the forest, a river, a beach, or my garden lawn with beautiful wild orchids.	7%
8. Conceptual reflections	Reflections on the concept of free evolution, such as the notion of a social space in free evolution, free evolution as a management tool, and other philosophical reflections.	6%
9. Associated feelings	Free evolution is associated with feelings, such as free, serene, and tranquil.	5%
10. No associations	Responses include "nothing" and "I don't know."	12%
11. Unclassified	Responses that do not correspond to any one of the themes under 1–10.	-

*Based on 412 responses, which exclude responses in the "Unclassified" category

Table 1 - Study Participants' Support for Different Themes Associated with Free Evolution

The area in the photograph is in free evolution. Which of the following emotions most closely resembles yours?

1. This space is not aesthetically pleasing and could adversely affect the landscape of our countryside.
2. This space is becoming wild. It will become a beautiful and quiet area for wildlife, where vegetation will grow spontaneously.
3. This space has been abandoned. With a little maintenance, it would be more welcoming.
4. Nature is reclaiming its rights here, but it can also attract undesirable species (e.g., wild boar, deer, and parasites) and cause damage in the surrounding areas if left unchecked.
5. Others, please feel free to elaborate.

We categorized the responses as a:

- negative perception if statements 1, 3, and/or 4 were selected;
- positive perception if statement 2 was selected;
- positive perception, but undesirable species need to be regulated if statements 2 and 4 were selected;
- positive perception, but landscape needs maintenance if statements 2 and 3 were selected; and
- positive perception, but has adverse effects on the landscape if statements 1 and 2 were selected.

Figure 2a - Images used to assess acceptability of different types of landscapes in free evolution: (a) forest.

Figure 2b - (b) fallow field.

Figure 2c - (c) fallow field near home.

Figure 2d - (d) field with high concentration of dead wood.

Fifty percent of the participants attributed statement 2 (the primary positive statement) to all four images, indicating that all four landscape types were perceived positively by half of the participants, regardless of the differences in the landscapes' characteristics (Figure 3). The forest (Figure 2a) received the highest numbers of positive perception (Figure 3). The majority of participants perceived the field with dead wood (Figure 2d) positively, although it also received the highest numbers of negative perception. Responses to the fallow fields (Figures 2b and 2c) and the forest (Figure 2a) highlight that participants were more ready to accept free evolution in a landscape that is already forested and were more reticent to accept afforestation (or closing) of a currently unforested (or open) landscape. For some participants, closing of a currently open landscape could imply the disappearance or impoverishment of certain species. Examples of responses to open-ended questions in the questionnaire include:

"Is [Figure 2a] the result of a loss of grassland? Specific species may suffer from the disappearance of their environment if there is climax forest everywhere. The standardization of natural environments exacerbates the mass extinction of species that is underway." (Questionnaire respondent #140)

"The meadow [in Figure 2c] will disappear, along with the species it supports. A pity." (Questionnaire respondent #159)

Dead wood was perceived negatively. For example: "Dead wood should be removed to allow nature to recover." (Questionnaire respondent #112).

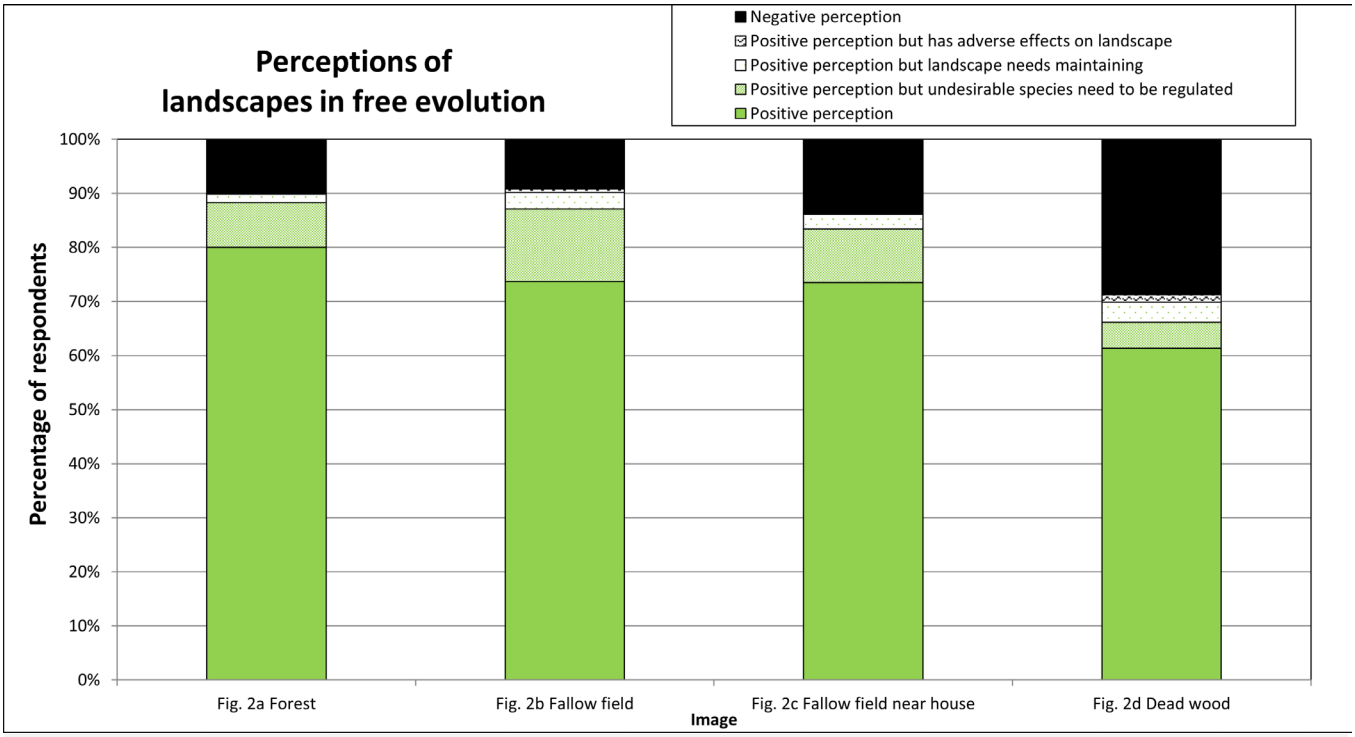

Figure 3 - Positive and negative perceptions of landscapes in free evolution.

Discussion

Let Nature Be–but Not Too Much and Not Everywhere

Although more than half of our survey respondents associated free evolution with the absence of human intervention and/or presence (Themes 1, 3, and 4 in Table 1), some respondents mentioned the need for humans to intervene in the landscapes represented by Figures 2a–2d. Examples of responses include:

"To keep [Figure 2d] as it is, humans must intervene." (Questionnaire respondent #268)
"A little clearing of undergrowth will bring back new species and habitats." (Questionnaire respondent #344, referring to Figure 2d)

Some respondents felt that free evolution should neither be systematic, nor for all types of landscapes. In their view, interventionism is also a form of protection that should not be abandoned. They recognized free evolution and human intervention as complementary tools for nature protection; free evolution is acceptable only if it does not become systematic and is used to diversify natural habitats and increase biodiversity. Examples of responses include:

"Locally, [free evolution] as a complement to conservation management of rare natural areas, why not?" (Questionnaire respondent #140)

"However, I learned that some landscapes, which I thought were natural, had in fact been shaped by humans . . . for example, wetlands or the (open) landscapes of the (Grands) Causses (in southern France) that were created by pastoral farming. Without human intervention,

these environments became closed (afforested) and eventually disappeared." (Questionnaire respondent #257).

"It's a good thing that some areas are left [to evolve freely], but it doesn't have to be so everywhere. We need to find the right compromise to allow biodiversity to express itself without having to close nature off completely from humans." (Questionnaire respondent #357)

Interviewees provided further insights. According to interviewee Mr. A, in the absence of predators, "game species will proliferate and cause damage to the woodlands and evolution is going to be blocked at some point. . . . To try to reflect the natural dynamics of evolution, the regulation of big game animals . . . must be taken into account [in order to achieve] natural functioning [of the ecosystem]." According to this view, hunting big game animals is compatible with free evolution. Free evolution is equated with maintaining an area in a condition that is similar to the primeval state that existed prior to the human eradication of apex predators. To maintain this condition, the role of the missing predators needs to be taken by humans—there can be no free evolution without humans playing a regulatory role.

For some interviewees, freely evolving areas, especially those that are open to the public, are associated with safety issues, necessitating maintenance and control. Interviewee Miss B explained, "For me, you have to maintain a minimum, otherwise people can't enjoy it. You see, we've tried to maintain the trails more, but nature takes over so much that after a while, nobody can walk or pass through." The safety aspect was also highlighted by Miss B: "I'm not in favor of [freely evolving nature] along roads, because I think it is dangerous and can cause accidents and deaths on the road, so no."

Study participants held a positive view of free evolution, provided that it does not interfere too much with human activities. In cases where free evolution disturbs humans too much, setting aside special areas for free evolution is an acceptable solution. For interviewee Mr. B, "These areas that we leave to evolve freely [could be at] far away [locations]. We could create a special zone like a park, for example." The dualism between humans and nature is clear and is echoed by interviewees Mr. and Mrs. I: "But we can see this even in the countryside. Our garden is uglier than other gardens. So in fact we realize that real nature has to be far away. It mustn't get in the way; sidewalks have to be clean, etc."

In theory, it seems that free evolution is acceptable, but we soon realize that an ideological paradox remains. Even if people seem to accept free evolution, they nevertheless seem to find it hard to imagine total nonintervention. Many study participants felt that free evolution should not be systematic, nor applied to all types of areas. In their view, interventionism is also a form of protection that should not be abandoned; it is necessary to safeguard natural processes and prevent damage caused by unwanted animals coming from these areas. The desire to control nature remains a paradox that many participants justify by pointing to the dangers of free evolution and of nature itself. Common arguments included:

• **Certain populations of big game animals (e.g., deer) need to be regulated**—This is evoked for both ecological (the hunter takes the role of the apex predators in the ecosystem because these predators have long been eradicated by humans) and economic reasons (to avoid damage to nearby areas that are used by humans).

• **Safety of humans**—Areas in free evolution could be dangerous, especially if they are open to the public, located near busy roads, and so forth.

• **Avoid biodiversity loss**— Relative to forested environments, a meadow that is kept unforested through human interventions is considered to have higher species richness.

Childhood Experiences in Nature

At almost every interview, people shared their experiences of nature during childhood. This theme was almost always broached without prompting. All interviewees were in favor of integrating free evolution into their living spaces. They often explained the importance of nature in their lives by the strong presence of nature in their childhood. Having a garden is something that is very important to interviewee Mrs. L, "because I grew up in the countryside. My parents had a huge orchard so I've always imagined myself living near one. And then I lived in an apartment and I realized right away that it didn't suit me. So yes, when the time came to change, [it became indispensable to have a garden]."

Figure 4 - Photo courtesy of the PRELE network and Francois Nimal.

Mr. I became aware of environmental issues because of "my parents. Rather, it was a question of education. Since I grew up in the countryside, it was unthinkable for [them] to let me stay indoors all the time. I used to get kicked out regularly with not much to do around me except [playing in the natural environment], so I had a lot of fun that way. I was in a pretty nice area, because you could ride your bike for miles on trails without ever crossing a road."

Experiences Abroad

We also noted that experiences abroad could explain why some of the interviewees had positive perceptions of free evolution. Mrs. I said that they were open to free evolution because "we lived in Berlin for a few years where lots of areas in the city have been left fallow like that. There were no problems of coexistence. There was high human density and at the same time areas that were effectively . . ." ". . . abandoned," continued Mr. I, "with foxes, hedgehogs, things like that—things that would have been frowned upon in France. When we arrived in Berlin, I rediscovered theories of just letting nature take its course. This notion of not letting nature be, as if we knew better than nature what nature should do, I feel like we've proven that it is wrong."

Interviewee Mr. D had lived in French Polynesia, and his military career has taken him all over the world. He has learned that "we have to be careful [with what we do with nature] and that there really is a way of doing things. I mean, I just came back from Polynesia. Last time I was there, it was 28 years ago. This time, I found the same Polynesia as 28 years ago, except for one or two places. Well, after all, Polynesia, it's another culture. Also, Australia with its Indigenous peoples and New Caledonia, there's an ancestral culture."

Fear of Leaving Land Uncultivated–Generational and Societal Effects

Since the 18th century, free evolution on previously cultivated land has always had negative connotations. As Mr. A pointed out, fallowing has historically been associated with the absence of human activity caused by high mortality rates or rural exodus—an area evolves freely because it has been abandoned by humans: "You can see there have been peaks like that in history, which led to the return or disappearance of nature, depending on population growth and human needs. For example, the forest took over in the 13th or 14th century during the plague, because there weren't many people left. And in the late 19th century, there was the Industrial Revolution, so agricultural land was abandoned."

More recently, fallowing has become a social symptom of rural exodus since the 1960s, considered a direct consequence of the agricultural sector's transformation in postwar France. Mr. A explained: "In the 1920s, farmers had very little land; fields were around the size of 200 m^2 each. So, in the collective subconscious of these old-timers, it is a waste to leave even 500m^2 [uncultivated]." The fear of leaving land uncultivated was often associated with older people. According to one interviewee: "People really have a hard time [understanding the choice of leaving land uncultivated], I understand very well. My

grandparents had a perfectly clean garden, so if people have gardens with weeds etc., [my grandparents would think that] it must be because these people are lazy. [We] don't do this out of laziness; we do it because we believe in something."

Fear of the encroachment of "wasteland" and landscape closure stem from the agricultural and environmental policies of the 1960s, which have not changed much over time. We have therefore become accustomed to landscapes that have been shaped by these policies, in other words, landscapes that are developed, controlled, and exploited, and therefore mostly open. Since the perspective on "wasteland" has a historical character (e.g., associations with rural exodus, periods of high mortality, etc.), the fear of land abandonment was often cited by older respondents. The acceptability of free evolution appeared higher among younger respondents, possibly because they have been exposed to discourses of environmental problems from a young age. Although age difference may play a role in the differences in the acceptability of free evolution, the role of differences in social and historical contexts is also likely to be important. For example, the acceptability of free evolution may differ between people living in rural and urban areas but from the same generation.

Land consolidation and landscape policies of the last century have influenced our perception of the landscape and, more broadly, the environment. As early as the postwar period, political and economic institutions have been voicing their opinions on the best way to manage, maintain, and ultimately control uncultivated land. For example, Article 1766 of the Civil Code states: "If the lessee of a rural inheritance does not furnish it with the livestock and tools necessary for its exploitation, if he abandons cultivation, if he does not cultivate reasonably . . . the lessor . . . may, depending on the circumstances, terminate the lease." Uncultivated land left fallow became a symbol of the unproductive and social death of an area. Fallowing was referred to as the "leprosy that threatens rural landscapes"; "the undergrowth is the enemy to be eradicated mercilessly" (Schnitzler and Génot 2012). From the end of the 1960s onward, the discourse of "landscape closures" came to the fore; it refers to the idea that

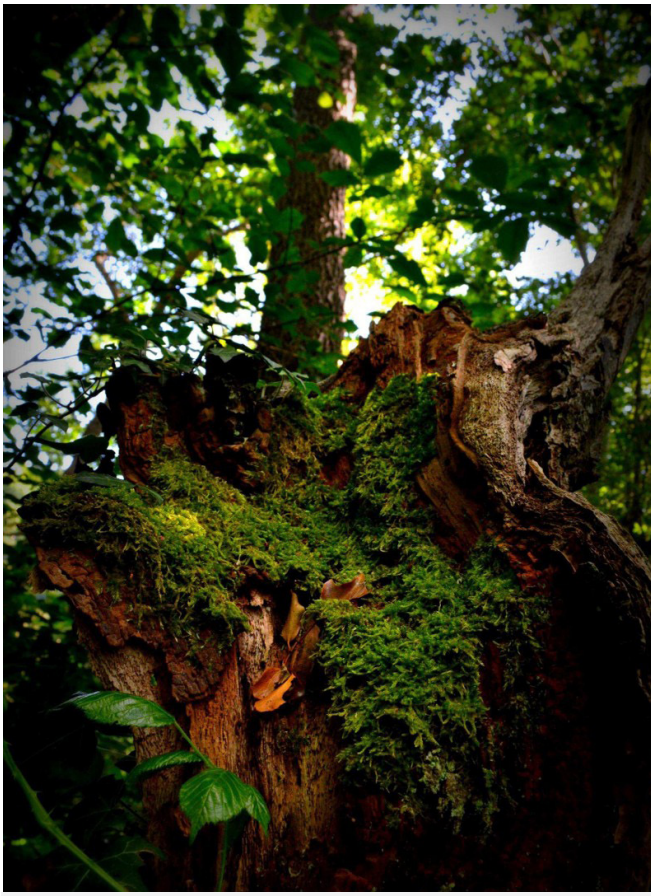

Figure 5 - Photo courtesy of the PRELE network.

above a certain threshold of fallowing and natural afforestation, a previously "open" area (i.e., an area from which a person can have a wide visual field) will be condemned to "close" completely (i.e., the visual field will decrease) (Beau 2022). This issue of landscape closure resonates strongly with the farming community. Ecologists have also shown that open landscapes are, as a general rule, richer than closed ones in biodiversity. As a result, the maintenance of open landscapes has become an integral part of environmental and agricultural policies in Europe since the 1990s. At the same time, environmental protection policies have focused primarily on protecting areas with rare, threatened, and/or remarkable species and natural habitats, setting them aside as nature parks or sanctuaries. By sanctifying certain areas and types of nature, these policies, which aim to emulate the large national parks in the US greatly influence social representations of nature. Thus, the protection of these areas indirectly and unintentionally encourages disrespect for and disinterest in natural areas outside dedicated protected areas (Viard 1990).

Conclusions

A study on free evolution is first and foremost a study about the relationship between humans and nature. Archaeologists and anthropologists generally agree that since Neolithic times, humankind has only tolerated the wild in a subjugated and controlled form. As Descartes (2022 [1637]) wrote in the 17th century, technology can "render ourselves the lords and possessors of nature." We cannot deny that we are still operating within this paradigm of mastering nature today. The fear of land abandonment and landscape closure is the result of the agricultural and environmental policies of the 1960s. These policies have not changed much and continue to fuel the belief that there is a boundary between humans and nature. All these beliefs, conveyed by institutions, collective memory, and culture, have permeated individuals and partly explain the negative representations of nature in free evolution. The choice to leave a natural area to evolve freely questions our relationship with nature, and more profoundly, the foundations of our society. Ultimately, free evolution, before being solely a matter of nature, is a societal issue. Its representations, whether positive or negative, derive from deeper social representations rooted in our culture and history. The dominance of the human–nature dualism has a strong influence on our representation of free evolution, specifically, and of nature, more generally. Nature protection is not only an ecological issue, it is also associated with philosophical and anthropological considerations. To change human behavior toward nature, we will necessarily have to change the way we see the world to find our rightful place in it.

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Photo credit: CoalitionWILD's team, alumni, and partners gathered at the #NatureForAll Youth Oasis during the 12th World Wilderness Congress in Rapid City, South Dakota, United States, in 2024

Mainstreaming Mentorship in the Conservation Space:

Building Intergenerational Partnerships for Sustainable Conservation Action

BY VERONICA DANDZO-ADZAGUDU and FÁTIMA D. GIGANTE

Our world today is facing one of its biggest challenges: the unprecedented destruction of nature, humankind's life support system. Reports show that between 1970 and 2020, the population sizes of 5,495 vertebrate species declined at an alarming rate of 73% (WWF Living Planet Report, 2024). With the accelerating rate of biodiversity loss, the conservation sector's role in safeguarding ecosystems cannot be overemphasized. Furthermore, to sustain effective conservation efforts, biodiversity issues must be addressed through interdisciplinary and multi-actor approaches (MacDonald 2010).

Veronica Dandzo-Adzagudu

Fátima D. Gigante

Young people are important actors affected by current conservation issues and likely to face the future consequences of global environmental challenges. Given their dual role as current stakeholders and future environmental stewards, this highlights the growing need to actively engage and support young professionals within the conservation sector. Engagement of young professionals in sectors such as climate change action and decision-making has grown significantly in recent years. Likewise, many conservation organizations increasingly recognize the value of

involving young professionals in environmental policy, strategic decision-making, and on-the-ground implementation of conservation initiatives, from species protection to habitat restoration, at both local and global scales.

Despite growing recognition of the important role of young professionals, meaningful engagement of this group in the conservation sector remains limited. As a result, their fresh perspectives and potential contributions to the effective conservation of the Earth's biological resources are often underutilized. Many young professionals face a range of challenges that hinder their full participation in the conservation sector. In the United Kingdom, a survey conducted by the Zoological Society of London (2025) found that limited access to mentorship, professional networks, and career guidance significantly restricts young professionals, particularly those from underrepresented groups, from pursuing conservation careers.

As awareness of conservation issues grows among youth, so too does their interest in pursuing conservation careers and playing an active role in addressing environmental challenges. Yet many young conservationists seeking structured support to develop thriving careers face barriers to accessing mentorship, including limited availability of senior mentors, lack of professional networks, geographic constraints, and unequal access to opportunities for underrepresented groups. This gap not only deprives the sector of a skilled, innovative, tech-savvy workforce with valuable knowledge and experience, but also threatens the long-term sustainability of conservation efforts. To address these challenges, there is an urgent need to promote the effective engagement of young professionals through structured mentorship programs, alongside other strategies that foster intergenerational exchange of knowledge, experience, and skills, and ensure the conservation sector remains resilient, inclusive, and forward-looking.

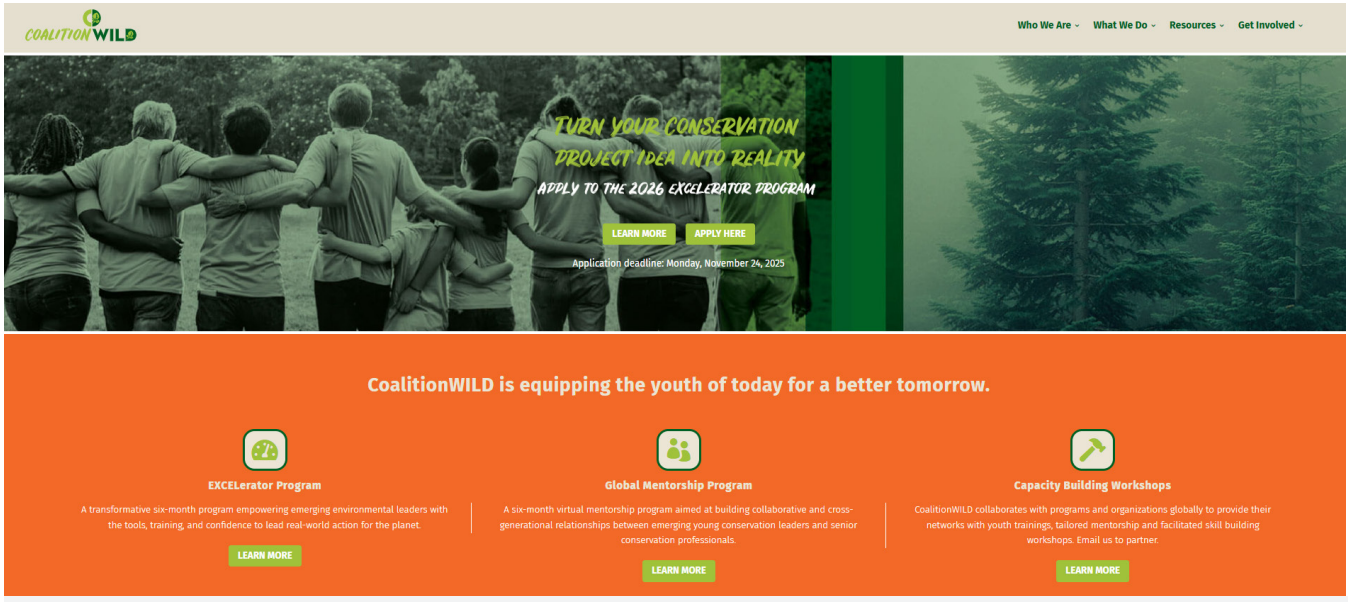

Figure 1 - CoalitionWILD website and mission.

One notable initiative addressing this need is CoalitionWILD, a WILD Foundation program. CoalitionWILD envisions a world where younger generations are respected, valued, included, and supported as active leaders and agents of change in creating a better future for the planet. Since its launch in 2013 at the 10th World Wilderness Congress, CoalitionWILD has championed mentorship for young professionals in the conservation space.

This commitment to mentorship and leadership development was significantly strengthened in 2016, when CoalitionWILD entered into a formal partnership with the US Department of the Interior during the World Conservation Congress in Honolulu, Hawai'i. Established through a Memorandum of Understanding, the partnership aimed to connect emerging conservation professionals with experienced experts across conservation, restoration, and environmental protection.

"The conservation community has a responsibility to help youth by inspiring those who have yet to care for nature, empowering young professionals already inspired to develop their capacities and networks, and by lending our time and experience as mentors . . . recognizing that youth have as much to teach as they have to learn." (IUCN 2016)

Through this collaboration, young professionals participating in CoalitionWILD's program gained access to mentorship, guidance, and technical expertise from subject matter specialists, supporting the development of strategic and effective conservation initiatives at both local and global levels.

From this foundation emerged the Global Mentorship Program, a structured mechanism designed to facilitate intergenerational partnerships, promote reciprocal knowledge sharing, and strengthen professional networks between emerging conservation professionals and their senior counterparts. This program helps bridge the generational gap within the conservation sector.

Seven iterations of the program later, there have been more than 600 participants. Numbers speak for themselves: in the most recent program, held in 2024, 85% of participants rated their experience as Very Good or Excellent, and 90% said they would highly recommend the program to others. Demand for the program continues to grow, and at CoalitionWILD it has become increasingly challenging to meet the rising need for mentorship among young conservation professionals, given the limited availability of senior conservationists able to provide support.

Can Mentorship Cultivate the Next Generation of Conservation Leaders Through Intergenerational Learning?

CoalitionWILD understands mentorship as "a long-term, trust-based, and horizontal relationship between two or more people that provides a space for two-way exchange of knowledge, ideas, and experience, fostering reciprocal learning and empowering young people to exercise their agency while developing the skills to lead and innovate." Although young conservation professionals have the potential to be changemakers, starting a new

"For the conservation sector, mentorship strengthens the workforce by building confidence, technical skills, and leadership capabilities among the next generation of conservation leaders. It facilitates knowledge transfer, prevents loss of expertise, and encourages holistic problem-solving and innovation."

role or navigating a career path in conservation can be daunting without guidance. Mentorship provides emerging conservation leaders with clarity about their career goals, actionable strategies, and support from a more experienced counterpart to help achieve them. It also promotes knowledge transfer, enabling mentees to gain broader industry insights, understand historical context, and expand their professional networks through potential collaborations.

For senior conservation professionals, mentorship provides opportunities to develop leadership and communication skills, reflect on their own practices, gain perspectives from different generations, and engage with new technologies and emerging trends through reverse mentorship (i.e., when younger professionals share their knowledge, skills, and perspectives with more experienced colleagues). Both mentors and mentees benefit from increased self-confidence, self-awareness, and empathy, particularly when a safe space for reflection, questioning, and constructive feedback is established.

At the organizational level, mentorship designed to foster intergenerational exchanges preserves institutional memory, passes on hands-on experience, and promotes operational efficiency. It ensures the development of specialized talent able to step into critical positions, strengthens employee engagement and loyalty, and facilitates the transfer of organizational knowledge, procedures, and best practices. Mentorship also creates an environment where new ideas can emerge, improving project outcomes and organizational effectiveness.

For the conservation sector, mentorship strengthens the workforce by building confidence, technical skills, and leadership capabilities among the next generation of conservation leaders. It facilitates knowledge transfer, prevents loss of expertise, and encourages holistic problem-solving and innovation. Mentorship also promotes interorganizational collaboration, joint projects, and knowledge sharing, enhancing the overall effectiveness of conservation initiatives. When young professionals are guided and

supported, their increased competence and dedication improve stakeholder confidence, enhance community trust, and ensure the long-term sustainability of conservation projects.

From Vision to Policy: Mainstreaming Mentorship

Stewarded and guided by the policy expertise of the WILD Foundation, CoalitionWILD took its first formal steps toward institutionalizing mentorship within the conservation space in the lead-up to the 12th World Wilderness Congress, held in Rapid City, South Dakota, United States, from August 25 to 31, 2024. Drawing on more than a decade of experience supporting young ecological stewards, and in response to a growing demand from early-career conservation professionals that was not being matched by engagement from mid- and senior-level practitioners, CoalitionWILD's team developed Resolution 04: Mainstreaming Mentorship of Young Ecological Stewards (WILD Foundation 2024).

The resolution articulated mentorship as a long-term, trust-based, and reciprocal relationship that enables intergenerational knowledge exchange, strengthens leadership capacity, and safeguards continuity and legacy within conservation efforts. It positioned mentorship as a strategic investment in the sustainability of restoration, protection, and conservation efforts, marking a foundational moment in CoalitionWILD's policy-driven approach to embedding mentorship as a core practice within the sector.

Figure 2 - Participants sharing their insights after a mini-speed mentorship experience, part of the session "Experiencing Mentorship: Connecting Generations in Conservation," led by CoalitionWILD at the Youth Pavilion during the 2025 IUCN World Conservation Congress in Abu Dhabi.

"To ensure the long-term sustainability of restoration, protection, and conservation of nature efforts, we must invest in the younger generation of ecological stewards. These young ecological stewards will soon enter the workforce, advocate for, and actively engage in movements and policies focused on restoring, protecting, and conserving nature. We recognize that mentorship . . . is a critical strategy to enhance the effectiveness and maintain the legacy of conservation efforts in the long run."(WILD Foundation 2024)

But this was not the end of CoalitionWILD's policy work—it was just the beginning. The success of the initial resolution provided CoalitionWILD's youth-led team with the energy, confidence, and support networks needed to advance the effort further. Building on this momentum, the team developed and advocated for Motion 097: Mainstreaming Mentorship for Young Ecological Stewards to Enhance Conservation Efforts (IUCN 2025),

which was adopted at the 8th IUCN World Conservation Congress in Abu Dhabi, United Arab Emirates, between October 9 and 15, 2025. This motion has since been formalized as Resolution 8.096 (IUCN 2026), embedding a commitment to mentorship within the world's largest international network of conservation professionals and further establishing mentorship as a fundamental pillar of effective, forward-looking conservation practice.

From Policy to Practice: Implementing Mentorship

For more than seven years, CoalitionWILD has translated its commitment to mentorship into action through the annual Global Mentorship Program. Drawing on early implementation experience and later reinforced by policy advocacy, the program has evolved into a structured yet flexible platform for intergenerational exchange, leadership development, and capacity building within the conservation sector.

Building on the momentum of recent policy successes, CoalitionWILD now aims to strengthen and expand the Global Mentorship Program, ensuring it serves a growing and increasingly diverse community of young ecological stewards worldwide. This includes refining program design, increasing accessibility across regions, and actively seeking partnerships with organizations interested in embedding mentorship within their own structures and initiatives. By collaborating with partners, CoalitionWILD aims to scale mentorship beyond a single program and promote its adoption as a standard practice across the conservation community.

At the same time, CoalitionWILD seeks to support the IUCN and other stakeholders in rolling out the resolution, drawing on their expertise and lessons learned from hosting mentorship programs and promoting intergenerational partnerships. Through this work, mentorship is intended to become a core pillar of effective and forward-looking conservation practice, helping to foster a more inclusive conservation space, guide the development of the next generation of conservation leaders, and ensure that generational knowledge is passed on. IJW

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Photo credit: Iceberg tunnel photographed off Portal Point (Antarctic Peninsula). Photo by Derek Oyen on Unsplash.

Subjective Perspectives of the Antarctic Wilderness:

Part One of an Integral Ecology Study

BY TINA TIN, ANNABELLE MAYES, and JOHN PEDEN

Antarctica is the fifth-largest continent on Earth. It is the only continent without Indigenous populations or permanent residents and is managed multilaterally. Humans first set foot on the continent in the 19th century (Howkins and Roberts 2023). Although seven countries (Argentina, Australia, Britain, New Zealand, Norway, Chile, and France) have staked claims to parts of the continent, and two more (Russia and the United States) have reserved the right to claim in the future, the 1959 Antarctic Treaty freezes existing claims and precludes future claims, setting Antarctica aside for peace and science. Today, the 29 countries that are Consultative Parties to the Antarctic Treaty govern Antarctica together through consensus-based decision-making under the Antarctic Treaty System (ATS), while another 29 Non-Consultative Parties have signed the Treaty but do not participate in decision-making (Nuttall et al. 2018; Secretariat of the Antarctic Treaty 2026). Specifically, the Protocol on Environmental Protection to the Antarctic Treaty (1991) protects Antarctica's environment, ecosystems, "and the intrinsic value of Antarctica, including its wilderness and aesthetic values and its value as an area for the conduct of scientific research" and is the only international treaty that provides legal protection to wilderness (Bastmeijer and Tin 2015). Each year, approximately 122,000 tourists visit Antarctica (IAATO 2025a, b). Over 100 research stations operated by

Tina Tin

Annabelle Mayes

John Peden

"The limited information that is available on subjective perceptions of Antarctic wilderness indicates that there is broad support for Antarctica as a wilderness, an integral component of the Earth's climate system, and as a scientific laboratory."

30 countries provide capacity for more than 5,000 people to conduct and support research across the continent simultaneously (COMNAP 2024). Pristine areas that are free from human interference are declining while human activity escalates as the Consultative Parties have yet to take concrete actions to protect Antarctica's wilderness values as stipulated under the Protocol (Summerson and Tin 2018; Leihy et al. 2020).

Protection of Antarctica's wilderness values and the management human activities on the continent require mutual understanding and synergy among numerous public and private stakeholders across all continents and are closely connected to geopolitics and the global economy. The 29 Consultative Parties are home to a combined population of 4.4 billion people (Secretariat of the Antarctic Treaty 2026; United Nations 2024). Antarctic science involves researchers based in more than 60 countries on all 6 continents outside Antarctica (Hughes and Hughes 2024). The annual value of Antarctic tourism, commercial fisheries, and a suite of interrelated regulating services has been estimated at US $180 billion (Stoeckl et al. 2024). The scope and complexity of Antarctic wilderness protection necessitate the integration of insights from different disciplines, and the consideration of the diversity and multidimensionality of human and other-than-human relationships in the natural world. In response to these types of complex environmental challenges, integral approaches to ecology have emerged to facilitate the understanding of the complex interconnectedness of natures, cultures, and knowledges while integrating the insights of biophysical sciences, social sciences, and the humanities (Mickey et al. 2017). Among the different approaches, the integral ecology framework of Esbjörn-Hargens and Zimmerman (2009a) based on Wilber's Integral Theory (Wilber 2008), provides a robust framework to map out the four irreducible perspectives of environmental problems: objective, interobjective, subjective, and intersubjective. Each perspective maps a different combination of the individual, collective, interior, and exterior aspects, providing partial and complementary information that can be assembled to form a complete picture of the phenomenon. In the case of the Antarctic wilderness, the land, ocean, snow, ice, and ecosystems (objective perspective) are impacted by human activities that are regulated under collective systems (interobjective perspective), such as the ATS, which provides legal protection to Antarctica's

wilderness values and by fuel and commodity prices that influence global movement of people and goods. Collective systems, in turn, comprise individuals who act, decide, and vote based on individual experiences, attitudes, and beliefs (subjective perspective), which are also shaped by collective ideologies and worldviews (e.g., Romanticism, capitalism, anthropocentrism) within the cultural (intersubjective perspective) space. Our hope is that, by weaving together these perspectives to build a more holistic picture of the Antarctic wilderness, we can foster the emergence of possible pathways for Antarctic wilderness protection in a time of increasing nationalism and the breaching of planetary boundaries (Hemmings et al. 2015; PBScience 2025).

This article represents a first step in a larger project aiming to build a more holistic picture of the Antarctic wilderness by using integral ecology as a framework (AntWILD Integral). Adoption of the full integral ecology framework requires the mobilization of extensive information, which is not always available for Antarctica. Therefore, for the larger project, we will focus on the four perspectives, which form the foundations of integral ecology, while focusing on one—the subjective perspective—in the present article. In the remainder of this article, we present an outline of the components of integral ecology. This is followed by an overview of the subjective perspective on the Antarctic wilderness through literature review and analysis. This overview begins with a review of what we know about people's level of knowledge of Antarctica,which provides a context for the subsequent section on people's subjective perspectives of Antarctic wilderness. Anchored by the subjective perspective, we then highlight emerging links among the different perspectives and identify future directions to guide our integral exploration of Antarctic wilderness.

Integral Ecology

Integral ecology is a comprehensive framework for characterizing ecological dynamics and has been applied to Antarctic politics, global soil security, woodland management, climate change, and other fields (Arkell 2018; Grunwald et al. 2017; Wheeler et al. 2018; Preist 2008; Esbjörn-Hargens 2010; Esbjörn-Hargens and Zimmerman 2009a). It posits that in order to have a full understanding of any environmental problem, all four perspectives of the problem—objective, interobjective, subjective, and intersubjective—need to be considered. The four perspectives co-arise and mutually influence each other in complex ways.

The subjective perspective, also known as the terrain of experience (Figure 1,), is concerned with the subjective experiences of human and other-than-human members of the natural world in our own immediate awareness. Sensations (e.g., warmth or tension), emotions (e.g., fear or joy), beliefs (e.g., mining is currently occurring in Antarctica), and attitudes (e.g., I'd like the number of people visiting Antarctica each year to diminish) are included in this terrain, which can be understood through felt experience. This is home to subjective perceptions and is the focus of the present article. The objective perspective, also known as the terrain of behavior (Figure 2), is concerned with physical

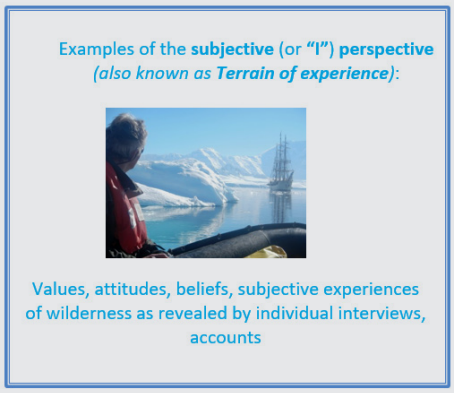

Figure 1 - The subjective (or "I") perspective of the integral ecology framework with examples for the Antarctic wilderness. Photograph by Torsten Dederichs on Unsplash.

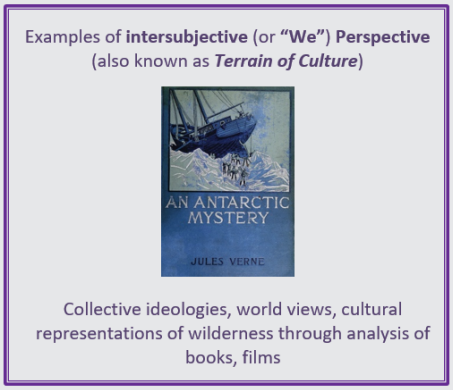

Figure 3 - The intersubjective (or "We") perspective of the integral ecology framework with examples for the Antarctic wilderness. Image from Project Gutenberg.

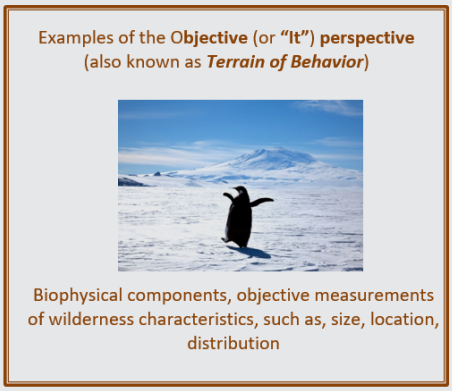

Figure 2 - The objective (or "It") perspective of the integral ecology framework with examples for the Antarctic wilderness. Photograph by Laura Gerwin/US Antarctic Program.

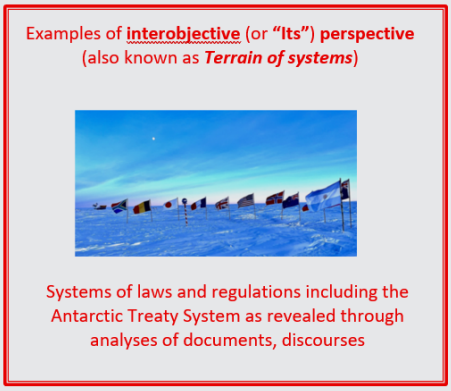

Figure 4 - The interobjective (or "Its"—"It" in the plural form) perspective of the integral ecology framework with examples for the Antarctic wilderness. Photograph by Ian Crocker/NOAA.

Figure 5 - Schematic of the four perspectives of the integral ecology framework with examples for the Antarctic wilderness.

boundaries or surfaces and actions and movements. It includes physical, chemical, or biological characteristics (e.g., ice thickness, salinity, or plant growth rate) and behaviors (e.g., seabird foraging habits) and can be known by measurement. This is home to the natural sciences and most Antarctic research. The intersubjective perspective (terrain of culture; Figure 3) is concerned with shared horizons between individuals, including ideologies (e.g., liberalism or ecocentrism) and shared understandings (e.g., language or observances) and can be understood through mutual resonance. The interobjective perspective (terrain of systems; Figure 4) is concerned with functional interactions and patterns and includes geopolitics and institutions (e.g., the ATS), ecosystems (e.g., polar desert or coral reefs), and economic systems (e.g., global economy and financial markets) and is understood through systemic analysis (Esbjörn-Hargens and Zimmerman 2009b).

Integral ecology provides a way of understanding the relationship between who is perceiving nature, the methods a perceiver uses to study nature (how), and what is perceived as nature, while considering the development and complexity in nature, humans, and systems. Due to data limitations, the AntWILD Integral project will focus on the what of the four terrains (i.e., the terrains of experience, behavior, systems, and culture; Figure 5), leaving the how (comprising eight families of methodologies) and the who (referring to eight levels of psychological complexity) (Esbjörn-Hargens 2005) for future studies.

Terrain of Experience (Subjective Perspective)

Level of Knowledge of Antarctica

There is relatively little information on people's subjective perspectives of Antarctica, and even less information is available on their subjective perceptions of the Antarctic wilderness. Most studies on the topic have focused on the perspectives of people living in the countries of the Consultative Parties to the Antarctic Treaty, and there are no studies on the inhabitants of any of the more than 135 countries that have not signed the treaty.

According to existing studies, Antarctic knowledge appears to be low in Europe (the Netherlands and Spain) and North America and higher in some Asian countries (Malaysia) than others (Republic of Korea and Turkey). For example, a vast majority (87%) of university student survey participants in Canada, the US, and the Netherlands reported that they had low levels of knowledge about Antarctica (Tin et al. 2019). Similar results have been reported in Spain (Peden et al. 2016). Similarly, more than half of nearly 1,000 students from 9 schools in the Republic of Korea considered themselves to be not well informed about the polar regions (Chung et al. 2022). A study in Turkey reported low to very low levels of Antarctic knowledge among secondary school students (Ursavaş and Kandemir 2020). In contrast, only one quarter of the participants of a nationwide survey in Malaysia considered their current knowledge level of Antarctica as poor (Goh et al. 2019) and the vast majority (~95%) of

1,734 upper secondary and university students answered more than 40% of the questions correctly on a test of basic Antarctic knowledge (Shabudin et al. 2016).

Other studies have primarily focused on the US and some of the Consultative Parties in the Southern Hemisphere. The US is the Consultative Party that has been operating the largest research station in Antarctica since 1956 and has retained the right to sovereignty claim in Antarctica since signing the Treaty in 1959. Australia, Argentina, Chile, and New Zealand in the Southern Hemisphere are Consultative Parties, have territorial claims in Antarctica, and are home to "gateway" cities that provide ports and facilities for people and goods to travel to and from Antarctica (Leane et al. 2021).

In the US, a Kahoot! online quiz on polar topics was run by 1,167 teachers in middle and high school classrooms across all 50 states in 2018/19. Only 26% of the 25,880 respondents chose the correct answer on a question on the effects of polar and non-polar ice melt and sea level rise (Pfirman et al. 2021). The same question was replicated in nationally representative surveys of the adult population in the US and in Australia and the correct answer was chosen by a higher percentage of Australians (42%) than Americans (34%). In addition, Australians were far more likely than Americans to claim they did not know the correct answer, indicating that American respondents were more likely to guess (Tranter 2020; Hamilton 2018).

Hobart is Australia's Antarctic gateway city; it is the logistical hub for the Antarctic programs of several Consultative Parties and the port for a small number of Antarctic tourist voyages. A survey of a representative sample of the adult population in Greater Hobart reported that one in eight participants had been directly involved in economic activities relating to Antarctica and more than a third had visited an exhibition, festival, or cultural activity focused on Antarctica in the previous year. Hobartians appear to have generally high levels of personal connection to Antarctica (Leane et al. 2021). In contrast, a representative survey of 300 adult residents of Punta Arenas, Chile's Antarctic gateway city, reported that nearly two-thirds of the participants rated themselves as not at all or minimally informed about Antarctic issues; the proportion rose to nearly three-quarters in Santiago, Chile's capital (Salazar 2013).

The Antarctic claims of Chile and Argentina overlap , and both countries operate more facilities (Argentina, 13 and Chile, 14) than the average (3–4 facilities per country; COMNAP, 2024). Ushuaia, Argentina's Antarctic gateway city, is the port for 65% of all Antarctic tourist cruises (Todorov 2024), and a poll of 319 residents in 2019–2020 reported that residents have knowledge of Antarctica's natural landscape but know less about the historical and symbolic connections between Ushuaia and Antarctica (Medina and Salemme 2024). Three thousand kilometers to the north, in Buenos Aires, Argentina's capital, an attitude of indifference toward Antarctica

was expressed by a third of the 500 young (15–25-year-olds) participants in a survey (del Acebo Ibáñez and Costa 2010). In contrast, nationwide representative surveys in New Zealand in 2009–2015 reported that 67%–78% consider Antarctica to be very or quite important (Colmar Brunton 2015).

Based on this review, we can infer knowledge of Antarctica is higher among some of the Consultative Parties (Australia and New Zealand) than others (Argentina, Chile, and the US). In the Southern Hemisphere, people living closer to Antarctica generally know more about it than those who live in the capital. However, while limited information on people's subjective perceptions of Antarctica exists for a number of the Parties to the Antarctic Treaty, what the vast majority of the world's population knows about the continent remains undocumented.

Subjective Perceptions of Antarctic Wilderness

A few studies have provided insight into subjective perceptions of the Antarctic wilderness; they are also focused on Consultative Parties, similar to studies on Antarctic knowledge. For example, in New Zealand, participants in two nationwide representative surveys considered Antarctica to be very or quite important because it is one of the last pristine environments left on Earth (Colmar Brunton 2011, 2015). The unique and untouched character of the Antarctic environment has similarly been noted by residents of the gateway city of Christchurch (Salazar et al. 2021). In a survey of young people in Buenos Aires (Argentina), 20% of the participants had a poetic or utopian vision of Antarctica, using terms such as "beautiful landscapes," "a dream," "a virgin place," "a pure place," and "an oasis" to describe the continent (del Acebo Ibáñez and Costa 2010). Based on concurrent surveys conducted in several gateway cities, 48%–69% of the respondents from Christchurch (New Zealand), Hobart (Australia), and Punta Arenas (Chile) disagreed that using Antarctica's plentiful resources is important for their city's future economic development, reflecting their high levels of concern about increasing commercial activities in the Southern Ocean and Antarctica (Salazar et al. 2021).

To further elucidate subjective perspectives on Antarctic wilderness, we present a synthesis of the results of the research project called "Managing Antarctica for the Benefit of Mankind: A Research Project on the Public Perception of Antarctica and the Way It Should be Managed" (AntWILD), which has published some of the only studies specifically focused on the topic. AntWILD studies use a questionnaire with open-ended and closed questions to collect information on people's subjective perceptions of wilderness, wilderness in Antarctica, and human activities in the Antarctic wilderness. They have reported their findings from a range of study populations (Neufeld et al. 2014; Bastmeijer and Tin 2015; Peden et al. 2015, 2016; Tin et al. 2011, 2016, 2018, 2019).

Basis for Synthesis of AntWILD Results

We synthesized the results from Question 11 on the AntWILD questionnaire across several studies and datasets. Question 11 asks:

What is, in your opinion, the importance of Antarctica?

A. a science laboratory for the benefit of mankind
B. a tourist destination
C. one of the world's last great wildernesses
D. a reserve of mineral resources that might support society in the future
E. the "refrigerator" of the world, an important component of the Earth's climate system
F. Antarctica does not have any value for mankind

We compiled an amalgamated dataset containing the percentages of respondents supporting each of the five motifs (a., science, b., tourism, c., wilderness, d., minerals, and e. climate) associated with the importance of Antarctica from different study populations (Table 1). Each respondent could support any number of motifs. The amalgamated dataset comprises information published in three studies (Bastmeijer and Tin 2015; Peden et al 2016; McLean and Rock 2016) as well as information derived from one unpublished dataset and two previously presented datasets (Tin et al. 2018, 2019). It provides a unique glimpse of subjective perceptions on the Antarctic wilderness, summarizing the opinions of 1,876 respondents, but it is limited by widely different study population sizes and sampling years.

To provide a basis for first-order comparisons, we assumed that study populations' support for the different motifs followed a Gaussian distribution and estimated the margin of error of the percentage of a study population supporting a motif by where Z=1.645 is the z-score for a 90% confidence interval (CI) and p is an estimator of the percentage (Hazra 2017; Cumming et al. 2007); p was set to 0.5, which corresponds to the largest possible margin of error.

For each of the 16 study populations, we identified the motifs supported by the highest and lowest percentages of respondents (referred to as the HImotif and LOmotif, respectively). We defined %HI as the percentage range corresponding to the HImotif; the upper limit of the percentage range was defined as the sum between the percentage and the margin of error; the lower limit was defined as the difference between the percentage and the margin of error. For example, for the study population of "Wilderness managers and others associated with ASOC," the HImotif is wilderness (supported by 91% of the study population, with a margin of error of 7.6%), therefore the %HI is 84%–99%. We calculated the percentage ranges of all motifs. For each study population, we identified the motifs with percentage ranges that overlap with %HI; these motifs, including the HImotif, were classified as the HI group. In our example of "Wilderness managers and others," the HI group includes the motifs of wilderness (with a percentage range of 84%–99%), climate (75%–90%), and science (69%–85%) (Figure 6). We assumed that it is not possible to detect differences between %HI and the percentage

Study population	Sampling year	Sample size (n)	Average age of respondents (years)	Percentage of respondents associating different motifs with the importance of Antarctica					Margin of error
				a. Science	b. Tourism	c. Wilderness	d. Minerals	e. Climate	
A. Study populations in which all respondents have traveled to Antarctica									
Antarctic tourists – Sierra Outing[1]	2007	12	51	83%	58%	100%	0%	83%	23.7%
Antarctic tourists - Quark Expeditions[2]	2013	222	52	68%	43%	88%	17%	86%	5.5%
B. Study populations in which some respondents have traveled to Antarctica									
Wilderness managers, researchers, and others involved with Antarctic and Southern Ocean Coalition (ASOC)[3]	2013	115	41	77%	18%	91%	9%	83%	7.6%
Antarctic researchers[4]	2014	76	38	78%	24%	75%	5%	83%	9.4%
C1. Study populations in which no respondent has traveled to Antarctica—university students only									
University students in Tilburg, Netherlands[5]	2007	167	24	43%	11%	63%	19%	59%	6.3%
University students in Georgia, USA[6]	2012	179	21	41%	15%	62%	41%	51%	6.1%
University students in Madrid, Spain[6]	2012	189	21	46%	11%	57%	24%	65%	6.0%
University students in British Columbia, Canada[7]	2013	121	26	71%	20%	70%	21%	83%	7.5%
University students in Minnesota, USA[8]	2013	231	21	65%	10%	75%	33%	67%	5.4%
University students in Tilburg, Netherlands[5]	2013	227	23	52%	10%	52%	33%	55%	5.4%
University students in Savoie, France[9]	2017	43	22	67%	7%	72%	12%	72%	12.5%
C2. Study populations in which no respondent has traveled to Antarctica—mixed populations									
Residents of Tilburg, Netherlands[5]	2007	100	58	58%	9%	66%	24%	75%	8.2%
Residents of Prince George, Canada[5]	2009	45	47	64%	20%	67%	27%	78%	12.2%
Residents of Minnesota, USA[10]	2012	72	34	74%	22%	68%	32%	69%	9.7%
Residents of Murcia, Cabo de Palos, and Madrid, Spain[5]	2012	34	37	71%	24%	56%	26%	74%	14.1%
Non-researchers in New Zealand[11]	2014	43	33	44%	12%	70%	9%	80%	12.5%

Table 1- Amalgamated Dataset of Responses to Question 11 of the AntWILD Survey

[1] Tourists in Antarctica on a tour organized by Sierra Outing that is affiliated with the Sierra Club, a US-based environmental nongovernmental organization (eNGO). All respondents were from the US. Data published in Bastmeijer and Tin (2015).

[2] Tourists in Antarctica on a tour organized by Quark Expeditions, a private company. Data published in Tin et al. (2016).

[3] Wilderness managers, researchers, people involved with the eNGO Antarctic and Southern Ocean Coalition. Participants were encouraged to forward the survey to others. Data published in Bastmeijer and Tin (2015).

[4] Researchers involved with British Antarctic Survey (Cambridge, UK), Gateway Antarctica at the University of Canterbury, New Zealand, and the Scientific Committee on Antarctic Research (SCAR) Open Science Conference in Auckland, New Zealand in 2014. Participants were encouraged to forward the survey to their colleagues in Antarctic research. The survey included Question 11 from the AntWILD survey but was not part of the AntWILD study. Data published in McClean and Rock (2016).

[5] Data published in Bastmeijer and Tin (2015).

[6] Data published in Peden et al. (2016).

[7] Data derived from dataset presented in Tin et al. (2019).

[8] Data published in Tin et al. (2018).

[9] Unpublished data.

[10] Data derived from dataset presented in Tin et al. (2018).

[11] People not involved with research at or in the vicinity of the SCAR Open Science Conference in Auckland, New Zealand in 2014. An online version of the survey was advertised to non-researchers with no association to Antarctica through email requests and social media, as well as approaching some people in person. Data published in McClean and Rock (2016).

ranges of the other motifs in the HI group within the limitations of the amalgamated dataset (Krzywinski and Altman 2013; Florence and McGuire 2020; Gillies et al. 2024).

Similarly, we defined %LO as the percentage range corresponding to the LOmotif. We identified the motifs with percentage ranges that overlap with %LO, and the overlapping motifs were classified as the LO group. In our example of "Wilderness managers and others," the LOmotif is minerals (supported by 9% of the study population with a margin of error of 7.6%), therefore the %LO is 1%–16%. The LO group includes the motifs of minerals (with a percentage range of 1%–16%) and tourism (11%–26%) (Figure 6). We consider that it is not possible to detect differences between %LO and the percentage ranges of the other motifs in the LO group. However, we consider that %HI and %LO (and consequently, the HI and LO groups) are sufficiently distinct, even within the limitations of the amalgamated dataset.

Broad Support for Antarctic Wilderness

On the basis of the HI/LOmotif comparisons across the 5 motifs for each of the 16 study populations, we see that, in almost all populations, wilderness and climate (Figure 6; dark blue) or wilderness, climate, and science (light blue) are among the motifs supported by the highest proportions of respondents; tourism (yellow), minerals (red), or both (orange) are among the motifs supported by the lowest.

Considering that all 16 study populations have this broad similarity of higher support for wilderness, climate, and science and lower support for minerals and tourism, we focused on 4 populations from the US to highlight differences between respondents who have been to Antarctica (2 populations: "Antarctic tourists - Sierra Outing" who traveled to Antarctica in 2007 and "Antarctic tourists from US—Quark" who were in Antarctica in 2012) and those who do not have direct experi-

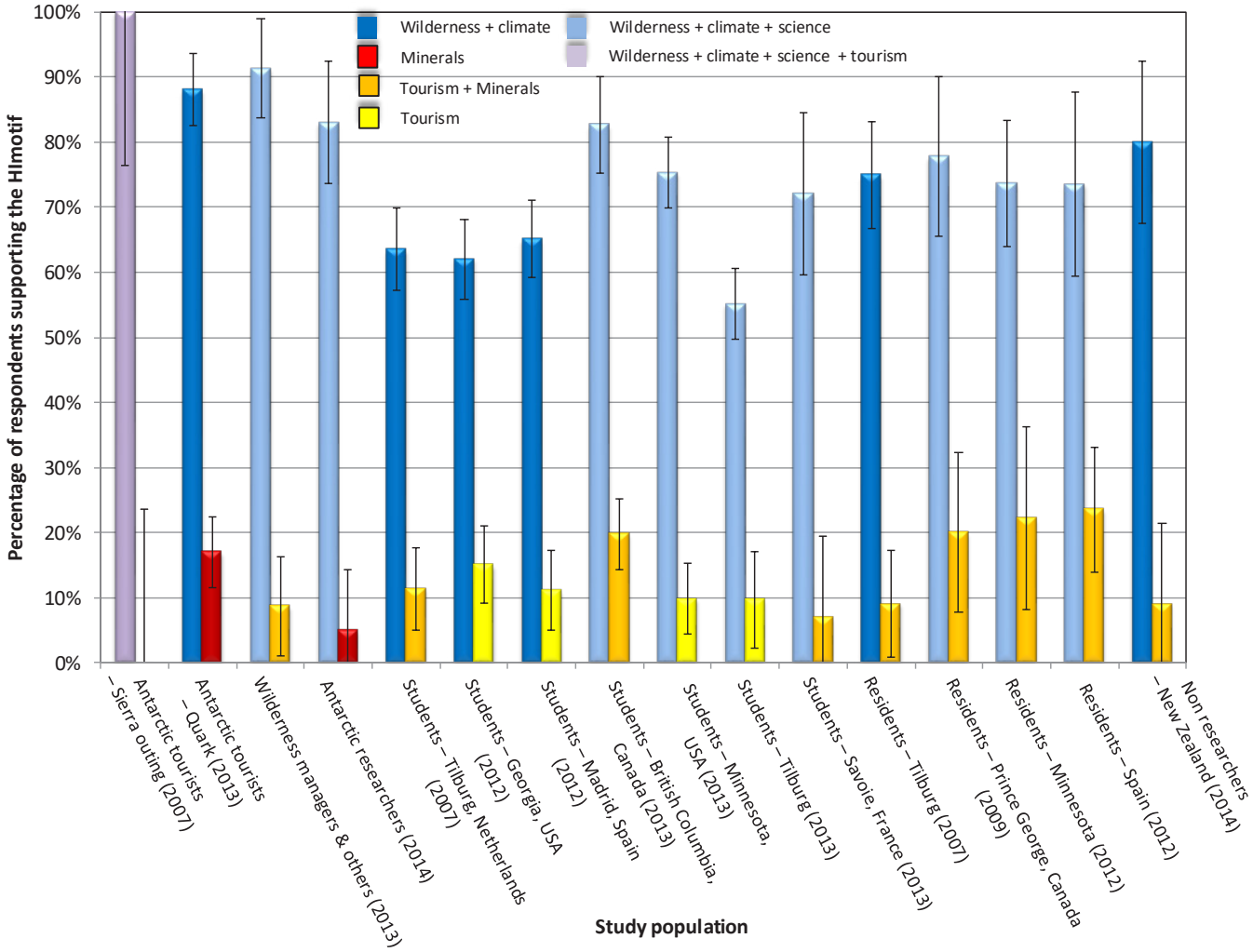

Figure 6- The percentage of respondents (represented by column height) supporting the motifs that are supported by the largest (HImotif; colored bar on the left) and the smallest (LOmotif; colored bar on the right) proportions of each of 16 study populations. Error bars indicate the margins of error for each study population. Color coding indicates the motifs that make up the HI (or LO) groups. HI (or LO) groups include the HImotif (or LOmotif) and the motifs with a percentage range that overlaps with the percentage range of the HImotif (or LOmotif). The upper/lower limit of the percentage range was defined as the percentage +/– margin of error. For "Antarctic tourists—Sierra Outing," the LO group makes up only the LOmotif (minerals), which has a percentage range of 0 +/– 23.7%. Details about each of the study populations are available in Table 1.

ence of Antarctica (2 populations: "University students in Georgia" and "University students in Minnesota") (Figure 7). For the motifs of wilderness, climate, and science, the percentage range of the "University students in Georgia" stands out because it is the lowest and does not overlap with the percentage ranges of the other three populations. For the motifs of tourism and minerals, the percentage ranges of the two tourist populations overlap with each other (forming a Tourist Group, indicated by crosshatched bars in green in Figure 7), while the percentage ranges of the two student populations overlap with each other (forming a Student Group, indicated by dotted bars in brown in Figure 7). Support for tourism was higher in the Tourist Group (all respondents had been to Antarctica) than in the Student

Group (no respondents had been to Antarctica), while support for minerals was higher in the Student Group.

Wilderness Characteristics and Values

Responses to Question 11 are further corroborated by participants' responses to open-ended questions on Antarctica, wilderness, and the Antarctic wilderness (Tin et al. 2016, 2018; McLean and Rock 2016). When asked about the meaning of wilderness, respondents highlighted specific characteristics (e.g., pristine, desolate, wildlife) and values (e.g., intrinsic, spiritual, and ecological). Examples of wilderness include national parks and deserts in their country of origin, and transboundary areas such as the Sahara Desert, the Amazon Rainforest, and the polar regions. Respondents considered that wilderness should be used for education, research, and some recreational activities, but stressed that environmental impacts should be minimal. Similar to wilderness in general, study participants also considered Antarctic wilderness to have the characteristics of awe/wonder, beauty, pristineness, immensity, and wildlife. Comments overwhelmingly supported

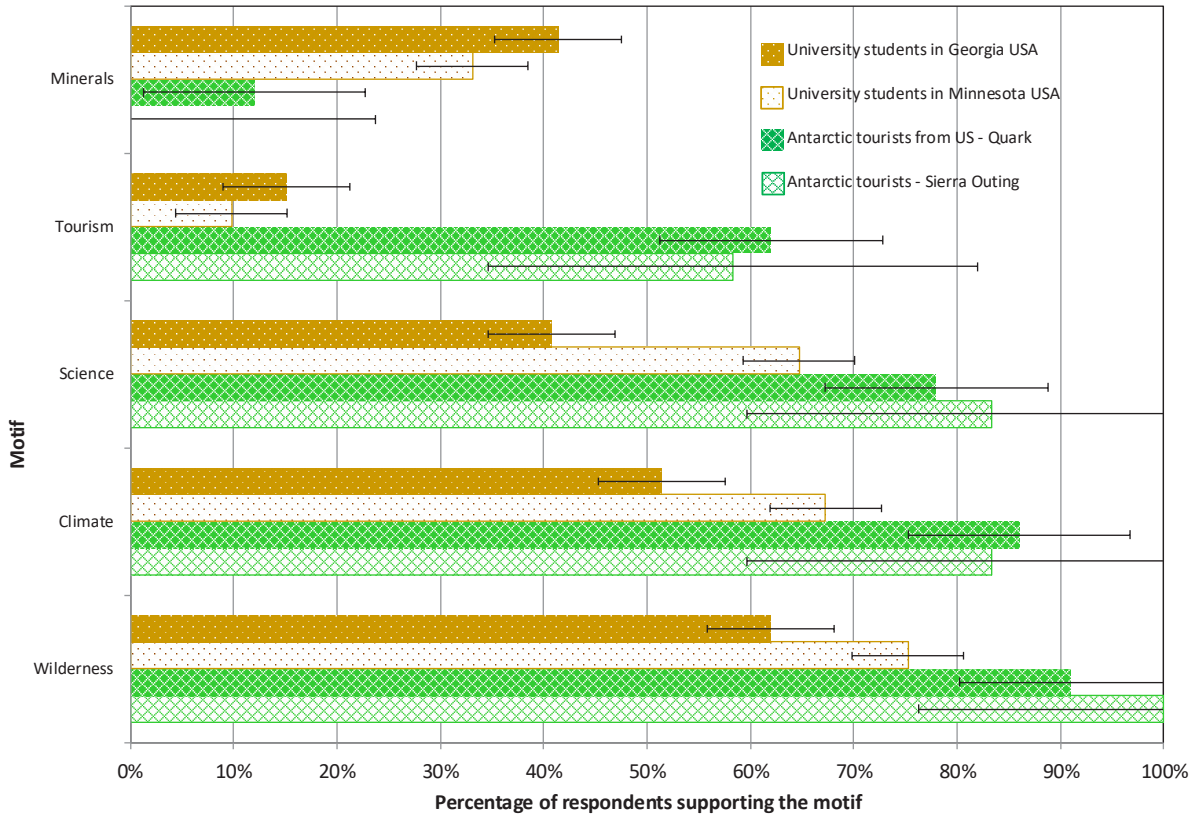

Figure 7- Percentages of respondents supporting five motifs for four study populations in the US. Error bars indicate the margins of error for each study population. "Antarctic tourists from US—Quark" is a subpopulation of "Antarctic tourists—Quark" (Table 1). It includes 58 respondents with an average age of 52. Data published in Tin et al. (2016). For "Antarctic tourists from US—Quark," each motif has a margin error of 5.5%

no resource extraction and controlled and limited tourism and scientific research; some emphasized the importance of "only doing what is necessary in Antarctica" (Tin et al. 2016).

Discussion

Subjective Values, Culture, and the ATS

The limited information that is available on subjective perceptions of Antarctic wilderness indicates that there is broad support for Antarctica as a wilderness, an integral component of the Earth's climate system, and as a scientific laboratory. To some people, wilderness connotes pristine, vast tracts of undisturbed nature with little to no human activity, whereas for others, wilderness is lifeless and desolate, "where grass and trees do not grow" (Tin et al. 2016). These ideas are likely to have been mediated by study participants' shared meanings (intersubjective perspective/terrain of culture) and nature experiences (subjective perspective/terrain of experience) in their countries of origin (e.g., the lush Boundary Waters Canoe Area Wilderness in the US or the dry Gobi Desert in China and Mongolia). And yet, when it comes to the Antarctic wilderness, study participants, regardless of their country of origin and whether or not they had been to Antarctica, converge and agree on the need to protect this pure, untouched place, showing little support for tourism development and mineral extraction, and approving only human activities with minimal impacts. How this convergence comes about is of particular interest for an integral ecology study—does a convergence indicate a homogenization in the terrain of culture? If so, is it mediated by the globalization of media? How is Antarctic wilderness portrayed in the media in different societies? For example, British narratives of Antarctica have been heavily influenced by the heroic and often tragic expeditions of the early 20th century (e.g., Ernest Shackleton's survival of the sinking of the Endurance and Robert Falcon Scott's death in the race to the South Pole). How would portrayals of the Antarctic wilderness in British culture differ from those in French culture, which have far fewer stories of strife (Spufford 1996; Martin-Nielsen 2021)? Furthermore, how would the portrayals in countries that were original signatories of the Antarctic Treaty in 1959 differ from portrayals in countries that have more recently expressed interest—for example, Turkey which is planning to apply to become a Consultative Party to the Antarctic Treaty (Hughes and Hughes 2024)—or gained prominence—for example, China, which is building its fourth station in 10 years, and in Marie Byrd Land, the largest unclaimed territory on Earth (1.6 million km2) the only unclaimed sector in Antarctica, and a region with no permanent human infrastructure to date (Zhang and Haward 2022; The People's Republic of China 2025)—in the ATS? These questions highlight the need to explore the terrain of culture (or intersubjective perspective) of different societ-

ies, identify overlaps (or lack thereof) with the subjective perceptions that are reported in this article, and trace any linkages with countries' engagement within the ATS (interobjective perspective/terrain of systems).

Incongruity Between Values and Environmental Impacts

While the 16 study populations in our amalgamated dataset generally showed higher support for wilderness, climate, and science and lower support for minerals and tourism, support for tourism was significantly higher among Antarctic tourists than in other study populations (Figures 6 and 7). However, the average greenhouse gas emissions per person per tourist trip to Antarctica (ranging from 5 to more than 30 days) were estimated to be 6.41 t CO2eq (including air travel from country of residence—2.26 t—and air/sea/land travels in Antarctica—4.15 t; Cajiao et al. 2025), which were 95% of the global average greenhouse gas emissions per person for the entirety of 2022 (6.762 t CO2eq; Crippa et al. 2023). Valuing Antarctica both as a wilderness and for its role in the Earth's climate system (subjective perspective) is incongruous with human presence on the continent because each person traveling to Antarctica emits 10–70 times or more greenhouse gases than the global average per person per day (objective perspective). Anthropogenic carbon emissions are responsible for climate change, which in turn puts additional stress on remaining wilderness areas (Arias et al. 2021; Asamoah et al. 2022). Such incongruity may indicate a disconnect between one's beliefs (subjective perspective) and the consequences of one's actions on the physical world (objective perspective); this highlights the limitations of focusing only on subjective perspectives that are based on self-reports and again underscores the importance of considering multiple perspectives/terrains in order to obtain a fuller understanding of a given phenomenon.

Valuing the Antarctic Wilderness Within the Context of Multiple Human Systems

Lastly, our review has shown that the world population's subjective perceptions of Antarctica remain largely undocumented. As a result, the decisions of any institutions (interobjective perspective/terrain of systems), including the ATS, regarding the Antarctic wilderness can at best be based on explicit knowledge of what only a very small part of the world's population knows or desires. Consequently, there is high likelihood that the ATS would fail in its mission of governing Antarctica "in the interest of [hu]mankind as a whole" (The Protocol on Environmental Protection to the Antarctic Treaty 1991, Preamble). Of course, it would be naive to assume that the interests of every member of humankind could be met at a time when 8 billion people are putting immense pressure on the planet's life-support systems (Merz et al. 2023; PBScience 2025). Other forces in the terrain of systems (interobjective perspective), including geopolitics, pandemics, and global financial crises, are also influencing human activities in Antarctica and consequently the

wild land, ocean, ice, and ecosystems in Antarctica (objective perspective) (Leane 2020; Tin 2022). Integral ecology reminds us that all four perspectives/terrains co-arise and mutually influence one another. More explicit recognition and articulation of the connections between people's subjective perceptions (terrain of experience), and shared meanings (terrain of culture) of the Antarctic wilderness and our impacts on the wild land, ocean, ice, and ecosystems of the Antarctic (terrain of behavior) can give rise to new ideas for how to meet the goal of protecting Antarctica's wilderness values as stipulated under the Protocol on Environmental Protection to the Antarctic Treaty (terrain of systems), although some of these ideas may require fundamental transformations of existing human systems (Wiedenfeld et al. 2022; Crist et al. 2021).

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RESTORATION A
STAY OFF

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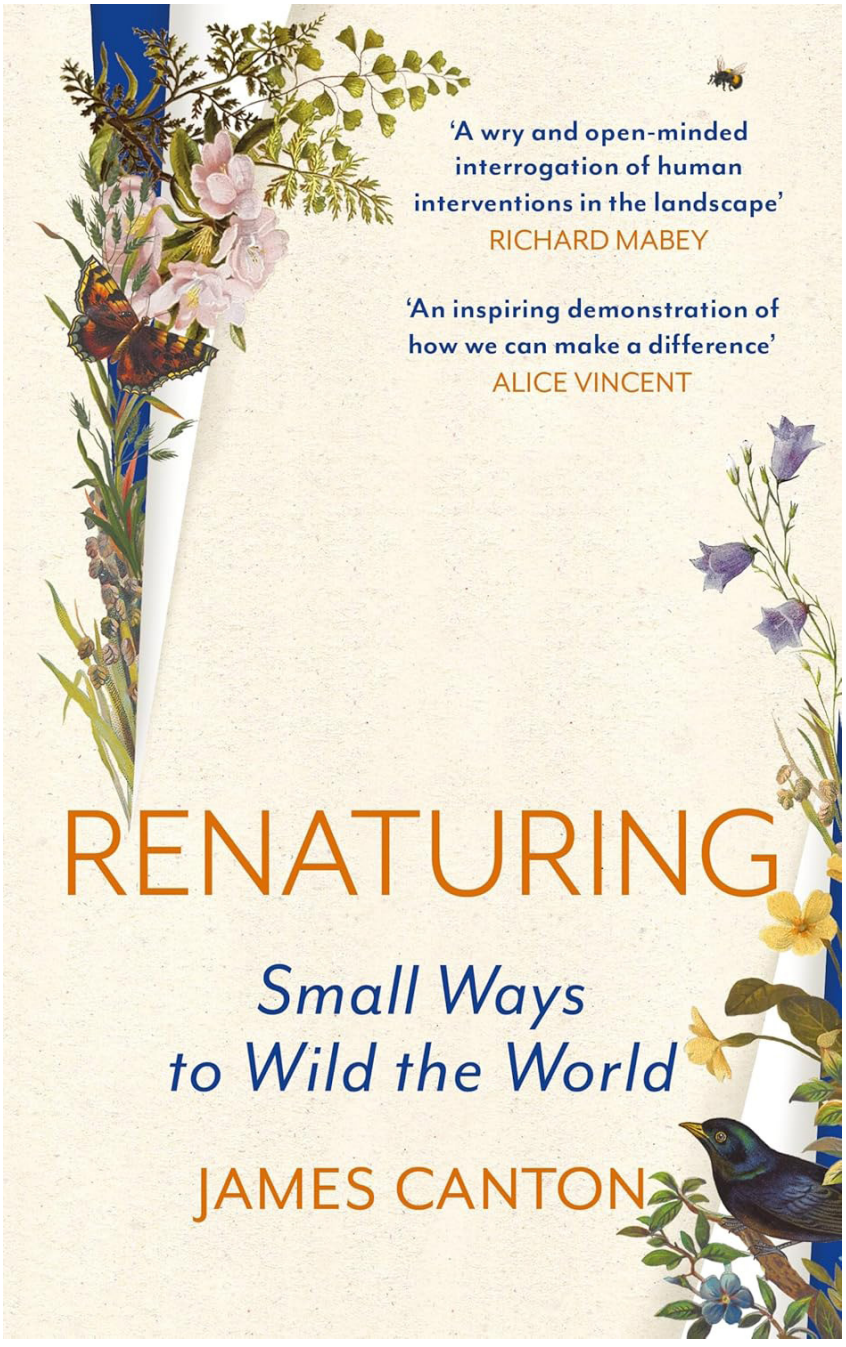
Photo by Isaac Quick from Unsplash.

Digital Reviews:

Patrick Kelly, Media And Book Review Editor

Renaturing: Small Ways to Wild the World,
by James Canton. 2025. Canongate Books.



Part nature journal, part land manager log, and part philosophical reflection, Canton's Renaturing begins as a personal story of a comparative novice attempting to return ecological function to a couple of acres. The work quickly evolves, though, into an exploration of what rewilding means and—possibly more importantly for the author—does not mean. A nature and travel writer as well as a university lecturer, Canton is well positioned to lead the reader on this journey that veers between hands-on fieldwork and consideration of the project's meaning and goals.

Canton opens the book by describing how he came to purchase and steward a small field in North Essex, England. He then recounts his adventures, sharing how that desire led him to speak with—and learn from—individuals with wide-ranging experiential and academic knowledge of native flora and fauna. Journal entries of Canton's efforts to return function to the field are interspersed with retellings of conversations with these guides as well as his perspectives on issues such as wildwashing, biodiversity, and—above all—rewilding.

The subject of extensive definitional debate and a term susceptible to idiosyncratic understandings, "rewilding" perhaps is best understood as an ecocentric effort in which humans attempt to revive self-sustaining ecological processes in damaged or nonfunctioning ecosystems. Under this approach, humans seek to withdraw from active management and instead yield to wild conditions and more-than-human autonomy. Canton subscribes to the view that true rewilding can only occur at landscape scale, as in the now traditional "three C's" model, which emphasizes core protected areas connected by corridors that allow carnivores to reassume their ecological roles. As a result, he contends that the efforts that he and other smallholders and urban residents pursue to help nature recover on their own properties are better understood as "renaturing."

Canton offers renaturing as a more accessible cousin to rewilding, one with a lower bar to entry and whose very existence helps to protect the meaning of rewilding from the dizzying array of definitions that observers assign to the term. Whatever one might think of this conceptual dispute, the author does suggest one key difference: given its restricted scale and inability to host all necessary elements of a functioning ecosystem, renaturing will always require human intervention, whereas rewilding, ideally, allows the human role eventually to recede from manager to mere participant.

Overall, Canton's work is an engaging and valuable contribution to the growing literature on rewilding. Alongside recent works such as Great Misconceptions, edited by Ian Parsons (Whittles Publishing 2024); Christopher Brown's A Natural History of Empty Lots (Timber Press 2024); and How Can I Help? by Douglas W. Tallamy (Timber Press 2025), Renaturing will be of great interest to anyone concerned with rewilding, managing land for wild conditions, or restoration work more broadly.

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