

THE *AIARE BACKCOUNTRY DECISION-MAKING GUIDE*: AN EXPLORATORY STUDY OF WHEN, WHERE, AND HOW IT IS USED

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ABSTRACT: Many avalanche professionals find decision aids or support tools useful to avalanche risk assessment. By extension, avalanche educators often employ them to teach good judgment and decision-making, or at least assume this means-end outcome, explicitly and implicitly. In this paper, we report the results of a non-random survey of recreationalists and snow professionals familiar with a common, yet empirically unexamined (U.S.-based) decision support tool distributed by AIARE, the largest provider of avalanche education curriculum in the U.S. Using a variety of question types, we explored when, where, and how this tool is used. In total, 758 individuals started the survey; of these, 622 completed it, 33% of which identified as professionals (119) or trained volunteers (88) working in avalanche terrain. Results indicated that respondents, on the whole, were more likely to use the book in new or unfamiliar terrain, and when avalanche forecast centers report moderate, considerable, and high danger levels (particularly among the recreationalists in our sample). Other results illuminate which specific field book resources (e.g., the North America Avalanche Danger Scale) respondents reported using most, along with when and where. Responses to questions aimed at uncovering how else study participants used the field book revealed slightly divergent results, when viewed in the aggregate. In particular, a slight majority of survey participants said they were more likely to use planning-oriented resources than resources designed for in-field and post-trip use.

KEYWORDS: Decision-making, avalanche education, risk management, decision support tool, risk assessment, avalanche safety.

1. INTRODUCTION

Research on decision-making tools, also called decision support tools or decision aids, designed to limit backcountry travelers' exposure to avalanche hazards (e.g., Hallandvik, et al., 2015; Landro, et al., 2020; McCammon & Hageli, 2007) is important to reducing incidents in avalanche terrain and informing avalanche education.

The purpose of this exploratory study was to assess when, where, and how the *Backcountry Decision-Making Guide* – a field notebook published by the American Institute for Avalanche Research and Education (AIARE), the largest provider of avalanche education curriculum in the U.S. – is used. Informally known as the "AIARE field book" or "AIARE blue book," the tool is designed to assist backcountry travelers with decision-making in avalanche terrain. A longtime staple of AIARE's curriculum, the field book is nearly 20 years old and has undergone numerous revisions.

Divided into four sections, the 65-page field book includes checklist-based prompts and templates thought to encourage users to write trip plans, employ safe travel practices, prompt field tests and observations, conduct trip debriefs, and reference resources. To aid users, the field book includes examples of what written trip plans and debriefs might ideally include.

More specifically, the field book opens, on the inside cover, with a proclamation in all caps to "use the field [to] make better decisions," followed by a table of contents. Next, the field book opens with an introduction to five "checklists," three of which constitute fillable templates.

These checklists, which AIARE courses implore their students to see as part of their "daily routine" anytime they plan to travel in avalanche terrain, include AIARE's "Risk Management Framework," introduced on page one; AIARE's "Plan Your Trip" template, introduced on page two (with tips and directions written in faux handwriting); followed by a reference entitled "Plan to Limit Your Avalanche Exposure" on page three; and introductions to AIARE's "Ride Safely" checklist and fillable template on page four and its fillable "Debrief" template on page five, both of which

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include tips and directions (again, written in faux handwriting).

The field book then includes 38 pages of this daily fillable trifecta ("Plan Your Trip," "Ride Safely," and "Debrief" templates, in that order, spread over two pages each), or 19 days' worth of daily checklists/templates.

The book then pivots to 8 pages of "test profile observations" templates for recording test results and other field observations, followed by four pages of grid paper. The field book ends with 10 pages of references, which include the North American Public Avalanche Danger Scale; U.S.-based guidelines for observing and recording common snow, weather, and avalanche phenomena; and a step-by-step guide to conducting an avalanche rescue.

2. METHODS

This study employed a 44-item online survey distributed in English. Individuals, 18 years or older, familiar with the field book were invited to participate and recruited using convenience and snowball sampling. The survey was sent to almost 50,000 email addresses provided by AIARE, advertised on AIARE's and Backcountry Access's social media sites, and shared with eight avalanche forecast centers in the U.S. for distribution over two rounds of data collection in May-June 2021 and March-April 2022.

The survey consisted of Likert-type response scales, matrix questions, forced-choice questions, multiple-answer questions, and open-ended questions. Many of the 44 questions addressed nuances associated with when, where, and how the field book is used and included over 12 images copied directly from the field book to enhance survey reliability. Several questions also dissected participants' demographic characteristics, such as their age, gender, race/ethnicity, education level, avalanche education level, whether they worked in avalanche terrain, outdoor activities in which they had taken part over the last 12 months in avalanche terrain, which U.S. snow climate they had traveled in most often over the last 12 months, and whether they had used any non-AIARE decision-making tools or aids over the last 12 months.

3. RESULTS

3.1 *Survey respondents*

Seven hundred fifty-eight individuals started the survey, of which 622 completed it. Respondents identified as male (68.8%),

female (29.7%), and gender non-binary/non-conforming (0.5%) with 1% preferring not to state gender. Most respondents identified as white (82.6%), while the remaining identified as Asian or Asian American (5.6%), Hispanic, Latino, or Latinx (2.9%), bi-racial (2%), Black or African American (1%), American Indian or Native Alaskan (0.8%), Middle Eastern or North African (0.8%), Native Hawaiian or Other Pacific Islander (0.3%), or preferred not to report (2.9%). The mean age for the sample was 39, while the range was 77 to 18.

In a forced-choice question asking respondents to indicate their familiarity with the AIARE field book, most said they were either extremely familiar (33.5% / 253) or moderately familiar (41.9% / 316) with it. Only 3.7% (28) responded that they were not familiar with the field book at all.

On average, respondents reported spending 25 days in avalanche terrain during the preceding 12 months. In a question asking respondents to indicate what U.S. snow climate they had spent most of their time in over the last 12 months, nearly equal numbers – 37% (230) and 38% (235) – indicated they had traveled most frequently in either continental or maritime snow climates, respectively, while 17% (104) and 7% (41), respectively, indicated they mostly traveled in a transitional snowpack or the Eastern maritime climate of New England.

Forty-three percent (267) reported completing an AIARE avalanche rescue course, while 85% (530), 34% (210), and 9% (56) reported completing an AIARE Rec 1, Rec 2, and Pro 1 avalanche course, respectively. In a forced-choice question, 67% (415) identified as recreationalists, while 19% (119) identified as a snow, ice, or avalanche professional, and 14% (88) identified as a "trained volunteer with leadership...responsibilities." In a multiple-answer follow-up question that asked professionals and volunteers to indicate the type of work they did, 19% said they worked as an educator, instructor, or trainer; 11% worked as ice or mountaineering guides; 10% worked as ski guides; 10% worked as ski patrollers; and 9% worked in search and rescue. Some respondents also indicated working as program administrators (4%), avalanche forecasters (3%), mechanized travel guides (3%), and park rangers (1%).

In a question asking participants what activities they had taken part in while traveling in avalanche terrain, over the last 12 months, from a list of 22 options (where participants were to "check all that apply"), the top five responses included AT or alpine skiing (74%), mountain

climbing / mountaineering (36%), hiking (33%), backpacking (29%), and cross-country skiing (19%).

3.2 When and where the AIARE field book is used

Questions about when and where the AIARE field book is used began by asking participants to recall how often, over the last 12 months, they "use[d] or referenc[ed] the AIARE Field Book" before, during, and after traveling in avalanche terrain (see Figure 1). In this case, almost half of respondents in the sample reported using it 60-100% of the time "before traveling in avalanche terrain (during preparation or planning)." Conversely, over half indicated using the field book 0-50% before travel. Furthermore, most respondents recalled referring to the field book very little, if at all, during travel. Similarly, most respondents reported rarely referring to it after travel.

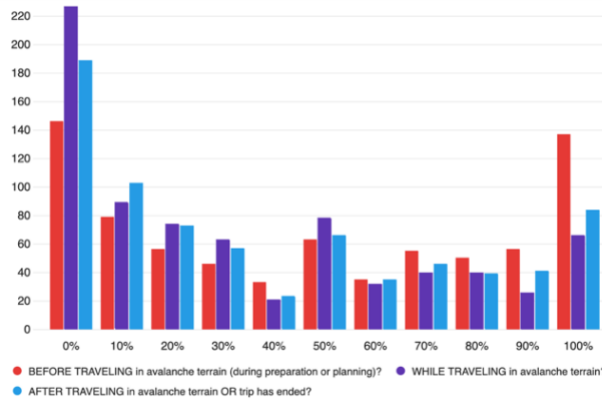


Figure 1: Percentage of time respondents used the field book before, during, and after traveling in avalanche terrain.

In another survey section exploring the contexts in which the book is used, a four-part matrix question investigated the relationship between book use and (a) terrain type (new, unfamiliar, and familiar terrain) and (b) personal vs. work settings. Respondents, on the whole, said they were more likely to use the book in new or unfamiliar terrain (65%), while half of the respondents reported using it at least 50% of the time in familiar terrain (see Figure 2). In the prompt asking how often participants reference the field book on personal trips, responses were almost equally distributed along a 7-point spectrum from "never" (15.3%) on one end to "every time" (14.1%) at the other end (see Figure 3). Then, in the question about use in the context of work, which was applicable only to the professionals or trained volunteers, a little over a third said they "never" (35%) referenced it, while 39.8% reported that they "frequently,"

"usually," or "always" use it (as illustrated in Figure 4).

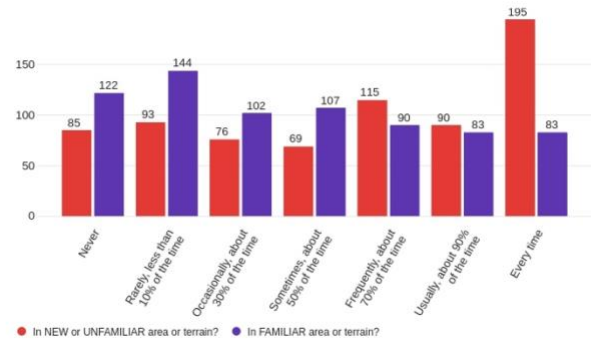


Figure 2: Field book use by terrain familiarity.

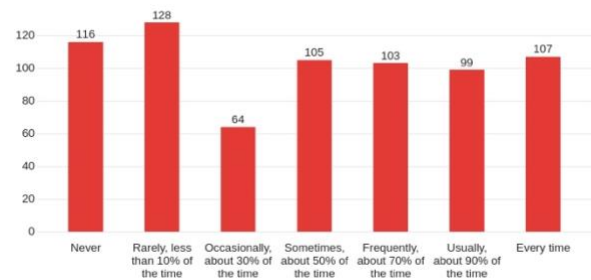


Figure 3: Field book use on personal trips from "never" and "occasionally" to "frequently" and "every time."

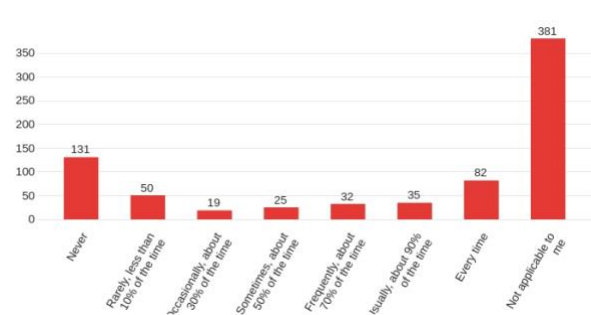


Figure 4: Field book use during work-related contexts (among those respondents for whom the question was applicable).

The last context-oriented questions probed the effect forecasted avalanche danger ratings (Low, Moderate, Considerable, High, Extreme) may have had on respondents' use of the field book. Fifty-two percent, for example, said the daily forecast was very or extremely influential while only 21% reported that it had no influence. When asked about specific danger ratings, 50% said they were either likely or extremely likely to reference the field book when the danger rating was moderate, considerable, high, or extreme. However, when the danger rating was low, almost half (47%) responded they were unlikely or extremely unlikely to reference the field book (Figure 5).

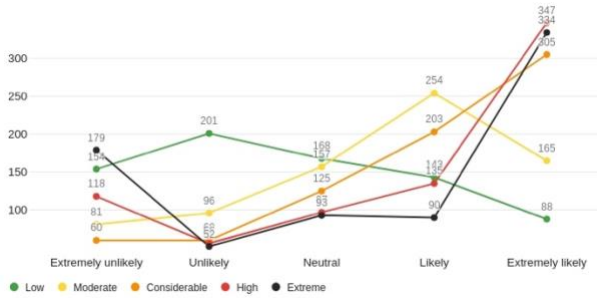


Figure 5: Relationship between forecasted danger rating and the likelihood of using field book.

Drilling further, we found a statistically significant relationship between forecasted avalanche danger ratings and field book use, which appear to corroborate these descriptive findings. For instance, an avalanche danger rating of considerable or high was associated with higher use ($p < 0.05$).

Lastly, when analyzing professional vs. non-professional respondents, recreationalists reported that avalanche danger level influenced their use of the book significantly more than professionals. In fact, recreationalists were significantly more likely than professionals to use it when avalanche danger was moderate, considerable, or extreme. On the other hand, we found a weak correlation ($R = 0.18$) between notebook use and the amount of time spent in avalanche terrain.

3.3 *How the AIARE field book is used*

Thirteen questions asked participants to indicate how they used the field book. More specifically, we asked participants to indicate whether they referenced the field books' resources and/or filled out the daily checklist-based templates provided during "...a typical day while preparing for or traveling in avalanche terrain."

Likewise, we used the same two-stage approach to ask participants whether they referenced and/or "complete[d] or fill[ed] out most of the Test Profile Observations reference" on a typical day.

We concluded this section of the survey with two questions asking whether participants referenced the "Avalanches and Observations reference" and "North American Public Danger Scale resource" found near the back of the field book.

Each question in this section on field book use included an image of the checklist, template, or resource, and utilized Likert-style responses on

a 1 to 5 scale (ranging from extremely unlikely to extremely likely).

Nearly half of the respondents said they regularly referenced AIARE's "Risk Management Framework" found at the beginning of the field book (as illustrated in Figure 6 below).

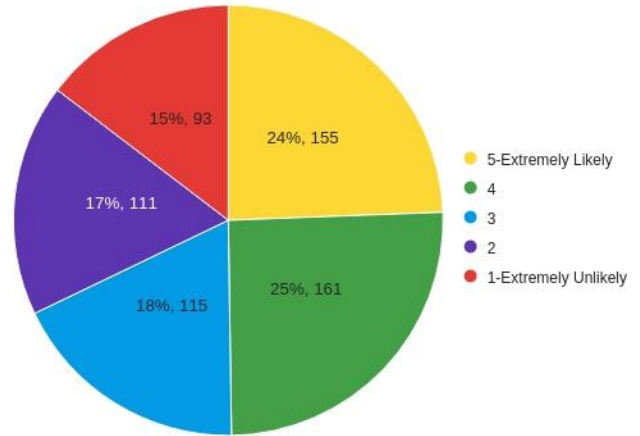


Figure 6: Likelihood of referencing the AIARE Risk Management Framework.

Turning to the first of the fillable trifecta templates – the "Plan Your Trip" checklist/template – half or more participants marked 4 or 5, though more reported referencing the tool than reported filling it out (as noted in Figures 7 and 8). However, a majority of respondents suggested they would do both on a typical day.

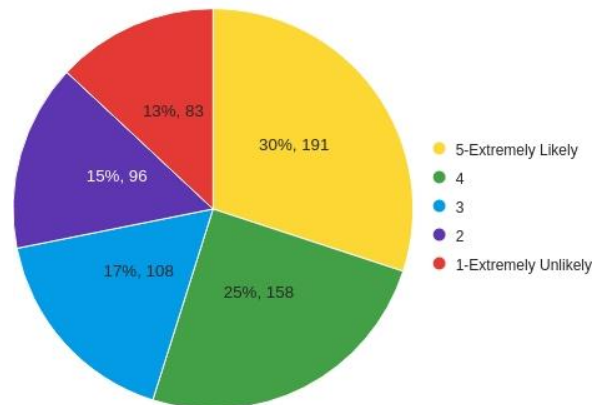


Figure 7: Likelihood of referencing the Plan Your Trip checklist.

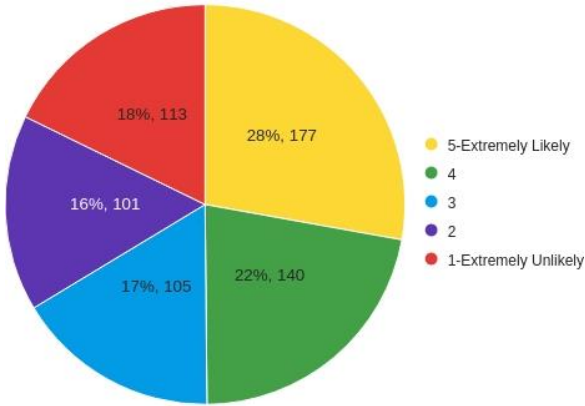


Figure 8: Likelihood of completing or filling out most of the Plan Your Trip template.

With respect to the field book's two other fillable checklists/templates, participants said they were less likely to refer to or fill out the "Ride Safely" and "Debrief" templates that follow the "Plan Your Trip" template (as shown in Figures 9-11). Like we found with the first template, in fact, responses suggest survey participants were more likely to refer to these tools than they were to fill them out (as Figures 9-11 also show). For instance, when asked if they reference the Debrief template (Figure 10), 60% (383) selected a 3, 4, or 5 on the likelihood scale but 49% (316) indicated they were fairly unlikely to also fill out the template (Figure 11).

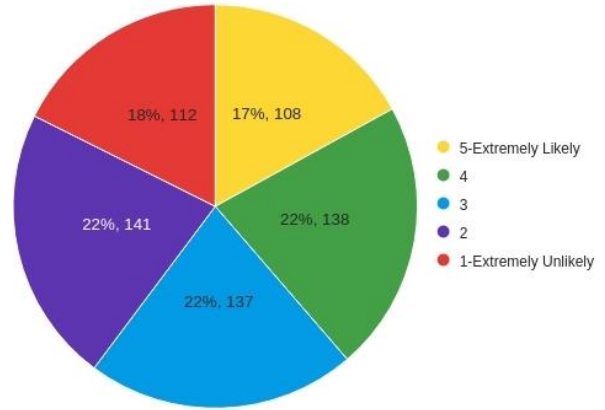


Figure 120: Likelihood of referencing the Debrief checklist.

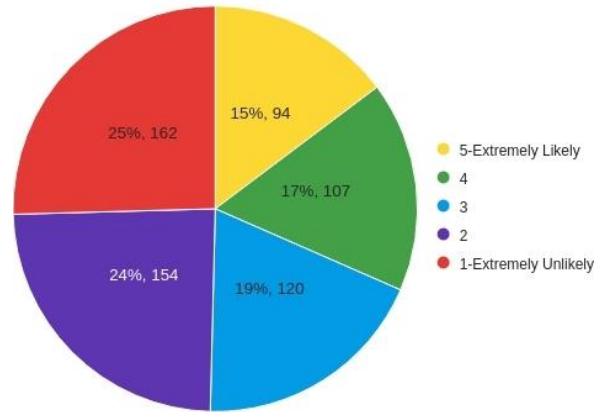


Figure 311: Likelihood of completing or filling out most of the Debrief template.

In questions about the "Test Profile Observations reference," around a quarter of respondents reported referencing or filling it out on a typical day (as displayed in Figures 12 and 13).

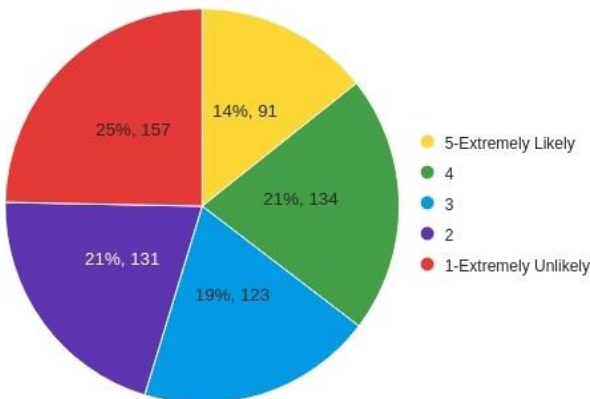


Figure 9: Likelihood of completing or filling out most of the Ride Safely template.

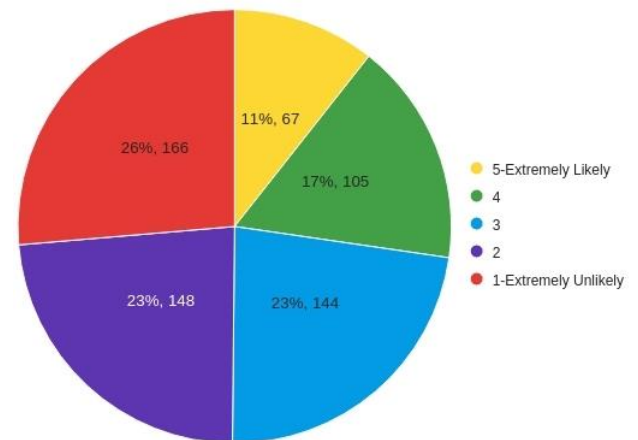


Figure 142: Likelihood of referencing the Test Profile Observations

Profile Observations template.

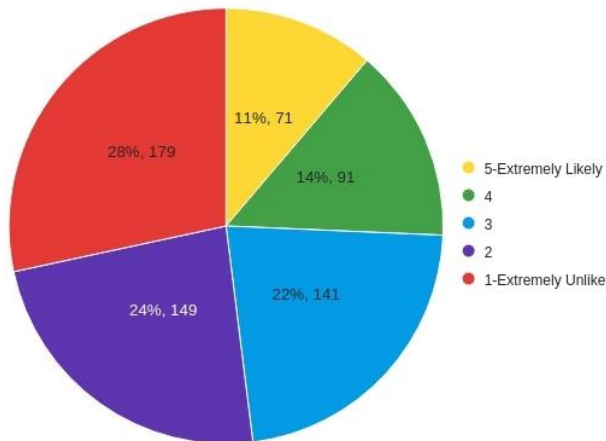


Figure 153: Likelihood of completing or filling out most of the Test Profile Observations template.

In closing, a majority of participants reported referencing both the "Avalanches and Observations reference" and the "North American Public Danger Scale resource" (see Figures 14 and 15). Specifically, 57% (368) selected a 4 or 5 when asked about referencing the Avalanches and Observations reference and 53% chose a 4 or 5 when asked about referencing the Danger Scale.

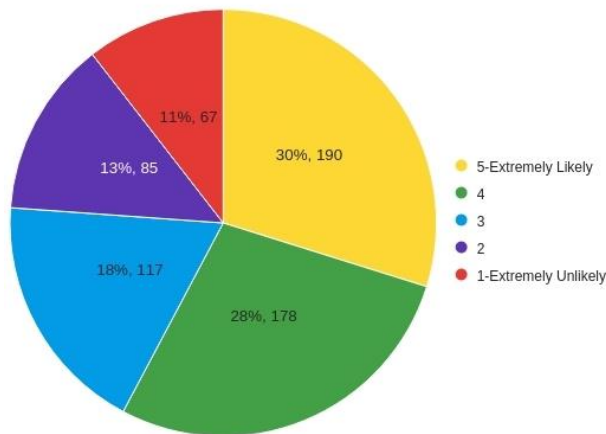


Figure 164: Likelihood of referencing Avalanches and Observations reference.

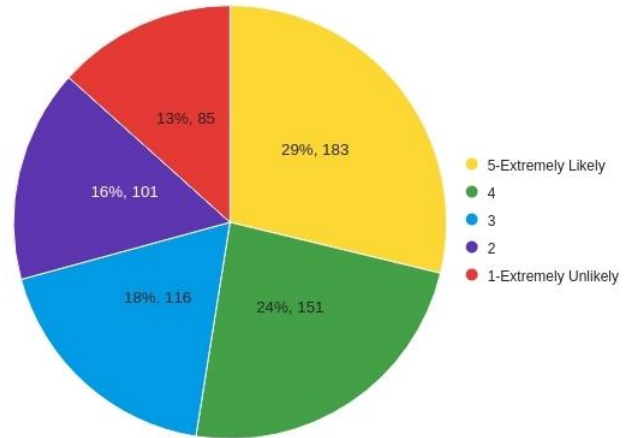


Figure 175: Likelihood of referencing North American Public Danger Scale.

4. CONCLUSIONS

Overall, respondents were more likely to use the field book in new or unfamiliar terrain, and when avalanche forecast centers report moderate, considerable, and high danger levels – particularly among the recreationalists that took part in in our study. Respondents also found some resources and references more useful than others during a typical day of traveling in avalanche terrain. A slight majority of survey participants, for instance, said they were more likely to use planning-oriented resources than in-field and post-trip resources.

Regrettably, we wish we could report other relationships between study variables. Conspicuously absent, for example, is the correlation between avalanche education level and field book use, as well as other ways recreationalists differed from professionals. We hope to analyze both of these in the future.

Study findings are subject to limitations. Foremost, survey respondents represent a convenience sample; thus, results are not generalizable to all field book users. Nevertheless, findings may provide some empirical-based implications for future editions of the AIARE *Backcountry Decision-Making Guide* and similar notebook-type decision-making tools.

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