

## Trend Analysis of Canadian Avalanche Accidents: The Avaluator Avalanche Accident Prevention Card Has Not Reduced the Number of Accidents

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**ABSTRACT:** The Avaluator Avalanche Accident Prevention Card (Haegeli & McCammon, 2006), a Canadian government avalanche prevention initiative, was designed to help recreationists avoid accidents, and therefore, to reduce the overall number of avalanche accidents in Canada involving recreational users. McCammon and Haegeli (2006) argued that the Avaluator will cause a statistically detectable reduction in the number of avalanche accidents within 3 or 4 seasons after its adoption. However, research has revealed that (a) the data behind the Avaluator's Obvious Clues are not available for inspection (Uttl, Uttl, & Henry, 2008; Floyer, 2008); (b) Haegeli and McCammon (2006) inappropriately excluded over 1,148 avalanche accident reports from their sample due to missing values and based the prevention values on only 252 US accidents; (c) several independent studies have found the Obvious Clues prevention values published in the Avaluator to be grossly inflated (Uttl, Henry, & Uttl, 2008a,b; Floyer, 2008; Uttl, Kisinger, Kibreab, & Uttl, 2009). We examined McCammon and Haegeli's (2006) prediction. Our trend analysis of avalanche accidents in Canada revealed that the number of accidents has sharply increased rather than decreased following the Avaluator's adoption. This increase is consistent with findings that the Avaluator's prevention values are grossly inflated and give users a false sense of confidence in slope stability.

**KEYWORDS:** Avaluator, Obvious Clues, avalanche accident trends, avalanche fatalities.

### 1 INTRODUCTION

Avalanches kill roughly 15 people a year in Canada. However, 29 people were killed during the 2002/2003 season. In response, Parks Canada commissioned a report that recommended the development of a "made in Canada" decision tool to help users avoid avalanches. Subsequently, the Avaluator Avalanche Accident Prevention Card (Haegeli & McCammon, 2006), a Canadian Government avalanche prevention initiative, was designed to help recreationists avoid avalanche accidents, and therefore, reduce the overall number of avalanche accidents in Canada involving recreationists. The Avaluator's development was funded by Canadian Taxpayers (>\$500,000 for the Avaluator development and >\$500,000 for the evaluation of its effectiveness) (see Uttl, Henry, & Uttl, 2008b; Uttl, Uttl, & Henry, 2008).

McCammon and Haegeli (2006) claimed that the Avaluator will lead to a statistically detectable reduction in a number of avalanche accidents within 3 or 4 seasons following the Avaluator's introduction on the market. To illus-

trate, if all recreationists consistently used only the Avaluator's Obvious Clues and limited themselves to slopes with 4 or fewer clues, one should see a 77% reduction in the number of avalanche accidents.

However, we have raised serious concerns about extremely poor methodology used to develop the Avaluator's Obvious Clues (e.g., elimination of most of the accident records due to missing values; see Uttl, Henry, & Uttl, 2008a,b; Uttl, Uttl, & Henry, 2008; Uttl & Kisinger, 2009); the authors' refusal to clarify their methodology (e.g., provide the list of 252 accidents that remained in their analysis); and the authors' inability or unwillingness to provide access to their data for the limited purpose of verifying their claims (see Table 1. Avaluator: Facts; see also Uttl, Uttl, & Henry, 2008; Uttl & Kisinger, 2009).

Moreover, our independent research attempts to replicate the Avaluator's Obvious Clues prevention values have revealed that the prevention values published in the Avaluator are grossly inflated in the US accidents sample (Uttl, Henry, Uttl, 2007, 2008) as well as in the Canadian accident sample (Uttl, Kisinger, Kibreab, & Uttl, 2009). Following in our steps, Canadian Avalanche Center's attempt to replicate the Avaluator's prevention values also found them to be inflated (Floyer, 2008).

We examine historical trends in the number of avalanche accidents in Canada. If the Avaluator is reducing the number of avalanche acci-

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dents, we should see a downward trend in the number of accidents following its introduction on the market during the 2006-2007 season. In contrast, if the Avaluator is giving users a false

sense of security due to its inflated prevention values, we should see an increase in the number of accidents, injuries, and deaths.

Table 1. Avaluator History.

**2003-2006:** Avaluator developed by Haegeli and McCammon at a cost of over \$500,000 of Canadian taxpayers money as part of the ADFAR project (Haegeli, McCammon, Jamieson, Israelson, & Statham, 2006)

**2006-2007 Winter Season:** Avaluator introduced on the market and incorporated into the curriculum of Avalanche Safety Training courses approved by Canadian Avalanche Association (CAA).

**December 2006:** Haegeli and McCammon fail to explain huge discrepancies between prevention values published in McCammon (2002, 2004) and those in the Avaluator. They also refuse to clarify their methodology.

**March, 2008:** Uttl, Henry, and Uttl (2008a) report that Avaluator's Obvious Clues prevention values are invalid because they are based on non-representative sample of only 252 accidents after Haegeli and McCammon inappropriately deleted 1,148 records from their data set due to missing values (see Uttl, Henry, & Uttl, 2008a,b for details).

**March, 2008:** The first independent study of the Obvious Clues prevention values by Uttl, Henry, and Uttl (2008a) reveal that the prevention values published in the Avaluator are hugely inflated due to inappropriate exclusion of 82% of all records due to missing values.

**April-June 2008:** Haegeli and McCammon refuse to provide access to their data for the limited purpose of verifying their claims. They also refuse to release even the list of 252 accidents that were used to calculate the prevention values published in the Avaluator. They even refuse to clarify their method.

**May 2008:** Canadian Avalanche Center (CAC), the publisher of the Avaluator, also fails to obtain access to the data behind the Avaluator's Obvious Clues prevention values from Haegeli and McCammon. According to Clair Israelson, Executive Director of CAC, Dr. McCammon refused to provide CAC with access to the data.

**July 14, 2008:** CAC commissions Dr. Floyer to conduct another "independent" study of the Obvious Clues prevention values. Dr. Floyer had just completed his Ph.D. under the guidance of Dr. Jamieson, Dr. Haegeli's close collaborator on the ADFAR project.

**August 13, 2008:** Clair Israelson meets with National Search and Rescue Secretariat (NSS) and Parks Canada in Ottawa to discuss Uttl et al.'s findings. They decide to allocate more money for development of a "made in Canada" replacement for the Obvious Clues Method because they are unable to obtain data from Dr. McCammon. NSS approves more money for this purpose on September 11, 2008.

**September 18, 2008:** Dr. Floyer completes his study and confirms Uttl et al.'s (2008a, 2008b) findings that the Avaluator's Obvious Clues are hugely inflated even though, following Drs. Haegeli and McCammon's "methodology", he also inappropriately excluded 71% of all accidents in his sample due to missing values.

Floyer recommends that "the efficacy of the Avaluator, including the OCM [Obvious Clues Method], should be examined after another three winter seasons [starting with the 2008-2009 season]."

**September 2008:** CAC Board of Directors decides (1) not to print any more Avaluators and (2) to direct Avalanche Safety Training providers to tell students not to take Obvious Clues prevention values seriously.

**September 25, 2008:** Responding to Uttl et al.'s criticism of the Avaluator's method and inflated prevention values at the International Snow Science Workshop, Whistler, BC, CAC's Vice President asserts that "the world is better with the Avaluator than without it" but withholds from the audience that the CAC's own study already confirmed Uttl et al.'s (2008a,b) criticisms including the fact that the prevention values published in the Avaluator are inflated.

**2008-present:** CAC continues to advertise the Avaluator as the best decision tool available. CAC continues to withhold from the public that it did not get access to the data from Drs. Haegeli and McCammon and that the CAC's own commissioned study by Dr. Floyer found them to be inflated.

CAC has failed to recall the Avaluator as defective and to inform over 20,000 Avaluator users who have obtained the Avaluator prior to September 2008, as well as those who purchased the Avaluator off the shelf that the prevention values published in the Avaluator have no scientific basis and, to our knowledge, has not advised these users to cross out the prevention values in their Avaluator booklets as it recommends to current AST students.

**Present:** The 20,000+ Avaluator users are unknowing participants in a research study recommended by Floyer (2008). In all likelihood, they are or will be studied to see how many have been involved in avalanche accidents, injured, or killed, and whether the Avaluator decreases or increases the number of the avalanche accidents, injuries, and deaths. They do not know that the Avaluator is defective; have never been informed about the nature of the study, its benefits, and risks; and have never had the opportunity to give their full informed consent.

## 2 METHOD

We collected data on all avalanche accidents in Canada with at least one fatality from October 1, 1995 to May 15, 2009, and calculated 2- and 3-year trends in the number of recreational avalanche accidents.

## 3 RESULTS

Figure 1 shows the yearly number of avalanche fatalities (recreational, guided, etc.), recreational accidents, and 2-year and 3-year moving averages for recreational accidents, from October 1, 1995, to May 15, 2009.

Contrary to often-cited claims, the 2002-2003 (2002) season was not at all exceptional in terms of the number of recreational accidents that the Avaluator was later designed to prevent. It was "exceptional" only in the number of fatalities, principally due to two guided tours, each resulting in 7 fatalities each (e.g., Penniman & Baumann, 2004).

Both 2-year and 3-year trends in the number of avalanche accidents have been stable from 1995 until 2003 and declined slightly thereafter. This decline coincides with the establishment of the CAC and substantially increased availability of avalanche condition and forecast reports. In the 11 seasons preceding the introduction of the Avaluator (i.e., from October 1, 1995 to September 30, 2006), the yearly number of recreational avalanche accidents ranged from 5 to 11, with a

mean of 8.1 and a standard deviation (SD) of 2.0.

The Avaluator was introduced on the market during the 2006-2007 season and by the end of the season thousands of Avalanche Safety Training courses students were trained to use it.

Coinciding with the introduction of the Avaluator, this downward trend has reversed and the number of accidents has been climbing. The number of recreational accidents in the 2007-2008 season, with 14 accidents, was the highest on record since 1995 at the end of 2007-2008 season. The 2008-2009 season has seen an even greater increase to 16 accidents, that is, a doubling of the 11-year average prior to the Avaluator's introduction. Indeed, the two seasons following the Avaluator's introduction are 3 and 4 SD outliers relative to the 11 seasons preceding the Avaluator's introduction.

The three-year moving average prior to the 2006-2007 season was 7.0 accidents and following a downward trend. If the Avaluator causes a reduction in the number of accidents as claimed and predicted by Drs. Haegeli and McCammon (McCammon & Haegeli, 2006), the number of accidents should have been reduced below this level and should have continued to decline. Instead, the number of recreational accidents is higher and increasing. At present, the 3-year average is 11 and the 2-year average is 15, the highest since 1995.

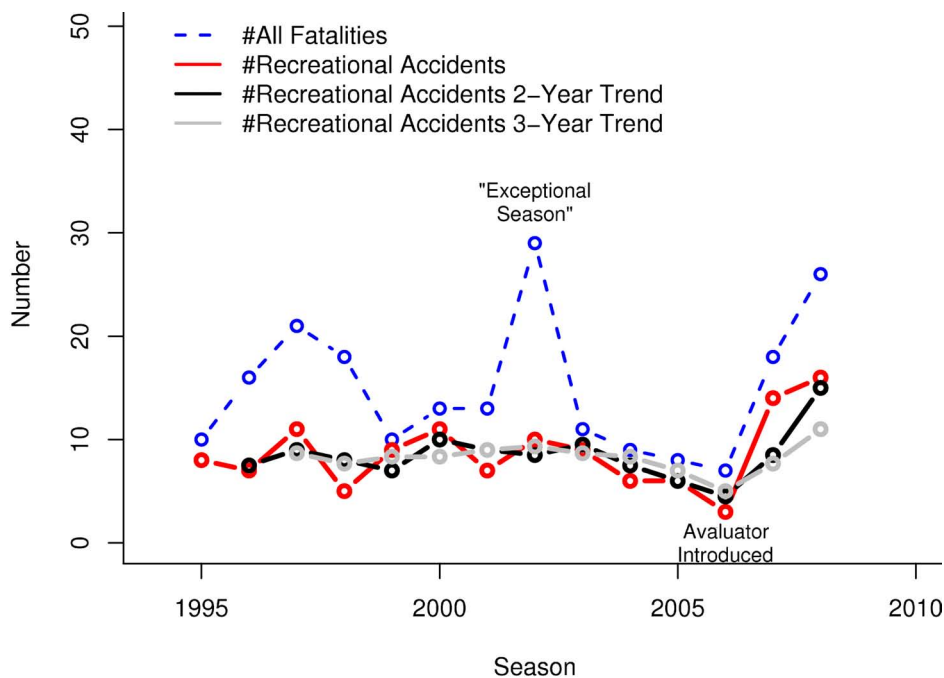


Figure 1. Canadian avalanche accident trends. The figure shows the number of fatalities (recreational and non-recreational fatalities) and the number of recreational accidents (that the Avaluator was designed to reduce). The figure includes 2- and 3-year recreational accident trends.

#### 4 DISCUSSION

Trends in Canadian avalanche accident fatalities reveal no evidence that the Avaluator Avalanche Accident prevention card has reduced the number of recreational avalanche accidents in Canada. The number of avalanche accidents has increased following the Avaluator introduction and are at the highest levels since at least 1995.

The increases in the number of accidents over the last two seasons are consistent with our findings (confirmed by the CAC's own research conducted by Floyer, 2008) that the Avaluator Obvious Clues prevention values are grossly inflated, give users a false sense of security, and, in all likelihood, would lead to more avalanche accidents, more injuries, and more deaths (Uttl, Henry, Uttl, 2008a,b; Uttl, Uttl, & Henry, 2008). Moreover, there is no evidence that a number of people recreating in winter backcountry suddenly more than doubled during the last two winter seasons.

Surprisingly, the Canadian Avalanche Center, the Avaluator's publisher, believes "the world to be a safer place with this tool [the Avaluator]" (CAA/CAC Board of Directors' Meeting Minutes, November 24, 2008; see also *Calgary Herald*, April 20, 2009, *Is there a problem with the Avaluator?*) and has decided not to recall this defective and, as our evidence strongly suggests, dangerous tool. Similarly, despite overwhelming evidence that the prevention values published in the Avaluator are the result of extremely poor methodology (Uttl, Henry, & Uttl, 2008a,b; Uttl, Uttl, & Henry, 2008; Uttl & Kisinger, 2009), have no scientific basis (Floyer, 2008; Uttl, Henry, & Uttl, 2008a,b; Uttl, Uttl, & Henry, 2008; Uttl & Kisinger, 2009; Uttl & Uttl, 2009), and lead to more rather than fewer accidents (Uttl, Henry, & Uttl, 2008b; Uttl, Uttl, & Henry, 2008), Parks Canada "continues to support the Avaluator as a simple and practical framework to help backcountry recreationists make decisions." (A. Latourelle, Chief Executive Officer of Parks Canada, February, 20, 2009).

#### 5 REFERENCES

- Floyer, J., 2008. Review of the Obvious Clue Method. Report for Canadian Avalanche Centre, Revelstoke, BC, Canada: Applied Avalanche Research.
- Haegeli, P., & McCammon, I., 2006. Avaluator Avalanche Accident Prevention Card. Revelstoke, BC: Canadian Avalanche Association.
- Haegeli, P., McCammon, I., Jamieson, B., Israelson, C., & Statham, G., 2006. The Avaluator – A Canadian rule-based avalanche decision support tool for amateur recreationists. Proceedings of the International Science Workshop, Telluride, CO.
- McCammon, I., 2002. Evidence of heuristic traps in recreational avalanche accidents. International Snow Science Workshop, Penticton, BC.
- McCammon, I., 2004. Heuristic traps in recreational avalanche accidents: Evidence and implications. *Avalanche News*, 68, 1-11.
- McCammon, I., & Haegeli, P., 2006. Evaluation of a rule-based decision aid for recreational travelers in avalanche terrain. Proceedings of the International Snow Science Workshop, Telluride, CO, USA.
- Penniman, D., & Baumann, F., 2004. The SME Avalanche Tragedy of January 20, 2003: A Summary of the Data. International Snow Science Workshop, Jackson Hole, WY.
- Uttl, B., & Kisinger, K., 2009. Pitfalls in the Analyses of Accident Records: The Meaning of Missing Values. Proceedings of the International Snow Science Workshop, Davos, Switzerland.
- Uttl, B., Henry, M., Uttl, J., 2008a. Human Factors in Avalanche Avoidance and Survival. Canadian Society for Brain Behavior and Cognitive Science, Victoria, BC.
- Uttl, B., Henry, M., Uttl, J., 2008b. Avaluator's Obvious Clues Prevention Values: Are They Replicable? Proceedings of the International Snow Science Workshop, Whistler, BC, Canada.
- Uttl, B., Uttl, J., & Henry, M., 2008. The Avaluator Avalanche Accident Prevention Card: Facts, Fictions, and Controversies. Proceedings of the International Snow Science Workshop, Whistler, BC.
- Uttl, B., & Uttl, J., 2009. On Superiority of Simple Solutions to Complex Problems and Other Fairy Tales. Proceedings of the International Snow Science Workshop, Davos, Switzerland.