

## TRANSCIVER TRAINING PARKS: SHORTENING THE BEACON LEARNING CURVE

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**ABSTRACT:** “Practice. Practice. Practice.” Avalanche educators are often heard chanting this mantra to students learning to use avalanche transceivers. How can that learning process be accelerated? Backcountry Access introduced its first public “Beacon Basin” transceiver training site in 2002-03 at Loveland Basin, Colorado, and expanded the program to include 10 sites across North America in 2003-04. In 2004-05, the program will expand to Europe. BCA donates Beacon Basins to select organizations that have a high number of recreational and professional backcountry users. Case studies from two sites confirm that practice search preparation time is significantly shortened with access to such dedicated training sites. And advanced skills such as deep and multiple burials can be developed in less time and in more realistic scenarios when utilizing Beacon Basin.

**Keywords:** beacon basin, preparation time, manual preparation time, practice search hours

### 1. BEACON BASIN

Backcountry Access, Inc., released the Beacon Basin system in the fall of 2002 for public use during the 2002-03 winter season. Beacon Basin is a beacon search tool that has 6 to 14 transmitters wired to an external control box powered by 6 D batteries. It is possible to turn on 1 transmitter, all 14, or any variation in-between. The transmitters are buried in varying orientations and at different depths. A probe target is placed above each transmitter to identify a positive strike. The Beacon Basin stays in place for the entire season and eliminates the time consuming task of physically developing beacon search scenarios. Beacon Basin allows for searches to be done in a non-contaminated environment—one without footprints, shovel marks, or holes that have been refilled. Because there are no “clues,” Beacon Basin provides realistic search scenarios. There is no cost to use Beacon Basin.



Beacon Basin control panel.

### 2. BEACON BASIN DEVELOPMENT

As a company, BCA's development team and Technical Representatives realized that digital beacons have taken the challenge out of single transmitter searches. Our need now was to develop better skills for deep and multiple burials. But setting up realistic deep and multiple burial scenarios is time consuming. We realized that the common practice method of burying and then extracting beacons, and repeating this process multiple times in a day, needed improvement. At the end of a beacon practice day we were more exhausted from digging holes than sprinting through primary and secondary search patterns. Thus, BCA's efforts began to create a local, multiple beacon searching system that shortened preparation efforts for us.



Loveland Beacon Basin: Planning the next search scenario.

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Once completed, the added value of Beacon Basin was quickly recognized. First, and most importantly, we realized that Beacon Basin had the potential to easily educate thousands of recreational beacon users and enhance practice for professionals and aspiring guides. Secondly, we were able to use Beacon Basin to effectively test new search methods and develop Pinpointing on a Line,<sup>2</sup> which has become a popular method of deep burial pinpointing among professionals. Third, as a leading manufacturer of snow safety equipment, it was important for us to train at a professional level and attain the same level of competence as the ACMG and AMGA ski guides. Beacon Basin allowed us to practice a typical ACMG transceiver exam scenario multiple times during a practice day. Last, as a non-profit and cooperative effort between Backcountry Access and participating ski areas, Beacon Basin was quickly accepted as a leading resource for beacon education in North America by ski patrol and avalanche educators.



Kirkwood Beacon Basin: Patrol practice.

**3. BEACON BASIN CASE STUDY: LOVELAND**  
The first public Beacon Basin was installed in four hours at Loveland Basin Ski Area in Colorado on November 18, 2002. This unit contained 14 transmitters wired to a control box and buried at various depths in an area 100mx100m. Its inaugural day on November 20, 2002, saw use by 12 professionals from the Colorado Avalanche Information Center, Colorado Mountain School, Alpine World Ascents and the National Ski Patrol. Searches took place between 9am and 1pm. At the end of the day all participants noted the efficiency that Beacon Basin had provided for practice searches but it had not yet been quantified. By March 15 of 2003, Beacon Basin had seen 149 individual users and experienced 70 hours of search time. Considering that it took 4 hours to install Beacon Basin, this means that an hour of searching accounted for 3.4 minutes of preparation time. The 3.4 minutes of preparation time is a figure derived from the ratio of install time to the time spent performing practice

searches throughout the entire 2002-03 season (Table 1). BCA was very satisfied with these results so we planned the expansion of the Beacon Basin program, thus directing our efforts toward more public beacon education.

**4. BEACON BASIN EXPANSION 2003-04**  
In 2003-04, BCA expanded the Beacon Basin program in North America. This was achieved by soliciting key ski areas and mountaineering centers that have a high concentration of recreational and professional backcountry users. Each Beacon Basin was hosted by a BCA Technical Representative in conjunction with the ski patrol, except in the case of Kokanee Glacier Provincial Park, which was hosted by Kokanee Glacier Mountaineering Inc. and the Alpine Club of Canada. Beacon Basin locations in 2003-04 by province/state/country follow: Whitewater ski area, BC; Kokanee Provincial Park, BC; Norquay ski area, AB; Kirkwood ski area, California; Arapahoe Basin ski area, Colorado; Bridger Bowl ski area, Montana; Crystal Mountain ski area, Washington; Steven's Pass ski area, Washington; Washington Alpine Club, Washington; Narvik ski area, Nordland, Norway. These 10 Beacon Basin sites were used for ski patrol beacon practice, public recreational practice, avalanche courses, beacon competitions, public beacon clinics, and guides training for their ACMG and AMGA beacon exams.

**5. BEACON BASIN CASE STUDY: KOKANEE**  
Kokanee Provincial Park is a popular ski touring area that hosts groups of 12 for 24 weeks a year. These trips are organized by the Alpine Club of Canada. Each group typically practices two separate multiple beacon searches as part of the orientation process. The use that Beacon Basin received in this area during the 2003-04 season is unprecedented: 252 users and 504 hours of search time. Considering that this unit took 6 hours to install, the ratio of install time to search time is 4:504 hours. This results in .71 minutes of preparation time per hour of practice search time (Table 2). It should be noted that the majority of practice searches that took place in this area consisted of groups of six, searching for six transmitters in complex, multiple burial scenarios. To prepare this type of search manually in .71 minutes would be impossible! Kevin Giles of Kokanee Glacier Mountaineering, Inc., notes that "Now that we have the benefit of practicing with the Beacon Basin, skiers are exposed to a much more realistic scenario which for many was a real eye opener. The Beacon Basin is an excellent and totally essential tool that all winter visitors to the backcountry should have exposure to. They

should practice with this tool until a feeling of confidence is achieved in locating deep burials.”



Recovering 2m probe target after 1.5m of new snow. The perfect deep burial practice!

#### 6. MANUAL BEACON SEARCH PREPARATION

Two professional avalanche educators have provided data for us that illustrate the efficiency of Beacon Basin. Markus Beck of Alpine World Ascents presented the following information: In Level 1 AIARE courses with 12 students, he typically spends 4 hours practicing with beacons on the second day of the course. Of these four hours, one hour is spent preparing search scenarios. Using the same formula, 1:3 hours multiplied by 60 minutes, the average manual set up time is 20 minutes per practice search hour (Table 3). Mark Kelly of the Colorado Mountain School presented this information: “I spent two full hours setting up search scenarios between 10am and 3pm on Saturday. My six clients practiced many scenarios but the most time consuming for me to set up were the deep burials which took place later in the day.” Using the ratio 2:3 hours multiplied by 60 minutes, the average manual set up time is 40 minutes per hour of searching (Table 4).

Table 1.  
Loveland Basin Ski Area Beacon Basin

Install time	4 hours
Practice search time	70 hours
Avg. preparation time per search hour	3.4 minutes
*Number of users	149

Table 2.  
Kokanee Provincial Park Beacon Basin

Install time	6 hours
Practice search time	504 hours
Avg. preparation time per search hour	.71 minutes
*Number of users	252

Table 3.  
Alpine World Ascents AIARE Level 1 Manual Preparation

Install time	1 hour
Practice search time	3 hours
Avg. preparation time per search hour	20 minutes
*Number of users	12

Table 4.  
Colorado Mountain School Manual Preparation

Install time	2 hours
Practice search time	3 hours
Avg. preparation time per search hour	24 minutes
*Number of users	6

*\*Number of users is not part of the calculations*

Considering that manual preparation times in these two scenarios are 20 and 24 minutes respectively, Beacon Basin offers tremendous efficiency by reducing the amount of time it takes to set up practice scenarios. But what of the four and six hour install times shown in the two Beacon Basin case studies? Remember that these two Beacon Basins had a combined user number of 401 people compared to 18 in the manual searches. The combined install times of the two Beacon Basins and the two manual preparation scenarios, compared to the number of users, follow in Table 5. Proportionally (multiplied by 3.335), we can imply that 10 hours of manual install time would allow 60 people to practice beacon searches effectively, without the aid of a Beacon Basin. However, 10 hours of install time with Beacon Basin allowed 401 people to practice. Using the numbers we have, Beacon Basin is 5.7 times more efficient than typical searches that require repeated manual installation.

Table 5.  
Hours of install time and number of users

	Hours/Users
Combined Beacon Basin's	10/401
Combined Manual	3/18
Adjusted Manual (3.335)	10/60

### 7. BEACON BASIN SCENARIOS

It is true that Beacon Basin offers a finite number of scenarios, but let's look at how many unique search scenarios an 11 unit Beacon Basin would offer. An 11 unit Beacon Basin would offer 39,916,000 different search scenarios (with a mere set up time of 4 to 6 hours!). David Barber, author of Digital Beacon Pinpointing in the Vertical Plane<sup>3</sup>, has provided some Beacon Basin numbers that he finds more practical for educational purposes. "How many entirely different 3-beacon sets/challenges can be simulated in an 11 unit Beacon Basin (i.e., 3 "on" and 8 "off")? Exactly 165 unique sets of 3 beacons. And because any set of 3 beacons can be found in 6 different orders (ABC, ACB, BAC, BCA, CAB, CBA) there are 990 different seek-and-find sequences that can happen across that 165 different 3-at-a-time beacon challenges." What David has deduced is that there are 990 different 3 transmitter scenarios that an 11 unit Beacon Basin can provide. Regardless of how one chooses to look at the numbers, it is highly unlikely that they can be duplicated without the use of Beacon Basin.

### 8. BEACON BASIN FUTURE

In 2004-05, Beacon Basin will expand again in North America. New sites will include Jackson Hole, Wyoming, Whistler, BC, Big Cottonwood Canyon, Utah, and a second site will be added to the Lake Tahoe area. Expansion into Europe began last spring with Narvik, Norway and will continue to include Austria, Germany, Switzerland, Italy, France, and the U.K.

### 9. SUMMARY

Beacon Basin is an effective tool for beacon search practice and education. Using Beacon Basin reduces the time spent setting up practice searches and offers more realistic search scenarios. Gary Brill, a Northwest avalanche educator states that "Beacon Basin makes it possible to practice deep burial and multiple burial searches much more efficiently than has been possible in the past." With the Beacon Basin expansion planned for the future, more recreational and professional users will have the opportunity to practice realistic search scenarios without long hours of preparation.

### References

<sup>2</sup>Ederly, B., 2002. Pinpointing on a line: A modern technique for solving deep burials. ISSW 2002.

<sup>3</sup>Barber, D. 2003. Digital Beacon Pinpointing in the Vertical Plane. Couloir XVI-1

*If your organization takes beacon practice seriously and you are interested in receiving a Beacon Basin for your area, please contact Backcountry Access, Inc. at (303)417-1345 for further details.*



Loveland Beacon Basin users, March 1, 2003