

RACE RESULT

www.raceresult.com

TRACK BOX TRACKING

How a Nordic Ski resort in Montana benefits from a semi-permanent installation of RACE RESULT Track Boxes to track trail usage



CROSSCUT
MOUNTAIN SPORTS CENTER

Introduction

The **Crosscut Mountain Sports Center** is a year-round mountain hub. Located just 17 miles north of Bozeman, Montana, in the heart of the Bridger Range, Crosscut sits on 500+ acres adjacent to Bridger Bowl and the Custer Gallatin National Forest. From Nordic skiing and snowshoeing in the winter to biking and hiking in the summer, Crosscut is a popular outdoor destination and attracts recreation users from around the region. The center and trails are beautiful and offer connection, solitude, and inspiration for the community. Not surprisingly, the pandemic has brought an increased number of visitors to Crosscut. This winter close to **2000 season pass holders** and many day pass users are enjoying the outdoors and exercising on the trails.

The trails are used mostly by skiers in the winter, but also open to snowshoers and fat bikes.

As a nonprofit organization, Crosscut is dedicated to serving the community and stewarding shared lands. As part of being a non-profit, Crosscut is expected to attempt to **track and report** how the area is being utilized. This is where RACE RESULT comes in – at **two different locations a RACE RESULT Track Box Passive** now automatically tracks users through the transponder on their season pass.

In this case study, the concept of a semi-permanent UHF track box installation is explained in detail.



1 The Challenge

“Nordic skiing – social distancing since 4000 BCE”

This tagline on the Crosscut website speaks for itself. The pandemic has driven many people to enjoy more outdoor activities at places with lesser crowds and Crosscut has seen an increase in both annual memberships and day passes.

New social distancing rules means skiers are not able to use the Nordic Center for changing in and out of gear, to warm up, or to hang out between work-outs. The Ticket Window is open with outside access only, and skiers are encouraged to purchase passes online to minimize the need for close interactions. The goal with the RACE RESULT Track Box was to have a **tracking system** that did not require staff to scan passes, but to make it as **hands-off and automated** as much as possible.

In previous years, the team at Crosscut has tried out two previous pass-tracking systems through RFID readers and barcode scanners, but they were not able to successfully get these to work. The new social distancing rules made it even harder for the Crosscut team to find an adequate tracking solution. **Fay Johnson**, Nordic Center Director at Crosscut, contacted local timing professional **Jim Nallick** with **Muddy Dog Sports** for advice. Jim had provided timekeeping services for several ski and mountain bike events at Crosscut in previous years with the RACE RESULT system and was familiar with the tracking requirements at the center. His first thought went to the newly developed Track Box Passive as a possible solution.



Jim Nallick: *“This is an unusual application for the Track Box outside of the traditional race timing the Track Box was initially developed for, but using it for tracking at Crosscut seemed like a perfect fit. The team at RACE RESULT had just started rolling out the new track box and we were able to get prototypes for testing. It took some time for the idea to take shape and the final installation of the Track Boxes to happen, but we have been up and running now since November 30 with zero down-time all winter. The TAVI transponders cards, that we decided on using, were introduced by RACE RESULT this summer specifically for contact tracing during the pandemic. Rather than relying on reusable transponders on ankle straps or on traditional racing bibs, the TAVI cards made the most sense for us. The cards have held up well to the challenge and proven to be a terrific choice.”*

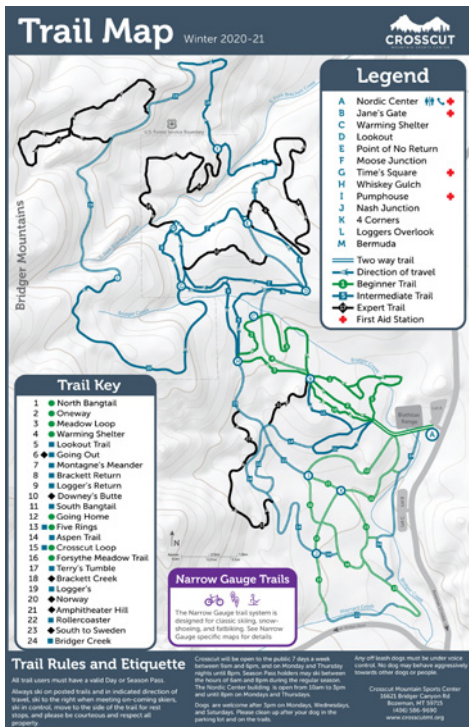
2 The Solution

Muddy Dog Sports installed a RACE RESULT Track Box Passive at **two different locations** at Crosscut. The Mountain Center has two parking lots that season pass holders can use to access the trails. One is the upper parking lot where the Nordic Center is located, the other is the lower parking lot with no staff and no facilities.

When the ski season is finished in March or April, Muddy Dog Sports will uninstall the Track Boxes and add them back into their array of equipment to be used for timekeeping at various sporting events throughout the summer. When winter season starts up again, the track boxes will return to their place at Crosscut.

Each season pass holder was issued a **TAVI card with unique transponder ID** that registers and tracks their usage on the two readers at the center. As soon as a transponder is registered at a scanning station, the data is forwarded live and included in tracking reports, which are made available online for staff and skiers.

Ric Roche, a season pass holder at Crosscut, shares his experience: *"The Crosscut season pass system is simple and works nicely. It's convenient having a scanner at both trail entrances and only requires the user to ski by with the pass attached to the skier. Seeing a tally of visits on the web site is a bonus."*



1-2 Track Box Passive

A main component of the solution is the **RACE RESULT Track Box Passive**.

The installation of the systems was done in close cooperation with the team at RACE RESULT, which provided remote support during initial setup and for testing. The Track Box Passive contains a **UHF reader** that receives transponder signal and forwards them to a server via the LTE network. This data is combined with the **GPS location** and **GPS time** of the Track Box.

At the upper parking lot, the Track Box is installed on the side of the lodge with an information board and under a small overhang. At the lower parking lot, the Track Box is installed on a pole at the edge of the parking lot where skiers enter the trails. Both locations have direct power going to the track boxes. In case of a power outage, the internal battery will keep the track boxes running for at least 10 hours.



RACE RESULT Track Box Passive

The boxes are mounted at a height of approximately 8 feet, which helps to protect them from access by unauthorized persons. Temperatures at Crosscut during the winter are not uncommon to reach **below -10F with 40mph wind gusts** blowing snow. The track boxes are exposed to the elements, especially at the lower parking lot where no roof protection is over the track box.

The best detection rates are achieved within a **13 feet range**. Each box is angled slightly downwards towards the skiers as they approach the track box readers to scan their passes. While instructions to the skiers state to hold the pass up to the box, the readers also usually detect skiers when they leave the trails as they pass by the scanning station, even with their pass tucked into their pant pocket or stuffed under their ski jacket. This allows for additional data analysis on average time spent out on the trails by skiers.

Jim Nallick still uses the Track Boxes as an excuse to get a ski workout at Crosscut and checks in on the equipment occasionally, but after the initial installation and fine-tuning of the setup, the systems now operate autonomously and are being monitored remotely.

Detailed information about the Track Box Passive:

[\[Track Box website\]](#)



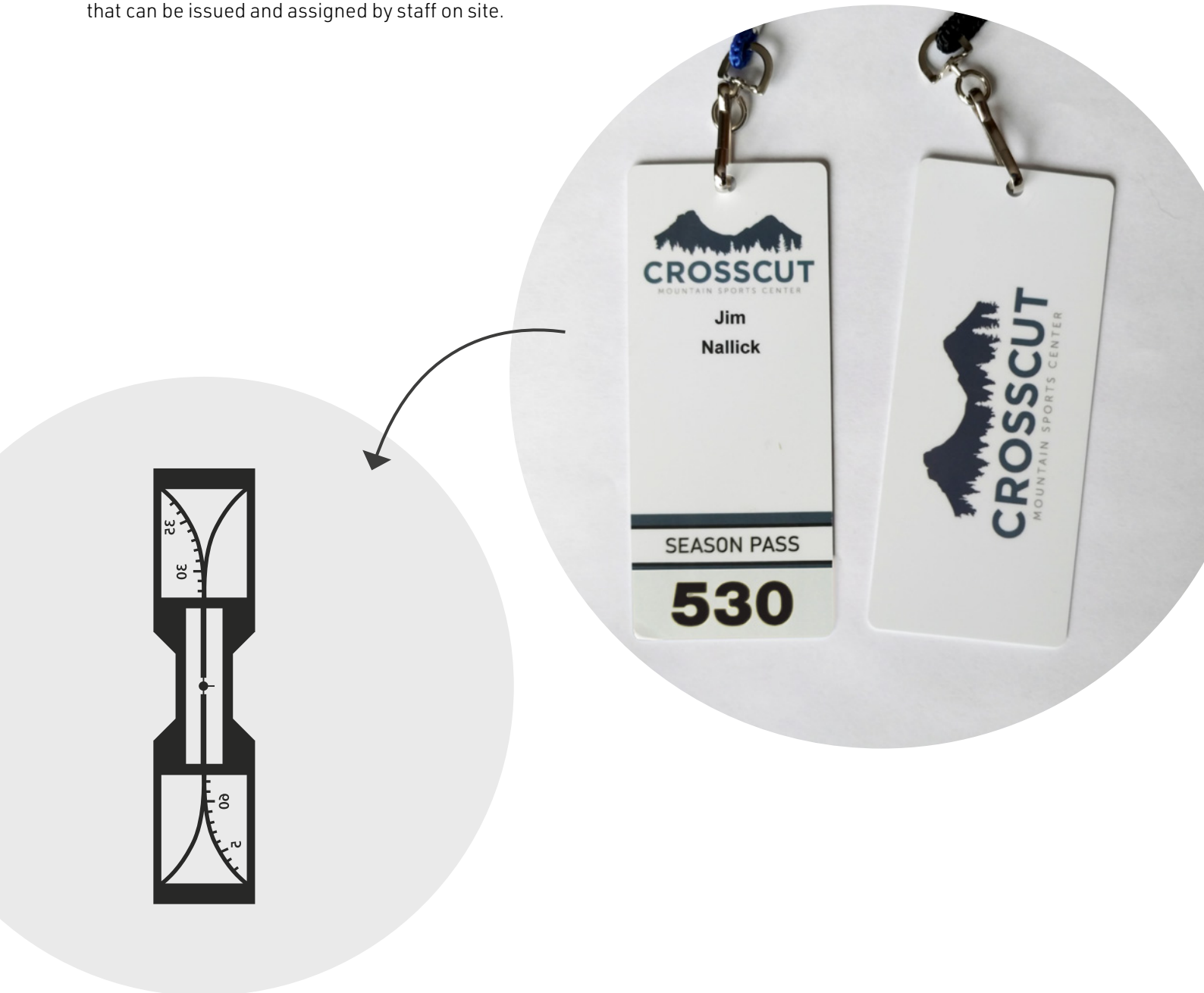
RACE RESULT Passive Transponder

2-2 TAVI Transponders

Almost **2000** season pass holders have been issued a **TAVI transponder card on a lanyard**. The card serves as the skiers' annual pass. They are asked to carry the pass with them and 'check in' at the track box locations by holding up their season pass in proximity to the reader before using the trails.

The passes are produced by RACE RESULT with the **transponder on the inside of the card**.

They are **custom printed** with the Crosscut logo and each skier's name. For those skiers signing up for season passes later, there are extra non-personalized passes that can be issued and assigned by staff on site.



2-3 Tracking Software

The biggest challenge of the project for Muddy Dog Sports was to determine what to do with all the collected data and what reports to create that would be useful to both the staff at Crosscut and interesting to the skiers.

The **RACE RESULT 12 event file** for Crosscut collects all reads live over a period of 6 months. The staff can see daily reports live on usage. The reports include daily total tallies and are broken up into both the upper and the lower parking lot. Considering the significantly higher number of visitors on the lower trails compared to the upper at the center, the Crosscut team has been excited to be able to also have record of those numbers and be able to paint a clearer picture of the total usage of their trails. More detailed analysis on usage by specific skiers, as well as monthly reports are possible.

11/29/2020-05/31/2021 | Bozeman, United States of America
Crosscut Season Pass Use

Date	Total Visits	Season Pass	Day Pass	Lower Lot	Upper Lot	Avg Time
M - 28 DEC 2020	166	111	55	61	105	1:21
T - 29 DEC 2020	199	148	51	98	101	1:40
W - 30 DEC 2020	156	112	44	74	82	1:22
T - 31 DEC 2020	219	149	70	70	149	1:29
F - 1 JAN 2021	230	159	71	89	141	1:27
S - 2 JAN 2021	246	202	44	140	106	1:36
S - 3 JAN 2021	234	190	44	90	144	1:29
Week #5 Total	1450	1071	379	622	828	1:30
M - 4 JAN 2021	70	60	10	40	30	1:43
T - 5 JAN 2021	111	99	12	61	50	1:26
W - 6 JAN 2021	137	121	16	77	60	1:24

Learn more about RACE RESULT 12:

[\[Timing software website\]](#)

While the staff reports are not available online to the public, skiers can check their "Season Pass Ski Tally" on the Crosscut website. The Ski Tally online only shows skier pass number instead of names, but it has already created some friendly competition among skiers, to see who can be the record holder for the season.

The event file in RACE RESULT 12 also allows the Crosscut team on site to manually enter the number of day passes sold each day. Day passes do not have transponders and therefore are not automatically tracked by the system, but the manual data entry is easy for staff to manage and allows day passes to also be included in the reports.

3 Future Opportunity

The goal for the initial installation of the Track Boxes was to keep the data reports relatively basic and see how it develops throughout the season. Future reports could include more analysis on time of day/ hourly reports, average time spent, or the use of specific trails; including some graphics showing usage over time.

The Track Boxes could also be deployed in what they were originally designed for and set up at some timed sections on trails for competition or challenges, in winter for skiers or for mountain bikers and runners during the summer months.



Fay Johnson, Nordic Center Director at Crosscut: *"We are happy with the solution Muddy Dog Sports has set up for us this winter season. The reports are useful for our staff and executive board and being able to access the data we need at all times live without needing to contact Jim is ideal. We're excited to see what other opportunities this set up might offer us in the future and the additional data the track boxes and software could provide year-round, whether that's tracking usage of certain trails at Crosscut, tracking the grooming schedule, or doing some weekly timed challenges."*

race result AG

Joseph-von-Fraunhofer-Straße 11
76327 Pfinztal

Phone +49 (721) 961 409 01
info@raceresult.com
www.raceresult.com

RACE RESULT Americas Inc.

2450 Central Avenue, Suite A
Boulder CO 80301
USA
Phone 303-390-1235
info.usa@raceresult.com
www.raceresult.com