



Fort Stanton Cave Study Project
Tracking the Hydrology of Fort Stanton Cave

Pete Lindsley

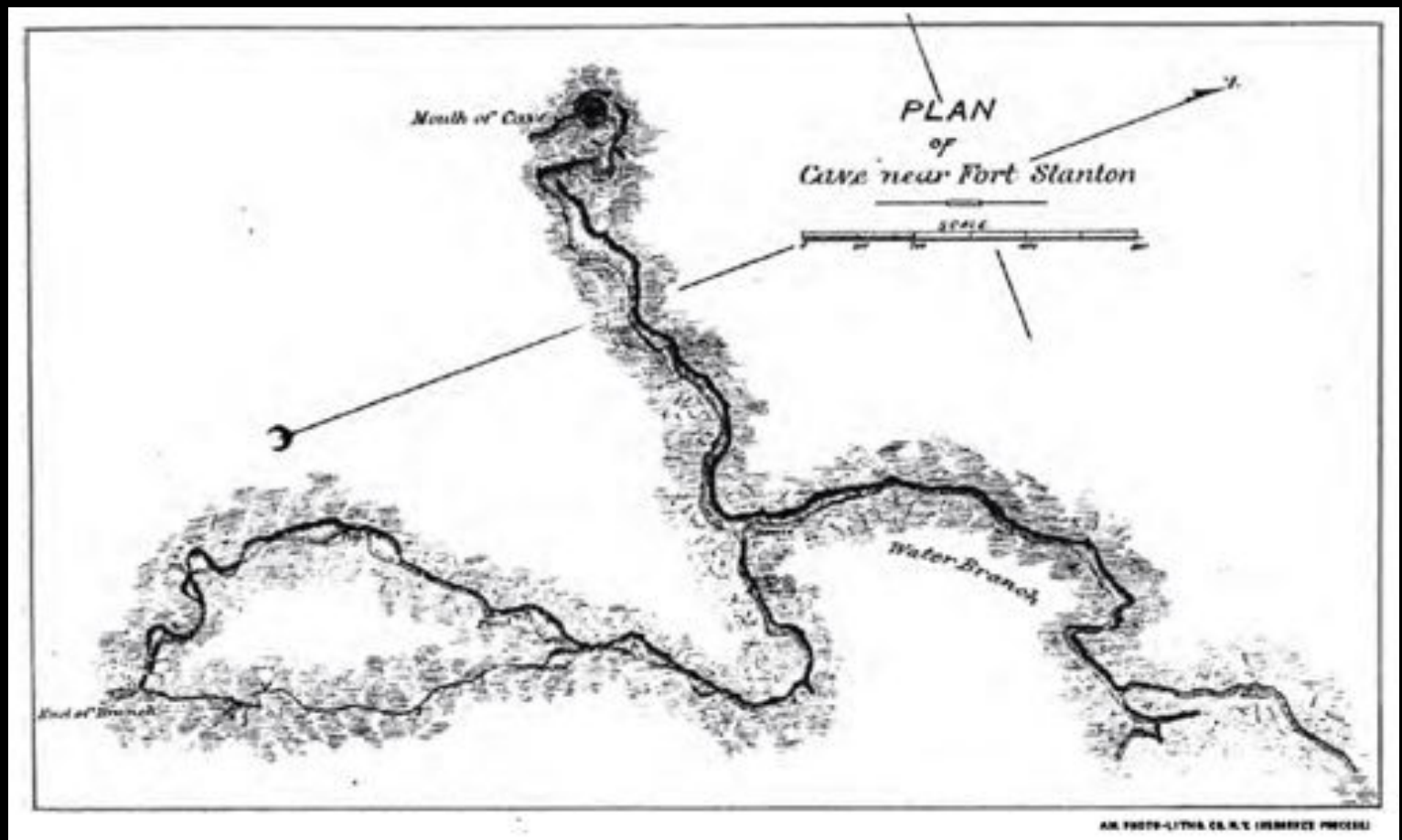
**Presented at the
SWR - Winter Tech
Las Cruces, NM, USA
December 6, 2014**



Fort Stanton Cave Entrance – photo by Wayne Walker

Fort Stanton Cave

For over 40 years cavers “followed the airflow” in search of additional passages. Many new rooms were found. But the only water found was in the Main Corridor (“Water Branch” on Wheeler’s map), or else it flowed into the entrance.

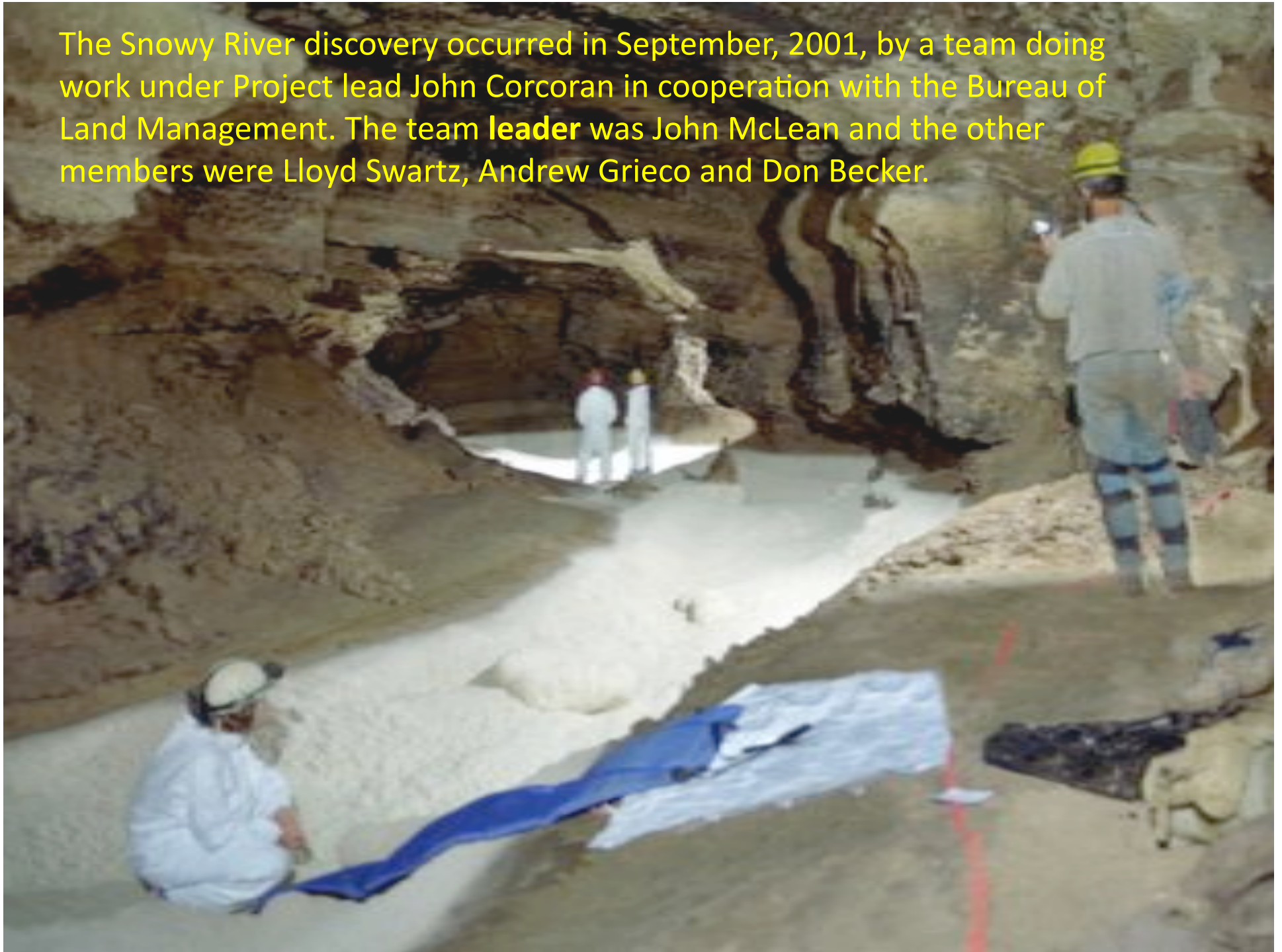


Understanding the water flowing in Fort Stanton Cave has been of interest since the mid 1800s when the Wheeler Expedition initiated the first survey of the cave.



Wooden remains thought to be that of Capt. Conrad's 1872 boat. A few pieces were round in cross-section and may have been poles used to propel the boat. Photo by Carol Belski

The Snowy River discovery occurred in September, 2001, by a team doing work under Project lead John Corcoran in cooperation with the Bureau of Land Management. The team **leader** was John McLean and the other members were Lloyd Swartz, Andrew Grieco and Don Becker.



After the initial discovery in 2001, there was a pause in the exploration until a method was devised to explore and survey the new passage without damage to the resource. Many cavers thought it might have been years since water ran down Snowy River, and that travel along the route would cause extensive damage to the crystal surface.

Some cavers thought the dry crystal-floored white river would end after a mile or less from the Priority 7 entry point.

Then, heading North, the teams went towards Government Spring where they found a sump at the end of a lake.



Photo by Wayne Walker

Heading South, the teams went upstream just beyond a side passage which was called Mud Turtle. It was at the end of the Mud Turtle crawl where they located a spot that could be accessed by an access shaft from Don Sawyer Memorial Hall 44 feet above .



John Ganter photo of Snowy River North with Kat Rix lighting the way

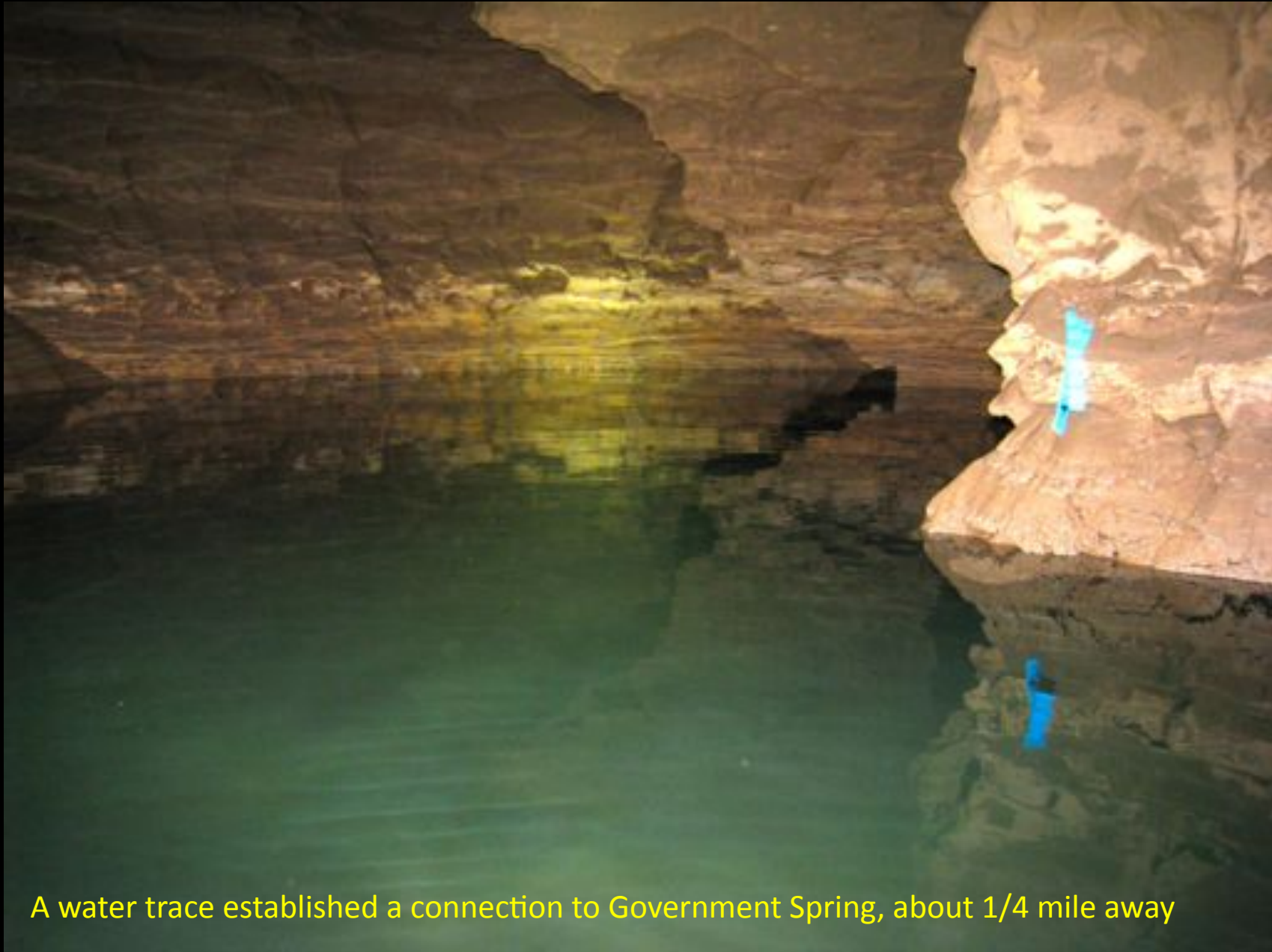
This photo is near the North end of Snowy River. Crystal Creek is just out of the photo at top right.

Beyond the explored section the passage is water filled and connects to Government Spring in the Rio Bonito Valley about 1/4 mile away.

John Ganter Photo



Crystal Creek Lake at the north end of Snowy River. Photo by Henry Schneiker

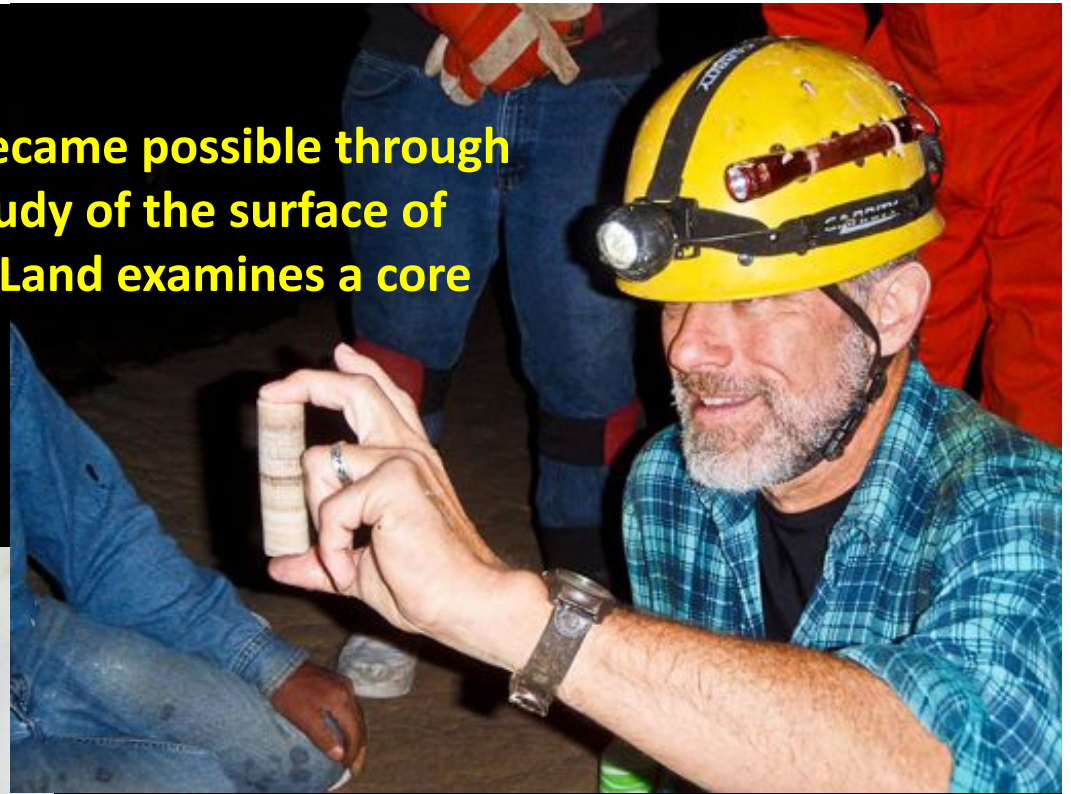


A water trace established a connection to Government Spring, about 1/4 mile away

Underwater continuation of Crystal Creek Sump. Photo by Tanja Pietrass.



When safer access to Snowy River became possible through the access portal, a more detailed study of the surface of Snowy River was initiated. Dr. Lewis Land examines a core sample.

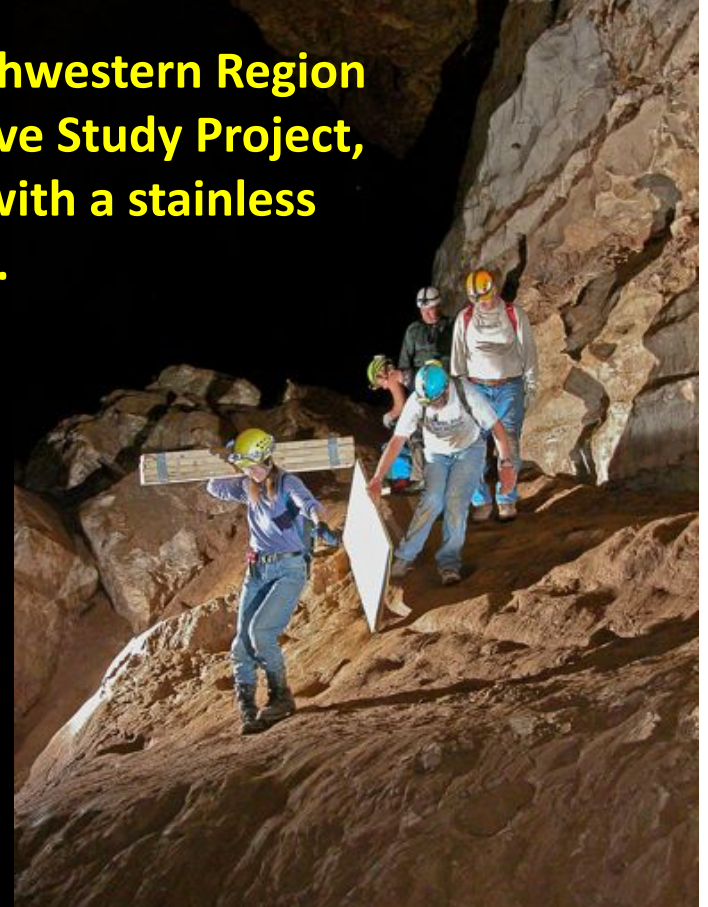


Realizing the importance of this unique resource, scientists and members of the FSCSP, SWR, BLM and members of Congress worked together to create the NCA.

An access portal, the cost of which was fully supported by the BLM in addition to thousands of hours of volunteer time by members of the SWR, has allowed a safe and easier access to Snowy River for scientists and explorers alike.



Following an extensive effort by members of the Southwestern Region of the NSS, under the direction of the Fort Stanton Cave Study Project, a 44 foot access portal was constructed and finished with a stainless steel structure made from parts fabricated by Jim Cox.



Scientists Study the Geochemistry



Photo by Henry
Schneiker



Microphotographs courtesy of Mike Spilde, UNM

Figure 4. Surface of encrusted sample showing a globule at high magnification. Original magnification = 8000x; Scale bar = 5 μm .

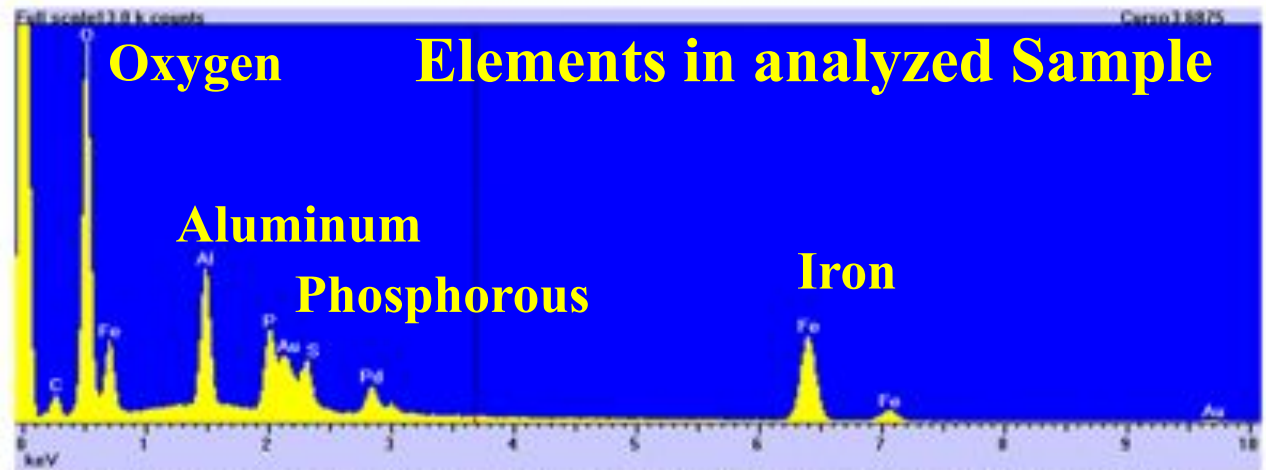


Figure 5. EDX of dark, glassy fragment. Sample consists mainly of Fe, O, Al, P and S with trace C. Au and Pd are from the conductive coating.

In 2007, when cavers completed the Access Portal into the Mud Turtle passage, they were surprised to find that Snowy River actually flowed more often under certain conditions.



Snowy River floods again in early August of 2008. Flow ended in the first week of January 2009. Bruce Daily photo.

Snowy River appears to flood on a non-periodic basis

**If there is a large winter snow-pack it is likely we will see a
Snowy River flow following heavy spring rains**

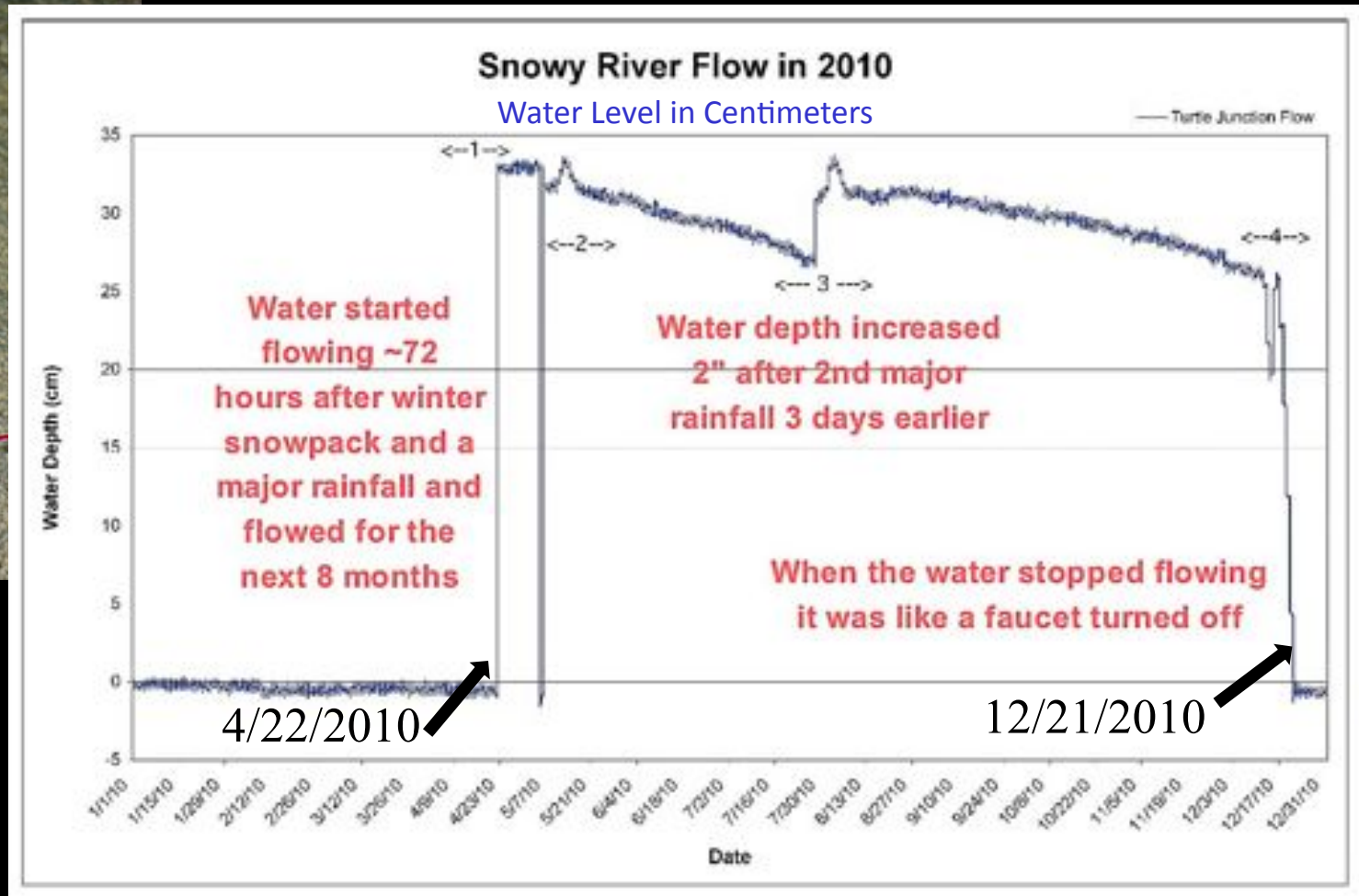
**It seems to flood after a 2-3 inch rainfall at the airport, but
not always...**

**After hurricane Dolly flooded Ruidoso, Government Spring
and Snowy River began flowing**

**In 2010 we had a water logger installed at Turtle Junction, and
the depth of water appeared to change from zero to 12 inches
in less than an hour!**

**In 2014 a team about half way to Midnight Junction found that
Snowy River was flowing again, but at a reduced rate.**

Snowy River Water Monitoring and Micro-climate Studies



Initial FSCSP Logger Installations 2008-2010

DIY sensors used LASCAR loggers and one pair of Schlumberger Loggers



Hydrological Monitoring of the Main Corridor

PVC pipes installed
in drill holes

Water levels monitored in cave
and at Government Spring



When we only had a single water logger at Turtle Junction in April, 2010, we started making plans to add additional units that would provide us a better overall understanding of the hydrology of the Snowy River Basin.

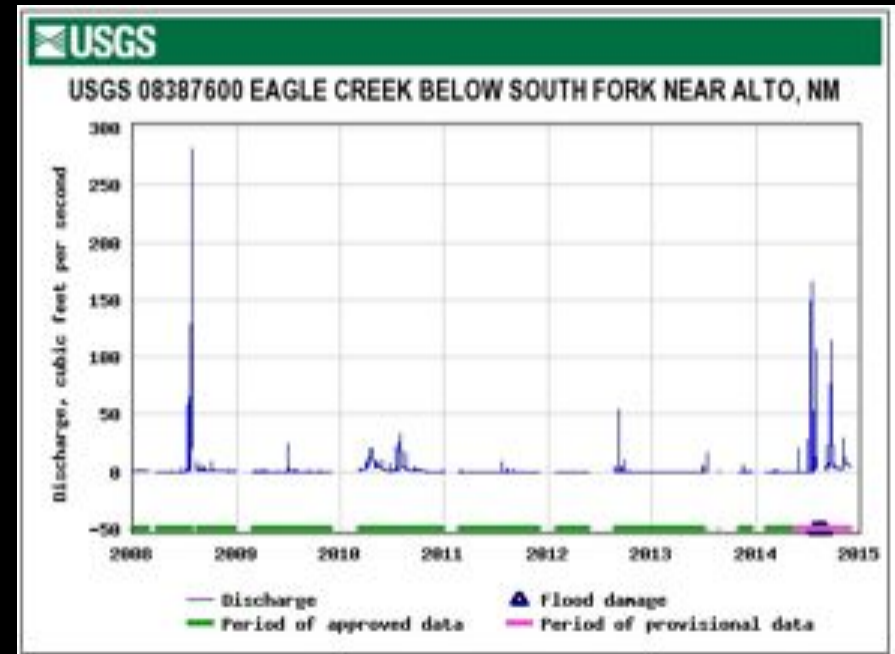
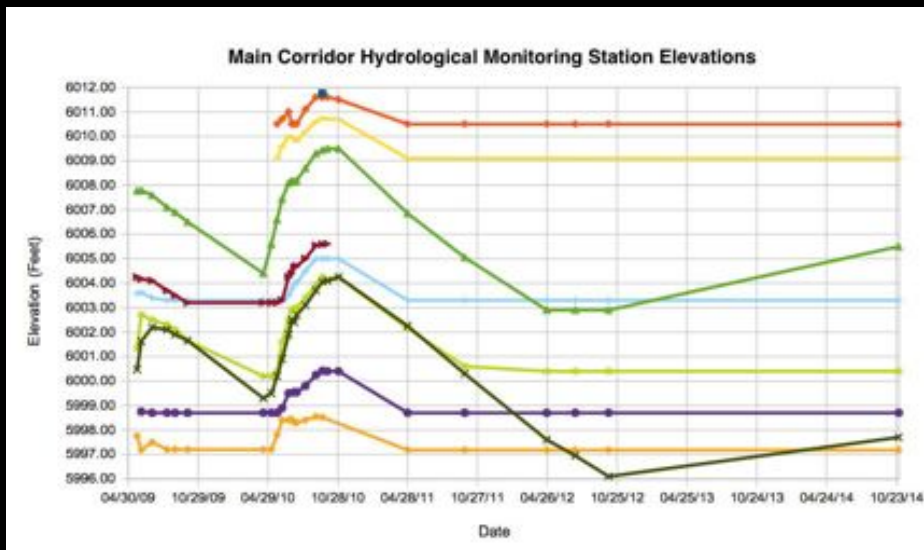


By 2012 we had explored and surveyed past Midnight Junction (9 miles upstream) where a camp was established, and we also deployed an additional 10 water loggers and two barometer loggers used for precise corrections. These loggers, placed in mostly dry locations, are capable of sensing increasing water depth every 15 minutes, and were programmed to record the expected flow when it occurs.

Hydrological Monitoring of the Main Corridor & Correlation of Snowy River flows with Surface Data

5 1/2 years of Main Corridor data:
July 2009 peaked at 1 test hole
2010 showed a broad peak
A single measurement on 10-23-14
showed a slight change in 2 holes.

7 years of Eagle Creek data:
July 2008 peaked at ~ 280 CFS
July 2014 is about 150 CFS
Did upper Snowy flow in 2009 & 2013?

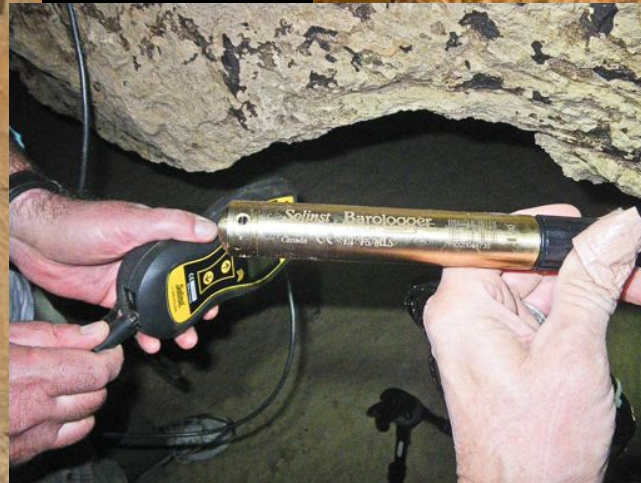


Steve Peerman's Main
Corridor drill hole monitoring

FSCSP.ORG Hydrology Data
[HTTP://fscsp.org/science/weather.html](http://fscsp.org/science/weather.html)

BLM Solinst Logger Deployed in 2011

Jim Goodbar's team installs first "deep Snowy" BLM logger at Floating Islands



New Discovery on July 8, 2012

“Finger Lake” is important as a source of water for M-J camps



Shawn Thomas photo

Water samples were taken and plans were made to install a water level data logger at Finger Lake.

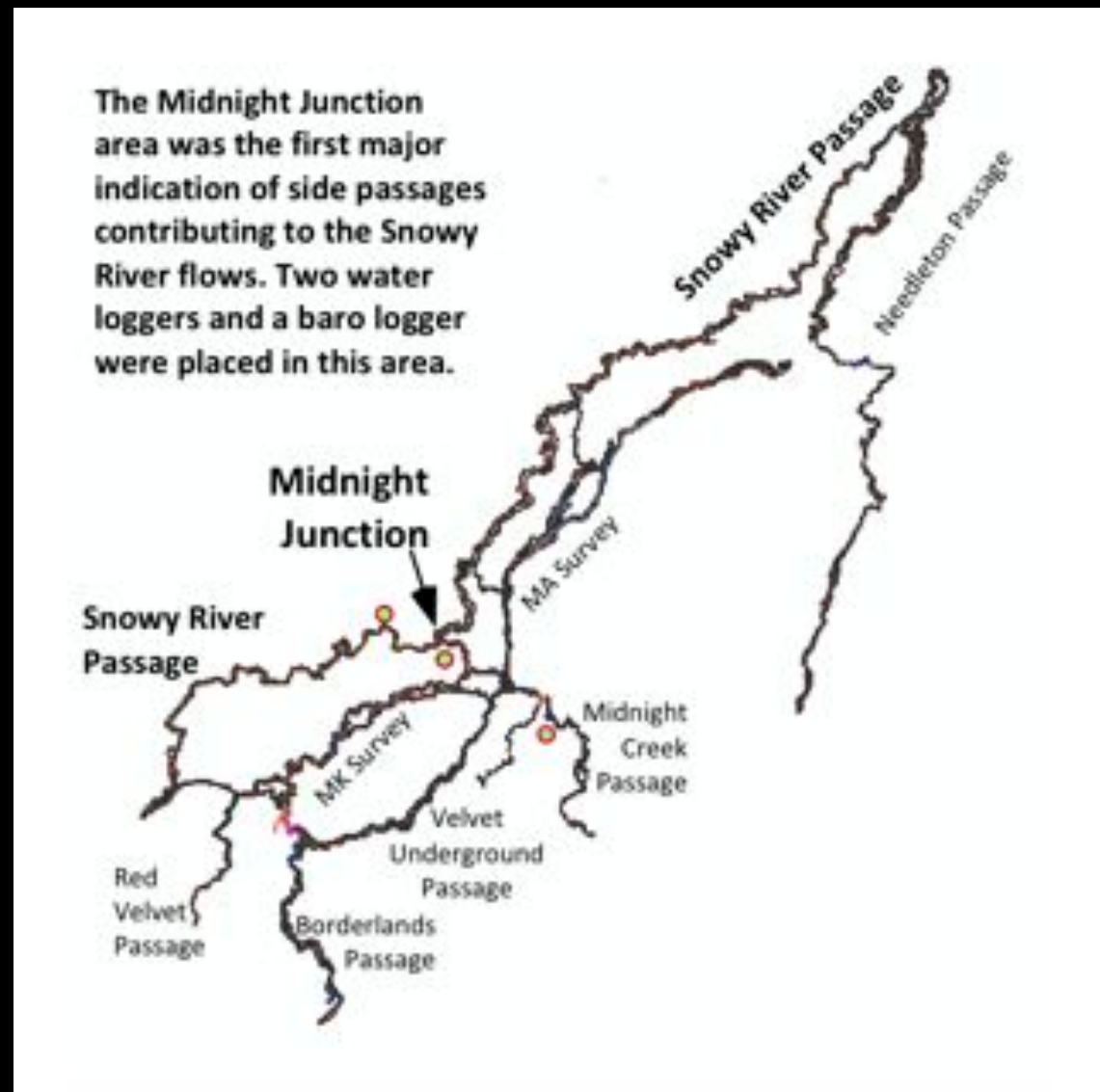
Trips into the far south Snowy River by the “strong & light” surveyors were limited by the amount of water that could be carried (both in and out).

A water level data logger trade study selected In-Situ data loggers which could be programmed to take more frequent data samples after a rise in water level was detected.

Passages discovered in 2013-14 provide more clues

This complex of side passages were all discovered, explored and mapped in 2013 and 2014.

The “frontier” of the Borderlands passage is over 11.4 miles from the entrance of the cave, the most remote cave passage known in the world!



FSCSP In-Situ Logger Array Deployed in 2013

The dual stage In-Situ loggers have an 8-10 year battery life, ideal for remote locations.

The barometric logger provides calibration for the array of water depth (pressure) loggers



BLM & FSCSP - Hydrology & Logger Maintenance

Michael McGee's stainless staff gauge installed at TJ and Finger Lake



Wayne Walker takes DNA water sample at Crystal Spring



Knutt Peterson downloads BLM Solinst logger at Independence Hall & Crystal Spring

**Ian McMillan samples water for DNA analysis in a pool
in the PA survey in May, 2014**



Snowy River Flows! August 16, 2014

Science Team: Kieffer, Foote, Jorgensen, Cornew, were turned back at SRS 391 by flowing water when they were headed to Midnight Junction for a sediment study.



C.L.Kieffer Photos



Jennifer Foote Photo

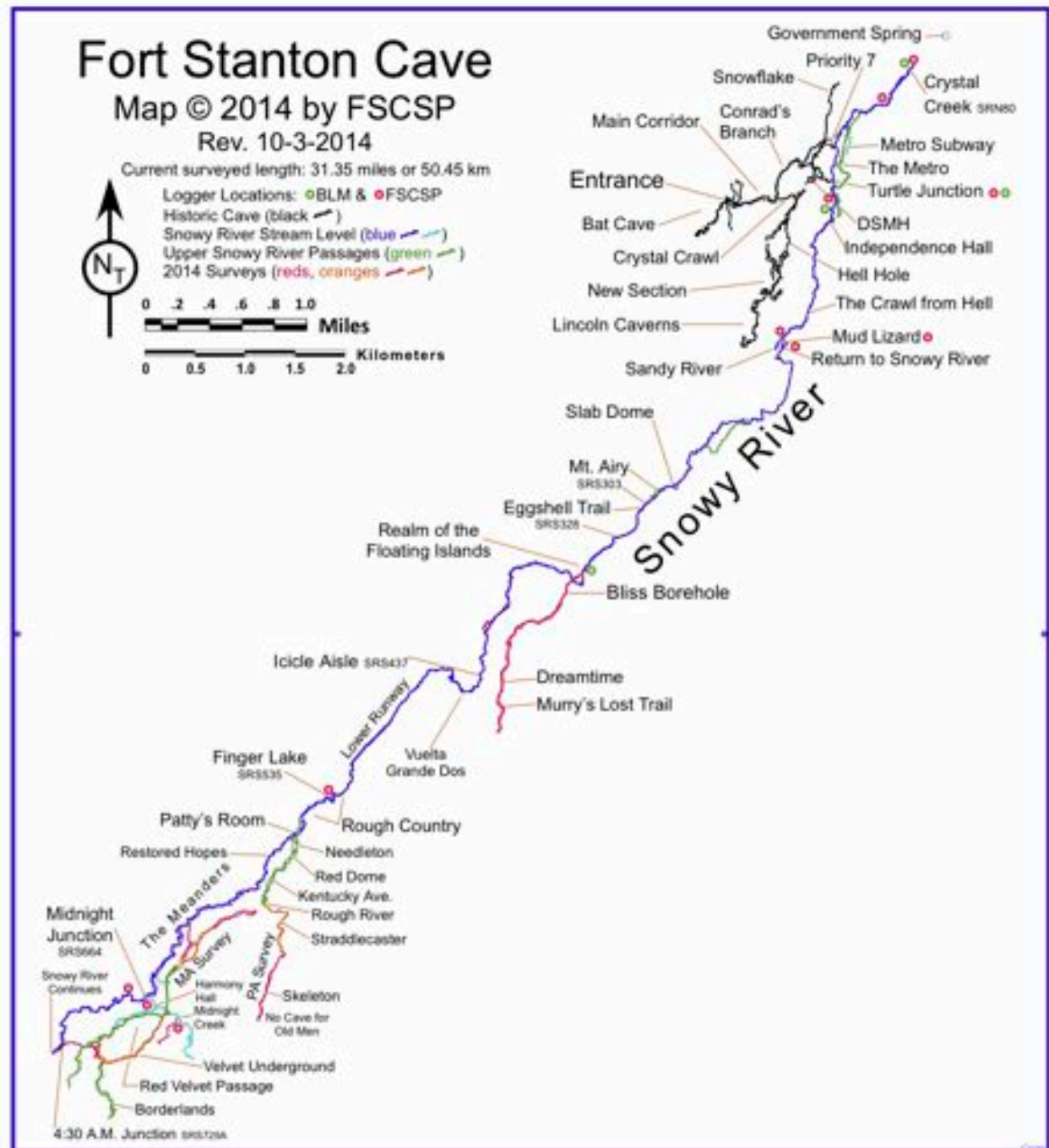
Fort Stanton Cave

data logger array

as of

December 10,
2014

Current Length
31.32 Miles



***Meanwhile, Snowy River just keeps on going, over
11 miles from the only cave entrance.***

This is it for today, but not the end – stay tuned.

Pete Lindsley, Ron Lipinski & Janice Tucker photo



Meanwhile, Snowy River just keeps on going, over 11 miles from the only cave entrance.

The Fort Stanton Cave Study Project expresses their appreciation to both the Bureau of Land Management and the Forest Service for permission to enter the cave and for their support of our Science Objectives in studying this unique cave system.

