

**PECOS DISTRICT
RESOURCE ADVISORY COUNCIL MEETING
FORT STANTON, NEW MEXICO
APRIL 21, 2016
10:00 am**

Present:

Wayne Walker
George MacDonell
Jeanette Martinez
Cody Layton
René Wahl
Knut Peterson
Ron Lipinski
Steve Peerman
Brian Kendrick
Howard Parman
Gregory Fulfer
Donald Davis
Chuck Schmidt
George Veni
Steve West
Reginald Richey
Ron Hillman
Trish McDaniel
James Goodbar
Stanley Allison
Glen Garnand
John Corcoran
Dr. Diana Northup
Jason Kimble
Brad Bolton
Ken Harrington
Jack Callaway
Pete Lindsley
Mike Spilde
Victor Polyak
Sharon Cuevas
Kyle Arnold

Not Present:

Alisa Ogden
George Farmer

Meeting began shortly after 10:00 am

Welcome/Logistics

STEVE PEERMAN – Chair

- Welcome
- Introduction
- Schedule
- Timing, moving things along, limit questions

CHUCK SCHMIDT

- Welcome
- Secured Ft. Stanton venue 20 years for \$20.00
- Introduce Beau Prewitt – new national conservation manager – Ft. Stanton
- Today is Ft. Stanton cave-centric day – we'll be reviewing new cave science
- There are a lot of things going on at the BLM that did not make into this program
- Oil and gas – agency has pushed out a lot of new policy with comment periods closing
- Venting, flaring and onshore rules
- Admin wants to get these in place before January 2017
- Have been changes at CFO and RFO – positive change as far as staffing
- Few board members whose time is expiring – we encourage you to re-apply
- April 30 is the deadline for board submissions – electronic submissions are accepted
- Mileage forms are available from Howard Parman and George

GEORGE MACDONELL

- As far as staffing, we are getting well-staffed up in CFO but we have a few key vacancies to fill
- Steve Caffey and Craig Cranston's positions are open
- Work load at CFO – staying pretty steady as far as ROWs
- APDs are slowing down – putting in a lot of processes in place to be more efficient
- RMP is moving forward – draft should be coming out in the beginning of June – public will have a 90-day review period

STEVE PEERMAN

- Can begin presentations
- Overall today will be a group of presentations on Ft. Stanton caves – we will show the significance of Ft. Stanton caves, in particular in terms of science – we have an unparalleled laboratory for caves here
- First presenter is Dr. Brian Kendrick from Los Alamos Labs – he is also chief cartographer – he will talk about how we map these caves

BRIAN KENDRICK

Overview of the Survey and Cartography of Ft. Stanton Cave

- I'd like to give you an overview of our Ft. Stanton survey cave work from fall 2014 through the present
- We're using turbo CAD map – can import, clean up and organize data
- And Adobe Illustrator – we already defined our standard layering scheme
- This allows a team approach – each team component can work on their part and next team can work on layers at the same time
- This allows us to generate scalable vector graphics – we can generate maps at any scale – new versions have been released over 2015
- We're doing resurvey work of Crystal Crawl, Lake Room and Hell Hole
- Steve Peerman worked on the floor map – he's also working on initial profiles
- This is the Ft. Stanton cave cartography team approach – new cave discovery we generate large amounts of survey data and cartography work
- Our team includes:
 - Brian Kendrick, Chief Cartographer
 - Derek Bristol
 - Eric Weaver
 - Adam Weaver
 - Garrett Jorgensen
 - Tonya Lemoine
 - John Corcoran
 - Steve Peerman
 - Pete Lindsley
- We generated a wall map of Ft. Stanton caves with Adobe Illustrator – its seven feet long (explains wall map) (zoomed into wall map to show detail, survey lines, compass lines) (resurvey area from Crystal Hall to Decoration Passage)
- New lower level has been discovered – will go back to survey – we have new leads even in the historical part of the cave
- We're looking at the new map versus the old map
- We'll resurvey document cultural signatures and historic artifact detail
- For Lake room, we compared the new map with the old map, looked for new leads – this could be a future dig
- SUMMARY – HOW IS IT DONE?
 - Survey cave passage – two to three cavers go in and start surveying, shoot lasers
 - We record survey data
 - Tandem survey – double checking – get agreement – record up, down, right left, to get an idea of passage size
 - We start drawing sketches – use protractor and sketch what is seen – boulders, walls, ceiling heights, pits
 - It's important to have detailed sketches – need accuracy to make maps
 - We get a profile view and cross section sketches
 - Here at Ft. Stanton we split these phases – we have one person doing profiling

- Once we have data and survey of the cave we enter data into the computer
- Make sure there are no entry errors – we can look at it in 3D from different angles – can line plot export into a file and read it into another program
- Scan sketch notes and digitize using compass sketch map editor
- (Showed example of sketch) We used compass line plot and survey stations – then we ask the computer to morph it – the computer will adjust and line up data
- We use aligned file and save –then load into Adobe Illustrator and draw with Adobe Illustrator on top of it
- Can view different layers, flow stone, mud, layers, formations, structure of layer – this is a standard wall compass layering scheme
- Whole sections of cave can shift suddenly
- Can import correct data and computer will compare old data with new data and automatically shift all data to new locations (we need to tweak this)
- ONGOING AND FUTURE WORK
- We will continue resurveying
- 3 Way Hill– new lead, dig
- We will be exporting walls layer into Arc GIS including Lincoln Caverns, Book Chapter maps
- We will interface with LIDAR data
- We may do a new survey in 2017

QUESTIONS

Q: Do you have plans to document where scientific samples have been taken to interface with geologic samples?

A: Yes, some of that work has been done and we will do more

Q: Regarding inventory work – if I taught a person is there any way to document additional features?

A: Yes, you could teach someone to take inventory – an instrument person and include other features

Q: Have you documented any of this in 3D so our disabled folks can experience it?

A: I think we are going to cover this topic a bit later, Ron Lipinski

Q: The in-cave process, how long it takes to get, say, 1000 feet of cave?

A: For example, in resurvey work, Crystal Crawl – treated as if it were a new cave and you resurveyed all the same cross sections; started at the entrance and went down to ? Decoration? Pass; 1000 feet from 9 am to 5 pm with an hour for lunch – six hours – if you are in a really crawly area you may only a few hundred feet in six hours – you can get thousands of feet and in some cases, you are able to get larger surveys done – say 5000 feet.

Q: Do you have an accuracy of two degrees? Is two degrees your measure?

A: Plus or minus two degrees but we like to get it smaller than that, one degree. Typically we try to do better than one degree – with new equipment we can shoot down to the -nth degree

Comment: Try to get radio locations so we can adjust to validate and shift to correct locations – mapping and cartography applications to shift

Q: When you initially drew this was it with a 3D cad program?

A: Probably 3D as well. Our survey approach – using very sophisticated programs in 3D. We can do reference files – it's a very powerful thing to work with. We can put an amazing amount of data in it and get an amazing amount of data out of it.

Comment: I think you are behind the times – there is a master drawing program that is far more accurate than Adobe Illustrator – you can keep adding to it and adjusting it – can cut it, create master plans – Micro Station. Based on data to begin with, high resolution – there is no way you can shoot data points if you are really tight in there – then you have 3D data points – Micro Station can generate floor plan and reflective ceiling program – Bentley Micro Station (discusses benefits) - it has ability to do scale – 500 miles based on survey material -

A: We have plans to do LIDAR scanning.

Q: Do you have to hand survey this?

A: Steve Peerman – you have to consider how much stuff you can carry into the caves, some spaces are so narrow and equipment has to be carried several miles

A: LICA – we're using that

PUBLIC COMMENT PERIOD

STEVE PEERMAN

- We are obligated to hear public comments
- Ken Harrington (audience)
- In addition to all the scientific work there are sections of old caves that should be open and available for recreation

Peerman

- I agree with you – Knutt Peterson is trying to work a plan to do that very thing – in light of management concerns it is not as simple as we might hope

KNUTT PETERSON

- We are trying to get public access in some areas – its important – we're making progress

HOWARD PARMAN

Proposed Changes in BLM Planning Regulations

- Handout Planning 2.0 (see attached)
- Proposed Planning Rule
- Introduction
- In February 2016 these proposed changes were published in the Federal Register – At that time we announced we were proposing to change the planning rules
- These changes are geared to improve BLM's ability to respond to social and environmental changes
- As we do our day to day EAs, go about doing our EISs as we do every so often, we try to include our overall arching land use plans and try to be more efficient

- The changes provide more meaningful opportunities for collaboration
- In the future we will apply the landscape scale approach and we want to improve our ability to implement this approach
- It's not new or different, we're just bringing this to the fore
- FLPMA, NEPA, the Land Use Planning Handbook – these don't change – the regulations will change and the Land Use Planning Handbook will change
- Once you get to the handbook, that is how we do land use plans, where we start
- We started in 2014 to do the initial outreach on these changes – the proposed rule was published at the end of February.
- Now we are in a public comment period and this fall we will publish the final rule
- As far as the proposed changes, the handout details the changes for each one
- There are new commitments to transparency – eplanning makes our NEPA documents available to the public
- There are new opportunities for public involvement early on in the process – no surprises that way
- A planning assessment is to be completed before starting an EIS
- Affirm the legal requirements for consistency with land use plans from other federal agencies
- We are reducing the comment period for drafts from 90 days to 60 days
- When we did the 2000 RMP amendment we could have done it in 60 days
- Also, what constitutes a valid protest is clarified
- Eliminates the requirement for a Federal Register notice for each proposed ACEC
- Also includes a notice that a draft plan is available for review
- It's not like we are going to stop all public notices; we are just putting everything into one Federal Register notice, all legal and statutory requirements
- So that is the rough picture of the upcoming changes
- First you do your scoping, then you have your draft RMP, the proposed RMP then comes the decision
- On your planning assessment you analyze preliminary alternatives and the rationale behind them – replaces analysis of management – we gather up the best information available with resources and resource uses
- Information gathering should be accurate, reliable, unbiased, uncompromised – the best available scientific information
- If a Notice of Intent is published before the final rule, BLM may complete the RMP based on existing regulations
- The 60-day comment period has been extended to May 24. Go to www.blm.gov/plan2 for more information on the rule changes

QUESTIONS

Q: Some agencies like CDC have been restricted by congress on climate change. Does BLM have that issue?

A: NO

Comment: Counties are very concerned about these changes – in particular about cooperating agencies

A: COOPERATING DOES NOT CHANGE

Q: Aren't they changing several definitions? The National Association of Counties is issuing information on it that BLM is taking away the local aspect of cooperating. This is a huge concern.

CHUCK SCHMIDT

- The concern from the county level is that they are not being given the coordination status versus the cooperation status – cooperating status does not change – it's based on law, not policy – we can work with them on this

Q: We're going to be losing the lower level grass roots input.

A: Chuck Schmidt - Lea and Chaves county – what status was granted to the county?

GEORGE MACDONELL

- Cooperating – gives them access to draft documents – the idea is to get scoping out early and incorporate concerns in our drafts – we still have to follow that process of what all needs to be included - certain regulations we have to follow - but the goal is to have as much public comment as possible

CHUCK SCHMIDT

- I want to get with George MacDonnell and discuss these concerns

STEVE PEERMAN

- I saw a webinar on landscape based planning and I am fascinated with it – also with special mention of the human landscape – it brought up managing cavers – we are part of that human landscape that would be involved in BLM planning for Ft. Stanton caving
- Management does not stop at an administrative boundary – the real question is: why do we have a separate plan for Roswell and Carlsbad? It's basically the same with minimal differences – it overlaps when we get into northern Lincoln County.

Q: What are you doing to encourage the public comment and to get the public to realize the importance and value of their comments? Cibola National Forest for example

A: Howard Parman – you can contact stakeholders, constituents, put it in the newspaper but you cannot force anyone to attend a public meeting.

CHUCK SCHMIDT

- We are getting comments sent to us electronically – we try to notify the public but unless something is driving people to be at that meeting, attendance is pretty light

HOWARD PARMAN

- We're trying to make all this available on websites, anyone can google that – if you go to the BLM website, most of the comments were negative. You can also ask to look at the public comments, you can review them. If you have comments and don't like what is being decided, give your comments and input.

Comment: An example of the analysis – by default it goes to the local area. The proposed rule is that the state director will go to where the public comments are being given. The proposed change in the wording is of concern; it will send comments to the state directors.

CHUCK SCHMIDT

- One of the last major efforts is trying to tackle the sage grouse area. We had to modify a lot of the RMPs. If you are in a state that does not have sage grouse can get the locals back to the area to comment because we're doing landscape based analysis now.

Comment: The changes from state to state – if we keep it local we are a lot better off. What is good for one area is not always good for the entire United States.

Comment: (Chuck Schmidt) Based on the area and scope of management, we may have differences in plans for management areas.

STEVE PEERMAN

- Dr. Ron Lipinski, just retired from Sandia National Labs. He is here as the author and major contributor to Caver Quest 3D Virtual Caving – Snowy River update.

DR. RON LIPINSKI

Virtual Caving in Fort Stanton Cave

- The purpose of Cave Quest is to make Ft. Stanton caves more available to more people. It is a fragile environment for bats, it's narrow and long, difficult to get in there. We want to find a way to represent the cave experience and for rescuers to get the cave experience.
 - Historically, we started with verbal descriptions of caves
 - Then there were hand sketches
 - Next we had actual surveys with plane views and cross sections. We were in 12 miles from the exit in the tunnels with equipment
 - Still photos
 - Movies and videos
 - 360-degree panorama from a single location
 - 3D rendering with photo-textured walls
 - An example – US Army, Wheeler Expedition, we showed drawings and 2D map entrance of the region
 - Here is a Snowy River photo
 - Closer to the entrance we can take advantage of more modern equipment – commercial LIDAR is smaller now
 - 5th generation is about five inches by seven inches
 - (Conducts demonstration) This is the Ft. Stanton cave – the view is generated by LIDAR put into three dimensions
 - The game is available to get young people into caving – they have to pass exams to go into the cave
 - We have an unlimited access mode also – you just have to go through your equipment requirements and click on them

- Unlimited access sets the program so you can get into the cave
- It's 3D renditions – shows the sinkhole – vegetation gets greener as you get closer to the entrance, there you see the dark cave
- If you get an opportunity to get cave information notes you will learn that there is more mass of life underground than on the surface – underground its mostly microbes
- New species have been found in Ft. Stanton caves – Dr. Penny Boston was working here and was promoted to lead astral biologist for NASA
- Bats are the ambassadors between the inner world in caves and the outer world
- Four billion dollars in value have been added due to bats eating bugs outside the caves
- We do not have White Nose syndrome in New Mexico now
- So back to the cave terrain, you can turn on the lights
- Looking at LIDAR technology – it's all true to life – you can take a rapid tour or you can follow the water inside the cave
- You can view all aspects of the actual cave with this program, it's as close as you can get to a real cave experience without going in
- Snowy River runs about 12 miles
- This is available online – the public has access so we're doing some outreach with this

QUESTIONS

Comment: (Knutt Peterson) This is a great program for public outreach

Comment: (Steve Peerman) This is state of the art

STEVE PEERMAN

- next speaker is Dr. Diana Northrup, visiting associate professor of biology at UNM

DR. DIANA NORTHUP

Fort Stanton Bats and Possible Treatments for White-Nose Syndrome

- I work with bats – I am currently studying White-Nose Syndrome
- Let me set the stage
- We have more microbes living on our bodies than we have cells in our body
- Ten times more microbes
- It is a similar dynamic with bats
- As a team we are trying to understand what we can do about white nose syndrome
- It has killed about seven million bats in the United States
- This is an emerging fungal pathogen
- In the winter the bats' immune systems are off, the bats wake up and groom and starve to death
- We wondered if bats have the same healthy microbe levels as humans – who lives on bats?
- There is species diversity – we have the most bats in the United States in Arizona and New Mexico

- We wanted to get a baseline to determine the natural defenses of our bats – we've been monitoring a culture of actinobacteria from bats
- Testing good cultures against bad cultures
- Microbes can affect us in a variety of ways, *i.e.*, mood, weight, etc.
- Study sites around New Mexico
- We've been swabbing bats for microbiota
- Protocol
 - We swab fur, membranes, 454 next generation sequencing, fungi and bacteria
 - Weeks of computer analysis
 - Discovered from five sites, the bats we swabbed from inside caves had different microbes from bats from the surface
 - Caves are full of actinobacteria
 - They are influenced by the ecoregion around them
 - So the organisms found in Ft. Stanton caves are different from other caves. There are differences from ecoregion to ecoregion
 - Cave-caught bats have more actinobacteria from surface bats
 - We are culturing these in three different types of bacteria
 - We inoculate the plates and manipulate to get individual isolates
 - We have caught seven types of bats – in-cave and surface bats at Ft. Stanton
 - We have 376 and counting parent cultures
 - Streptomyces are 77% - this is the same as where we get streptomycin – and Rhodococcus at Ft. Stanton
 - We have tried it on bats and opened plates of Streptomyces on bats
 - We're testing whether if we use this in caves we will harm the ecosystem
 - We streak a plate with actinobacteria and test it against *P. destructans* – if we can do this in the lab, can we do it on bats?
 - We have six isolates that can kill PD in the lab – they came off big brown bats
 - Part of 35 isolates that can kill PD at all our sites
 - Bat bacterial and fungal microbiota vary from individual bats and across species and gender
 - We are showing trends between surface and cave-caught
 - There is lots of work left to do developing additional cultures, producers of antibiotics
 - We're doing metagenomics, secondary metabolites, etc.
 - We're doing grant work as well
 - One of the things being ignored is what effect it will have on cave ecosystems
 - (Acknowledgements)

QUESTIONS

Q: Do streptomycins give bats natural immunity?

A: They may give natural resistance, we don't know yet. Ours is one of the first studies.

Q: Do they find actinoflora back east?

A: We don't know yet

Q: Considering advances in genetic engineering in recent years, has there been any discussion about implanting genome into bats' immune system?

A: We're just starting that, but it's been really slow.

Q: When you culture one that is eating up PD, how do you get it on the bats?

A: We just open up a plate and it will volatize SP into the air.

Comment: This is significant research. This syndrome is affecting our economy because bats are pollinators. They take care of insects in the fields.

A: The good thing about those bats in Austin is that they are not susceptible.

STEVE PEERMAN

- Introduces Dr. Northup's graduate student Jason Kimble

JASON KIMBLE - GRADUATE STUDENT

The Walls are Alive! The Microbial Ecosystems of Snowy River

- I am all that is separating you from lunch
- I am studying the microbial ecosystems of Snowy River
- This involves nitrogen cycling in caves
- We need to better understand how microorganisms acquire and cycle nitrogen in nutrient-limiting environments
- The nitrogen cycle is complicated but it operates everywhere
- If you take away microbes, the nitrogen cycle shuts down
- So in caves, what nutrients are available to microbes?
- Some are from the surface
- Ft. Stanton is a semi-closed system – we have Snowy River, which sometimes floods so we get connectivity from the surface
- In deeper caves, Lechuguilla cave for example, microbes are reliant on what is available – they can actually eat rock and get CO₂ from the atmosphere
- This has astrobiological significance, Mars for example
- How life on another planet could function
- Arid land caves are limited in available nitrogen cycling
- Looking at the microbial community – are microbial nitrogen cycling genes available?
- Discussed black FMD and brown FMD from Ft. Stanton
- I'm doing metagenome sequencing and assembly (discussed protocol)
- I found core biological nitrogen cycle – key pathways to the nitrogen cycle
- These organisms are well-suited to caves
- I have identified a potential core biological nitrogen cycle in Ft. Stanton caves
- In comparison to other cave environments, Ft. Stanton contains complex microbial communities not yet well understood
- Shows potential for negative impact from human activity

QUESTIONS

Q: If we were to find life on other planets, is this the type of life we would be looking for?

A: Probably, yes. We see similarities on other planets.

Q: Are these organisms primitive?

A: Probably the pathways, yes. These are inactivated by oxygen, suggesting ancient microbes.

Q: Are there applications to your research that can be applied in other areas?

A: Yes, I recently got a NASA grant.

Q: As far as Ft. Stanton caves, have you been able to get these down to species-level?

A: Not yet, some of them you cannot. Some of these organisms are very novel. Some are candidate novel. Different caves contain different microbial life. Only probably 30% overlap.

Comment: Ft. Stanton caves are a unique resource – the end is 12 miles from entrance. Here, we have organisms protected from sun.

MORNING SESSION CONCLUDED AROUND 12:30

AFTERNOON SESSION

STEVE PEERMAN

- Introduces Brad Bolton from the Lincoln National Forest

BRAD BOLTON

Forest Service Recreation Fees

- Introduction
- This will be a two-part program: 1) sustainable recreation – campgrounds; and 2) our fee program; new and existing fees; fee proposal – Mountain View Room program
- Sharon Cuevas will start us on sustainable recreation

SHARON CUEVAS

- Amenities have been reduced due to reduced tax revenue
- We charge fees for camp grounds so the public can get access to sites it wouldn't get access to otherwise
- We get recommendations from BLM resource advisory committees
- We only charge fees at certain sites
- Process
 - We get consensus on new programs
 - We learn what BLM expects from them
 - Evaluate the sites we are looking at for next year to charge fees and open them up to the public
 - We try to get them open in six months, after public outreach
 - Advertise in the Federal Register the sites we are looking at
 - We request comments and answer questions about the process
 - We provide an overview of the site, what the sites look like
 - Some people are more interested in rustic sites
 - Each site will look different in terms of what is proposed

- I will explain what is required to keep the site properly maintained and the associated costs
- We would like to provide everything for a great camping experience but that is not reality
- 85% of people understand reductions – we have to manage these sites up to a particular standard so funding reductions affect the number of sites we can make available
- Overview of sites and what activities can happen there
 - recreation.gov website – we get a 42% increase in visitors when sites go on the web
 - Usage and visitation rates
 - Some are historic sites
 - Fees charged go back into maintaining sites
 - There is a financial analysis side to this as well
 - What kind of revenue do we expect and how will we use it
- During the next six months we will be providing information to the public
- We will do market analysis
- We will look at state parks
- We're not looking to make a profit necessarily or compete with B&Bs
- We are part of the community
- Congress has realized we need to be sustainable
- If we can't look at other alternatives, we will have to increase fees or close sites
- We summarize data from public involvement and feedback – we could summarize thousands of comments or go through them one by one
- Point is, the community decides
- We gather information from all visitors and there are a variety of types of visitors
- We publish our site proposals in the Federal Register six months prior to making decisions
- We get the community involved in making our decisions – we also need to hear from the BLM about what it thinks they need
- We disclose the reason for the fees charged and how we use the public's investment
- Today is just an introduction on what sites we are looking at

BRAD BOLTON

- Per regulation, we have to post our proposals in the Federal Register six months in advance
- So in our local cabin rental program we have for rent the Dark Canyon Lookout
- This was historically built for fire lookout but it is no longer used for that
- We want to make Dark Canyon Lookout cabin available for overnight rental
- Our Mountain View Rooms objective is to make rental cabins available for generally, \$65.00 per night
- To get the fee proposal we use a computer program, fill in the amenities offered and the program spits out a fee
- (Showed photographs of interior of cabin, lookout, scenery, wildlife and terrain, volunteer restoration crew)

- The fee we are currently proposing for this cabin is \$65.00 per night plus a service fee of \$9.00 for internet reservation and \$10.00 for telephone reservations
- These are unique properties, they are a historic and rustic experience
- We provide no water, mattresses or linens, etc.
- The fees are retained to upkeep properties
- Mountain View Rooms works in Arizona as well
- All of this falls under the Federal Lands Recreation Act of 2006
- Some of our sites include:
 - Mesa Barn, close to Capitan – it's a unique property, stands out nationally
 - There was a ranger station on the edge of White Mountain wilderness – it's listed on the National Register – we have to maintain these sites as originally built (showed photos of inside, outside)
 - There is a property outside Cloudcroft – Blue Water Lookout Tower – we're currently not proposing providing drinking water, it's impossible with the price point of rental
 - Carrisa Lookout Complex – it's remote
 - Woolford Lookout, 20 miles from Cloudcroft
 - My favorite, Caboose in the Woods – train caboose (showed photographs of inside and outside)
- Once we post the sign that it is a historically registered location, maintenance needs tend to disappear – no vandalism occurs after that generally
- Properties closer to civilization are the most successful
- Access is through making reservations online – we have keypads on the doors and visitors get the key code
- We take photographs before and after restoration, inside and outside
- Some of these are high altitude so they are great for skiers, ATVs, snowmobile enthusiasts
- All of this is public information

QUESTIONS

Q: You mentioned the amount of the fee at \$65.00. Is this for Dark Canyon or for all properties?

A: We only did two this year and it would be for both. It is only an estimate though, what our market is showing us. We will get comments and make decisions later.

Comment: (Dr. Diana Northup) I love the idea of the Caboose in the Woods! We did this in Australia and they had a whole bunch of them. It was a great success!

A: Is this comment in the notes? I hope so, I am partial to this one.

Q: Dark Canyon cabin right now is mainly used by cavers when they are on weekend camping trips. The concern is that we have used the cabin during times of severe weather and if you put a key pad on that door we would be spending the night in some pretty nasty weather. Would you like to consider the fact that we do use it for emergency shelter?

A: Yes, that has been an issue in the past.

Q: Are you looking for comments today?

A: Just give us all your comments. If anyone has comments at any time, just forward them to Steve Peerman.

Q: Can we give comments today? The fee is way too low. I am a resident of Lincoln. And last year, we had 65,000 visitors in Lincoln and there was no place to stay. Something like this in Colorado, there was a building built before the war and they built a series of cabins and they rent out for an unbelievable amount of money. They are reserved for the next 100 years. I'm an architect and this type of facility rents out for \$500.00 per night.

Comment: You're talking about rich people

Comment: I'm not talking about rich people. 67,000 came to Lincoln, it's way too low.

Comment: I think keeping it this low is where we need to keep it.

Comment: \$65.00 per night is too low. It won't pay for itself at that rate. If you turned it over to a private party, they would rent it out for \$500.00 a night.

STEVE PEERMAN

- Running out of time
- Anyone with comments can send them to me or put them on the website

BRAD BOLTON

- What you can do – Lincoln National Forest Service website – you can make comments there

STEVE PEERMAN

- Introduces Pete Lindsley for Dr. Penny Boston
- Dr. Boston is now the director of astrobiology for NASA – she is an expert on caving

PETE LINDSLEY for Dr. Penny Boston

Cave Science

- That was a pretty neat presentation – another property for public enjoyment – a lot of those places don't have water, you have to bring your own water. If you go to fancy place you find food, water, beer in the fridge. If you could find a way to do that, people would probably pay \$5 for a cold beer.
- Ft. Stanton Cave is a unique property – it's a long spread-out property, 12 miles long - it's got these neat sidewalks and water – but you can't drink the water
 - Ft. Stanton Caves can be read like a book - talk about manganese oxides
 - We also have bioremediation – tiny microbiology critters – wearing black hats
 - This microbiology shows evidence of prior climates, *e. g.* phytoliths
 - Need a microscope to see them
- When you go to the entrance of the cave, you can see evidence of microbiology – starline specs on the walls – if you had a microscope on your hard hat, you would be seeing crystals on the wall
- It's very subtle – you can have a mud bank, sediment – and that can have these little critters in it also
 - There is life there but it's very small, microbiology

- When the river flows it has a lot of calcite and makes white calcite deposits – you can see the water lines
- Just above it, you see all this black stuff – when you are crawling, you can't let your hat hit the ceiling because all this black stuff will fall on you. If you drop any of this manganese on the white cave floor, the next people in the cave will tell on you
- This photograph was taken not far from Turtle Junction – it has a few deep holes and may have a two-to-three foot waterfall
- If you turn on this microscope you have on your helmet, you will see these oddball critters
- This cave has been there a long, long time – biological plants have died and filtered down into the cave
 - These layers are climate and ecosystem indicators
 - We have set up study sites – plotting locations which they have been studying – Carlsbad and Guadalupe
 - These photographs show crystalline structures – can compare the structure of these and get an idea of the types of plants that used to be on the surface – can go way back in time – Ft. Stanton is a great cave to time-date plants
 - When you are in the cave looking for this stuff, look for color on the cave walls – if the walls are covered with black manganese look for color – it's something alive
 - We are hoping some of this stuff is helpful to us – we are going to be working on this manganese – maybe some of the best manganese is ten miles back
 - You can only spend one night and you have to carry everything in – you have to carry it all back out

QUESTIONS

Q: Those slides were SEM images so they were only microns – it looked like you were showing creosote and pollens? Where is the nearest creosote from here today?

Comment: You're seeing changes in climate – what you are finding in the sediments may indicate what type of climate we had in the past

Comment: Creosote bush is common around Roswell

Comment: (Steve Peerman) When Penny was doing the work here she spent several days here with her student collecting minerals that plants produce – she was collecting that stuff all around the surface and comparing it with what was found in the cave and comparing. Comparison was not identical.

Q: Are these the samples we did for Diana?

Comment: (Dr. Northup) that was Penny - she basically laid the groundwork for someone to go through the sediment – that work was just calibrating the system - hopefully someone can come back and do detailing.

Comment: (Pete Lindsley) some of the work we do here may be found on Mars – a lot of the science that goes on here can be used elsewhere

STEVE PEERMAN

- Introduces John Corcoran for John McLean

JOHN CORCORAN for John McLean

Finding Hidden Caves – Earth Resistivity at Fort Stanton

- This presentation was developed by John McLean – who was a pioneer in electrical resistivity to underground voids – he has found all sorts of underground caves – he can detect caves with no entrances
 - John McLean has found more voids than anyone
 - Is there a way to locate caves from the overlying surface?
- Electrical resistivity – it's an old science – earth resistivity one of many geophysical methods used to infer subsurface properties from surface measurements
 - Can reduce the data through inversion
 - Brief resistivity equipment history
- Showing a graph of reduced data – resistivity profile of Snowy River – colors indicate how resistive the earth is as you drive a current through it. Blue colors are low resistivity. Red and purple highly resistive. Dark red and purple are probably air-filled cavities
 - He inset some white spaces which were cave passages. Turns out his work was Accurate – he probably visited less than half the existing voids
 - Over time his equipment was improved and became smaller
- His technique was fairly trustworthy – wanted to record existing and find new voids
 - Some have not been entered yet- some have no known entrances
 - Various things have happened over time – sediment has filled in some areas, some have been blocked
 - We are validating his technique
 - He started running lines away from known caves and found new anomalies – he pre-discovered them – found passages before anyone entered them
 - Mud Turtle passage – he initially decided to throw this data away – but turns out it was accurate
 - This area down to the south is the beginning of Snowy River south – later the survey teams came in and John had predicted the void
 - Are there more passages? A line of anomalies was found southwest of the Lincoln Caverns – he found another piece of Snake River –
 - Limitations
 - Large shallow passages are usually detectible with this technology for
 - Large, shallow caves
 - Uniform topography
 - Uniform bedrock
 - Cultural effects
 - Metal fence posts and wires will affect this technology
 - John ran over 200 lines since 2002 – discovered new stuff – homemade equipment is a plus, much less expensive – used to figure out where to dig and explore
 - Gives insight into karst systems
 - We know this cave goes a lot further than what we know of now, we think it runs at least six more miles linearly –

QUESTIONS

Comment: (Steve Peerman) How come that is where they put those lines – it's because that is where all those valleys were. If you are in a valley that is closer to the cave, the easiest way is to follow the valleys.

A: (John Corcoran) Others came out with their commercial rigs and some of their lines overlapped John's.

Q: Could you comment a little bit on what we think is after Government Spring?

A: There is another technique that Brian Kendrick and his son have used to map underwater systems and they made a B-line to Government Springs up north of Snowy River, you can see the lake and detect the Snowy River passage and there is another one just to the east that no one has entered - might be a parallel system.

STEVE PEERMAN

- Introduces Mike Spilde

MIKE SPILDE

Geochemical Studies at Snowy River, Fort Stanton Cave

- Seen caves from both sides and Snowy River is a pristine passageway and gives us the opportunity to study – grateful that we all have access to this study site, natural laboratory

- Research Questions

- What is the origin and history of Snowy River?
- What is the origin of Snowy River calcite?
- Can the water, sediment or calcite of Snowy River help determine where Snowy River passage goes?

- What is the source of the water that occasionally flows in Snowy River passage? Do we need to be concerned about pollution in Snowy River? It's a very fragile environment - important to know where it goes so we can protect it

- Origin of Snowy River calcite? A lot of what we know is from a series of Cores cut in 2008 – 8 cores. They just drilled through the calcite and stopped at the mud layer below. I did some further mineralogic study.

- This slide shows areas from which cores were taken. Basically the formation is Thinning. These cores record all the feature layers. We can correlate the layers from one core to the next.

- Two cores were looked at in detail – Snowy River 10 – (see slide) they contain microscopic lamina from 10 to 100 microns thick – calcite crystals are optically continuous across laminae – called flowstone, very porous. This is an unusual form of crystallization – we call it a statinoid

- We counted these laminae – came up with 260 light bands and 238 light bands Respectively – each couplet represents flooding and a deposit event

- We therefore dated Snowy River – 821 plus or minus 120 years – this corresponds to el nino events

- Snowy River calcite precipitation – determining thickness of calcite growth on data logger – don't know how fast it is developing – also looked at calcite saturation of Snowy River water values – low magnesium calcite is deposited – clay and diatoms are trapped among the calcite crystals – some are oversaturated; some undersaturated – it would be nice to get more water samples

- Examination of polished core – contained clay, silt, gypsum, caliche-cemented detrital bands bridging gaps
- What we know from the core samples
 - There is a lot of sand and gravel in Snowy River
 - What the source of water is in Snowy River
 - Little Creek resurgence
 - Eagle Creek is losing stream
- See slide for map – regional geology
- Looking to the formation – would be a bit deeper because of the formation out there
- Regional water chemistry (see slide) - a way to graphically compare waters in different areas of the system
 - Piper diagram – shows chemistry of waters – can we mix water A with water B and come up with water C – Snowy River?
 - Eagle and Little Creek water chemistry – would have to dilute these waters to get to composition of Snowy River
 - Eagle Creek is a good potential source – could be contributing to Snowy River waters - much more like Snowy River water
 - Diatoms- we filter each water sample before we run through analyzers - don't drink Little Creek water – Eagle Creek has a lot of diatoms and sediment – not that bad

QUESTIONS

Q: (Dr. Northup) Did you find in the cores any evidence of microorganisms?

A: Yes we found ?? 6/10 of a micron – I don't know what type organism – we found it in these in dark layers –

Comment: We have these water loggers from one end of Snowy River to the other - end and a lot of them have that calcite growth – best measurement is to take cap off – if we end up with them in our hands you can see the crystal. If we hang on to them you could look at those

A: Yes, that would give us a lot of information, take the cap off and look at it in scope and put it back on.

Q: So that passageway is probably much older? As more calcite is getting deposited it would fill up?

A: We can get a minimum and age base on the calcium deposit.

Q: Do we need to do some more core drilling?

A: Yes

Comments: Porosity and permeability, there was evidence early on that it had to be porous, if the water is turned off, the various ponds drained down into the sediment. The only sizeable ponds that remained were the few places the formation is exposed in bed rock. The effect of this is interesting – He was the only presenter who said we are supposed to clean up matter that is dropped, it's almost impossible to remove artificially. It's almost self-renewing in that the remaining matter on the floor gets washed along the floor until it is imperceptible. You've got all these crystals and you are probably adding more calcite into it . It's self renewing.

Q: So the light and dark layers - does that imply it's coming from different sources at different times?

A: Little creek resurgence allows silt to come in and so that is some of the bad stuff – sulfate - there is nitrate there and nitrite

Q: (Dr. Northup) Are bacterial associated with fecal matter either human or animal? I would really recommend you not drink that water – some parasites that just hang out

Comment: (Steve Peerman) Eagle Creek – this week we have done work on Eagle Creek = in terms of resource management this is private land. However, some of it is on National Forest lands so protecting the water source is important. The owner is concerned about contamination from the golf course and they think that the algae in the streams didn't used to be there before development of the golf course and they think the golf course is affecting the waters

Comment: One of the big mysteries of Snowy River is that it started to grow calcite years ago and there are at least two possibilities – speleogenetic material that carries gravel and mud was running much longer than 800 years and at some time that stopped. We don't get gravel running into Snowy River now, though that might be subterranean piracy. Between stopping of original water and starting of Snowy River water of today, it may have happened at the same time. Once the main speleogenetic water got saturated it would produce the calcite we see being deposited now.

STEVE PEERMAN

- Introduces Dr. Victor Polyak

DR. VICTOR POLYAK - UNM geologist

Radiometric Dating and Isotope Studies of Fort Stanton Cave Speleothems

- Fort Stanton Cave Studies
- Wife Paula and I are interested in a variety of things. We do paleo-climate research. (Shows photograph of mud folia) (see slide). Mud is very delicate, just touching it can damage it. It is very well preserved on ceiling of the cave. They probably represent (mentions David Davis resident expert) a time when the water was at the ceiling of the cave. Pool fingers – Dr. Diana Northup Penny Boston and Mike Spilde have done a lot of pool fingers. In some areas these are well preserved.
- Crystal Crawl - covered with gypsum crystals. These are gone now except in small places, you can still see these. We have a sample in the UNM museum from this area so we know it is from Fort Stanton caves. Double needle samples are around. (private sample). As we were doing this study we noticed that the tips are small and the bases are thicker and they are banded. In some studies the rate of growth of those crystals are an annual growth. The thickness correlates with the number of bands. They grew at the same rate. It looks like these needles grew for about 200 to 300 years. We don't have funding to do this work but I got a date of about 6000 years. We did look at the surface of these under a microscope – found corroded bat hairs. As the gypsum crystals were pushing out, the needles collected bat hairs.
- We did not see these inside the crystals but on the surface. Last time I was in the cave, found fossil cave pearls (see slide). Found two main layers which formed about 26,600 years ago. These were probably deposited during the last glacial period. At that time the area was wetter. So we can determine paleoclimatology using stalagmites. We are using broken stalagmites.
- We are funded by the national science foundation to do this work. This is what

we are working on publishing now - using stalagmites in paleoclimate studies. These probably formed 11,200 to 13,180 years ago. Small trenches are small milligram stable isotope work. Oxygen and carbon content will tell us something about the area.

- China speleothem record slide. This is from about 400,000 years ago. They now have data going back some 700,000 years ago. This is the measure of summer insolation – power of the sun on the earth. This is how power of sun changes in our hemisphere over time. Tilt and wobble and the orbit of earth has been tracked. Speleothem formation coincides with sun's power fluctuation.

- We put a data logger at Devil's Backbone last year. Mud in slide is not there – it's from people coming in and out of the cave, it belongs there but it was just messed up.

- Climatological data at Devil's Backbone Fort Stanton cave (see slide).

- Most of the cave is undecorated. To go to some of the decorated areas, you have to go into specific formations of the cave. We do drill powders now; we don't take them, but the powder.

- Ft. Stanton record (slide data). Summer insolation – oxygen is following insolation. We just don't have a record to show it nicely.

- The first ice age dropped 10 to 12 degrees over time. Moisture from ocean was wrapped up in ice sheets so the ocean level dropped. These formations were growing only in ice age - what we think is during the glacial period, it was a wetter period – a time when lakes formed in the Southwest (see slide – Holocene versus last ice age).

- We are hoping that in the depths of Snowy River we will find something on the Holocene period. There are four glacial cycles that we are recording in speleothems - we see all four in this sample (see slide - stalagmite FS2 chronology slide). Shows where in the sample it was drilled and age series dating by growth

- Climatic backdrop – ages of shelf stone - stalagmite FS-AH1 chronology – distance from stalagmite top and age (see slide show)

- During a warm climate the polar jet moves north – when it is cold the storm track is pushed down and we get more rain.

- Glacial 2 period – sample of flowstone from trophy room – glacial 2 is represented by one of the darker layers – have another sample for this period – fossil from the trophy room – it gives better chronology

- We have a good record of these for the last four glacials

- Conclusions – samples coming from Fort Stanton - go way back in time and show the lake forming period –

QUESTIONS

Q: (Steve Peerman) You said you are looking forward to getting more records from Snowy River, do you have a reason to expect more records?

A: We have some folks who are going to provide us with the information we need.

STEVE PEERMAN – conclusion of presentations

- Fort Stanton is a laboratory for many types of studies and discoveries (3:24 PM)

Set Date, Place and Agenda Items for Next Meeting

STEVE PEERMAN

- Chuck?

CHUCK SCHMIDT

• What is going to be interesting is the folks who are cycling through – hopefully it won't take us long to get those folks in – hopefully we will have a quorum Looks like forestry will have some items for next meeting

GEORGE MACDONELL

• RMP is on schedule for us June 1 – next meeting we will probably be mid-scoping at that point

JACK CALLAWAY

We can host next meeting in Artesia (Concho)

STEVE PEERMAN

- You are proposing holding the next meeting at your facility?

JACK CALLAWAY

- Yes

CHUCK SCHMIDT

• Would you like to have some time for that process? If we have best case scenario when can we get candidates through and voted in, would you like to have an informal meeting - how many are cycling off?

Q: Whose time is up?

A: (Howard Parman) Tish, George Farmer, Lisa Ogden

CHUCK SCHMIDT

- So - mid summer? Middle of June? Pushing into July?

STEVE PEERMAN

• The late part of June is ok for me but end of June, early July is not best for a lot of people

CHUCK SCHMIDT

• Roll the dice and pick a date. Thursday, June 14? June 16, June 23? June 30? June 30 would not work for me. June 30? Stay with the 30th?

CHUCK SCHMIDT

- I encourage you all to work on agenda topics. Something RAC has spent a lot of

time on last year is the ACEC sand ranch – maybe a progress check – and if you guys would like a report on activities within the offices, how many APDs are you running, how many rights of ways, that sort of thing?

JACK CALLAWAY

- I would like to see that in comparison to the price of oil

STEVE WEST

- I would like a report on the Black River area in the CFO

GREGORY FULFER (County)

- I certainly want to be responsive to you on rule changes. How about recreation?
- Chuck - don't want to push you on subjects, you are independent

HOWARD PARMAN

- If you can say, within next month, we have to back that up and if it's June 30, I have till May 15th to get the Register notice out

(GEORGE MACDONELL - ??? report on ?? (could not hear) That would be a good topic. We would be happy to report on some of those subjects

CHUCK SCHMIDT

- The national conservation area is wrapped into what we call the national landscape conservation system - we were requested funding for items here – we were just informed two weeks ago that we were successful and we have substantial amount of funding to improve recreation facilities here. We are trying to get our NEPA ready – expand our amenities – electrical and water

KYLE ARNOLD

- The forest service lady told us – getting potable water is expensive – we will be working on that - right now people just park all over. We are going to update our business plan and develop fees – want to set up gravel pull throughs, water and electricity. We did hear that we were going to receive the money and we have to get that money ?? by ??

CHUCK SCHMIDT

- We've got NEPA ready – we don't need to do full-on NEPA at this point because it is within existing planning - but we need to let public know

STEVE PEERMAN

- anything else?

CHUCK SCHMIDT

- This is a beautiful area – go out and enjoy it – there's so much history and we are blessed with all these scientists who want to get out there and study it

Adjourn

STEVE PEERMAN

- Ok, we are adjourned (3:36 pm)