Newsletter of the Pomona Valley Amateur Astronomers

To see the world for a moment as something rich and strange is the private reward of many a discovery.
Edward M. Purcell

Volume 30 Number 10 ***nightwatch*** **October 2010**

Vice-President's Message

November brings the end of daylight savings time and the start of earlier dark skies. It's time to take advantage of the chance to observe and still get to bed on time! First though, the Club ends October on a sunny note, as we again converge on Claremont's Village Venture craft, Halloween, and harvest Fair. We practice sidewalk solar astronomy by setting up just north of the Claremont Metrolink station. Join Club members with your solar scope or just your knowledge of the sun to share with costumed youngsters, their families, and other local residents.

November's Club star party is at the Cottonwood Springs campground in Joshua Tree National Park. Remember to reserve Friday, December 10th for our annual Holiday Party at Sizzlin' Skillets Restaurant in Upland.

In this season of elections, our Vice-President filling in as President reminds members that he'd love to be replaced. Please get in the spirit of the season and consider joining the Board to help to lead our merry band of sky watchers.

Joe Hillberg

PVAA Officers and Board

Officers

President .....Position Open ….....
Vice President ..Joe Hillberg.....909/949-3650
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Membership ...Ludd Trozpek.....909/624-3679
Publicity .....Dorene Hopkins.....909/983-5584
Programs .....Ron Hoekwater.....909/391-1943

Club Events Calendar

October 21, Board Meeting
October 22, General Meeting - Robert Piccioni - "Einstein for Everyone"
October 23 Claremont Village Venture, Solar Event, 9-5pm
November 6, Star Party - Cottonwood Springs, Joshua Tree

November 11, Board Meeting
November 19, General Meeting - Gene Serabyn of JPL
December 4, – Star Party
December 8, – Star Party - Oakmont School
December 10, Holiday Party - Sizzlin' Skillets - 6-9pm

January 11, 2011 – Main Branch, Ontario Library, 7 – 9 PM
January 21, 2011, – General Meeting

February 18, 2011, – General Meeting - Dave Jura Seuch
March 18, 2011, – General Meeting - Dave Doody
April 15, 2011, – General Meeting - Christine Pearce
May 13, 2011, – General Meeting

The World's Largest Telescopes, Part 5: Into the Age of Hale

In his book *An Acre of Glass: A History and Forecast of the Telescope*, J.B. Zirker covers the rise of giant observatory telescopes in the second half of the 20th century and the early 21st. The first few introductory chapters give a capsule history of astronomical telescopes. Chapter 1 covers everything from Galileo to the late 1800s. Chapter 2 is simply entitled, "The Age of Hale". It's as if there have been three great ages of telescope building: before, during, and after the career of George Ellery Hale.

It's a strangely compelling way of thinking about the history of the telescope, especially in this series on the largest single-aperture optical telescopes through history. In Shakespeare's Julius Caesar, Cassius says of Caesar, "Why man, he doth bestride the narrow world like a Colossus, and we petty men walk under his huge legs and peep about." Hale and the observatories and telescopes he brought into being bestride the astronomical world in similar fashion; it is doubtful that any other single person has had such a profound influence on the science of astronomy as it is practiced today.

Hale enters this series because he built the world's largest telescope not once or twice but four times, and the next four articles in this series will discuss those telescopes in reverse chronological order. But Hale's influence on astronomy goes well beyond specific pieces of equipment, into the types of questions that astronomers look into, the observatories where they do their work, and even the journals where they publish their results. And in all of these areas Hale's influence was transformative; he was not so much a bridge to 20th century astronomy its creator.

At beginning of Age of Hale, barnstorming instrument makers like A.A. Common could build the world's largest telescopes mostly or entirely on their own, as hobbies, much in the same way that William Herschel and Lord Rosse had built theirs. These telescopes were mostly upscaled versions of previous instruments. By the end of the Age of Hale, the world's largest telescopes would be national and internationally funded undertakings, requiring the expertise of large teams of engineers and materials scientists who would literally be inventing new technologies to bring the planned telescopes to fruition. Before Hale, the building of a telescope might be arduous but it typically only took a few years. The 200-inch Hale telescope on Palomar Mountain had a development time measured in decades, which set the pace for the Keck scopes that succeeded it and for present-day efforts like the Thirty-Meter Telescope. Starting with the 200-inch telescope, the process from early planning to first light could occupy the entire active career of an observer. The 200-inch was largely built for the intended use of Edwin Hubble, but by the time it was finished, he was too infirm to become its primary user; that job would fall to his graduate student assistant, Allan Sandage.

Hale's career spanned--and helped drive--an interesting reversal in the articulations among telescopes, observatories, and universities. From the beginning of observational astronomy until the late 1800s, observatories were built at universities, wherever the universities happened to be situated, and telescopes were built at existing observatories. By the middle of the 19th century, light pollution was sufficiently serious, and the observational needs of astronomers sufficiently demanding, to require that the next generation of telescopes be built at the best observing sites, rather than the most convenient ones. The Lick Observatory was the first to be built on top of a mountain for this reason, and Hale's observatories--Yerkes, Mount Wilson, and Palomar Mountain--would follow in the same footsteps (Yerkes is not on a mountain, but a lake, but it was the best available spot at the time within easy reach of the University of Chicago). In time, universities would expand to serve observatories built on the best sites for telescopes, a perfect reversal of the historical relationship. The university that would become CalTech existed before the big southern California observatories, but only as a prep school. Hale joined the institution's board of directors in 1904 and for the next few decades steered the school in the direction of serving the Mount Wilson and later the Palomar observatories. Similarly, the University of Hawaii has an outstanding astronomy program because it is close to Mauna Kea; the forest of giant telescopes grew up for observational reasons, and the university benefited, rather than vice versa.

When Hale began his career, the big questions tackled by astronomers were mostly to do with stars--cataloging their brightnesses, distances, and spectra--and the solar system--mapping planets and discovering moons, while nebulae, spiral and otherwise, took a temporary back seat. By the end of the Age of Hale--and directly *because of Hale*--the biggest questions tackled by astronomers would be the biggest questions tackled by scientists of any stripe: the origin and fate of the cosmos. Galaxies, whose reality as external "island universes" and whose mutual recession were established during the Age of Hale, under Hale's guidance, using scopes he built, at observatories he organized, and largely reported in the journal he co-founded (*Astrophysical Journal*), would be the stock in trade of big-ticket astronomy by the mid-20th century.

Under Hale's guidance the aperture of the world's largest telescopes expanded five-fold, but during his career, because of the work he facilitated, the size of the cosmos expanded many times more, from stars and nebulae in the Milky Way to redshifted galaxies at the edge of the observable universe. We are all still peeping about under the legs of Colossus.

In addition to Zirker's *An Acre of Glass*, I also relied on *The Perfect Machine*, by Ronald Florence, which chronicles Hale's career and, especially, the design and construction of the 200-inch telescope. Florence's book gives a useful window in the political wheeling and dealing that had to be accomplished to bring all of Hale's telescopes into existence, and shows just how remarkable it is that Hale was able to accomplish what he did despite lifelong mental illness. Both books are highly recommended. For more information on Hale and his telescopes, please see CalTech's page on the history of the Palomar Observatory

(http://www.astro.caltech.edu/palomar/history.html)

and the websites of the Mount Wilson Observatory

(http://www.mtwilson.edu/)

and Yerkes Observatory

(http://astro.uchicago.edu/yerkes/).

Mathew Wedel

Ex Prez Nearly Run over by Train

Sunday morning, after the Afton Canyon star party, former president of PVAA Ron Hoekwater was nearly run over by a freight train. The Afton Canyon Campground is in quite a picturesque setting. One of the things that make the campground an interesting area for photography is the nearby rail bridge. On Sunday morning I went and stood under the trestles, about 20 feet below rails and waited for a train to pass. I thought it would be interesting to see and hear what that sounded like. But when no trains came by, after about 15 minutes I went looking for other ways to entertain myself.

Other star party goers told about a narrowly avoided tragedy at a previous Afton Canyon gathering. It seems some adolescents were trying to drive an ATV across the rail bridge and became stuck. When a train came they barely got off the bridge in time. Their vehicle was destroyed. I think that I will continue to play under and not on the bridge.

As I alluded to earlier the campground is a photographers paradise. I kicked myself for not having brought my camera. I won't make that mistake again and I definitely intend to return to this observing site. Besides the occasional trains and the trestles, there are dry (at least this time of year) river beds, hiking areas through beautiful canyons and hills, wildlife, and wonderful sunsets.

This was a joint star party between the High Desert Astronomical Society, the San Bernardino Valley Amateur Astronomers and PVAA. Although no one group had a big turnout between the three there were a respectable number of telescopes. From PVAA I was joined by Bill Connelly and Ken Crowder.

The site is about as dark Cottonwood Springs and just slightly closer. It does not suffer from the late night traffic that has become a problem at Cottonwood. There are trains with their bright headlights but not that often, maybe every couple hours. The road in is gravel and then dirt. Others told me that this was the worst that they had seen the road. There were some deep gulleys, big rocks, and areas of soft sand. Still every one made it in and back out again without any serious problems. I would however recommend you avoid diving any vehicle that doesn't have much ground clearance. Leave the Mini Coopers and the Lamborghinis at home. If you have a four wheel drive vehicle you might want to bring it, if for no other reason than to go exploring the interesting terrain around the campground.

As for observing I looked for two objects in particular. First was Pease 1, a planetary nebula in the globular cluster M15. I saw this up at White Mountain in July with the 42-inch CDK scope. Even in the 42 inch it wasn't an easy object to pick out. In my 22-inch it quite difficult to distinguish from the stars in the field. The nebula is circular and about 3 arc-seconds diameter. That is about the size of Neptune. I can't say that I was able to definitely pick it out from the cluster stars. I noticed on the internet Pease 1 is often mistakenly referred to as Pease 15. An excellent article about Pease 1 may be found here: http://messier.obspm.fr/xtra/leos/pease1.html.

The second object that I looked for is much, much easier to see. NGC 7662, the Blue Snowball, is about Magnitude 9. As the name implies it is distinctly blue in color and is about 30 arc-seconds diameter. In the 22-inch it shows a fair amount of structure and the central star is visible. This is an object that I want to see again in the 60-inch when the opportunity presents itself.

I really had a great time at the Afton Canyon star party. If you would like to have a great time, come to the November 6th star party at Cottonwood Springs.

Ron Hoekwater

How Does It Work?

The Newtonian has a single flat mirror which doesn't change the F/# of the telescope. The F/# is determined by the primary mirror. But the Cassegrain is a different design in many ways. There are many different variations of the Cassegrain design. Each carries a different name which indicates the type of design used.

The common characteristic is a correcting lens in front, mounted on the optical tube assembly (OTA) and a secondary mirror which reflects the image back along the optical axis and outside of the OTA. Both mirrors may be spherical or aspherical. In one design the primary is a parabola and the secondary is a hyperbola. In another a Barlow is used to extend the focal point. Each design has considered cost, image quality and field flatness.

The design objective is to minimize the loss of the central part of the primary and yet get the focus outside the OTA. In the basic Schmidt-Cassegrain design the first plate is a lens which acts to correct spherical aberrations. The next surface is the concave primary mirror. Typically this is spherical and in today's common designs it is about an F/2. The secondary mirror is centered on the optical axis and is a convex mirror chosen to provide an equivalent F/10 system.

The focal point of the primary is placed behind the convex secondary. Note that if it is placed at the focus of the secondary, the image will be at infinity. This is not generally desirable, so the focus knob allows moving the primary toward and away from the secondary to provide a focus within a few inches of the back of the OTA.

Note that an "equivalent F/10" does not imply the focus is 80 inches from an 8 inch mirror. Rather, it refers to the cone angle at the focal point. Thus if a star is focused 20 inches from the secondary mirror, the cone of the image is 2 inches in diameter at the secondary.

The focus of the primary is usually driven by a screw with a pitch of 40 threads per inch. That means one full turn moves the mirror 0.025 inches (0.635 mm). In my Meade, that result in a movement of the focal surface by 0.60 inches (15 mm).

This is convenient when changing from a 26 mm lens to a 10 mm lens. The lens housing may take some of this into account, but otherwise it is only about one turn to change focus from one to the other. Par focal lenses are designed to absorb the difference in the housing. Changing lenses doesn't require a re-focus.

Ken Crowder

What's Up? Wobble Around A Cat's Eye

Back when the night sky was young (and I was a teenager) I read that Polaris (The North Star) was a transient pole star. In a mere 13,000 years the bright star Vega would be closest to the pole. Also, in 2000 BC a star called Thuban in Draco (Dragon) had been the pole star. This pole star switching is caused by a wobble of the Earth's axis around the its orbital Ecliptic Pole. In the north the Ecliptic Pole is also the location of the Cat's Eye planetary nebula. This 26,000 year wobble has been compared to that of a spinning top. The same wobble also occurs at the South Pole of course. It was first noted by the Greek astronomer Hipparchus in 130 BC.

This wobble also causes a Precession of the Equinoxes (and Solstices) through the twelve Zodiac signs on the Ecliptic Line. It moves at a snail's pace of one full Zodiac constellation every 2150 years. In the time of the Pyramid builders, the Sun entered Taurus on the Vernal Equinox. In the age of ancient Greece, it entered Aries. Today it enters Pisces, and in 4000 AD it will enter Aquarius (as in the hairy "Age of Aquarius").

Astrologers choose to ignore this Precession through the Zodiac signs. To them nothing has changed since the time of the Greeks. The period March 20 to April 19 is still ruled by Aries, even though the Sun is in Pisces at that time today. Astrology is based on what constellations the sun was in two thousand years ago. When asked "what's your sign?" you should reply "now or thousands of years ago?"

The wobble is caused by several factors. The Earth has a 23.4 degrees tilt, and its not a perfect sphere. It's all a lot of complex physics, so let's talk more about astronomy.

A drawn circle of polar Precession encompasses Ursa Minor (Little Bear, "Little Dipper") and Draco (Dragon). At this circle's center is the Cat's Eye planetary nebula (NGC 6543). While never catalogued by Messier, the Cat's Eye is a well known calendar and book cover object. Certainly this is because it's one of the most startlingly complex of planetary nebulae. It's a 1000 years old, and 3,000 light years away. Its several shells of ejected star material suggest a double-star system reacting in a complex way. This would explain why a pair of high-speed jets of gas lie at right angles giving it all the look of a spooky Halloween cat's eyeball.

Thuban, the pole star 4,000 years ago, is located in Draco's long tail as it snakes around Polaris. The name means "snake" in Arabic and although it was labeled in the 17th century as Alpha Draconis, it's not the brightest star. Was it brighter in the past? Today's brightest star, Etamin translates as the "dragon's head", here it seems to stare out at nearby Vega.

There are many classical myths about Draco. One has the nearby constellation Hercules fighting a dragon who guards golden apples in the garden of the Hesperides. It's featured in ***Metamorphoses***, a Roman collection of ancient tales. Recently, Draco was dramatized in a movie ***Dragonheart*** ('96) in which Sean Connery played a talking dragon.

As a teenager I was also told that Ursa Minor (Little Bear) has a long tail because it's been stretched by swinging around the fixed Pole star. First magnitude Polaris at this tail's end is the brightest star in Ursa Minor, but not the brightest in the sky as many think. Polaris, always a favorite of sailors and lost people, is a multiple system of three stars. Its giant main star is the closest of Cepheid variables and there are two small companions. Ancient observers write of Polaris as a much brighter star. Was this just because it's the Pole Star, or was it brighter in the past?

I want to close by commenting on the Keck Observatory's recently discovered "earth-like" planet orbiting Gliese 581 (in Libra). It's wonderful that astronomers have discovered six planets surrounding this red dwarf star, and that 581g is in the Goldilocks (not too hot, not too cold) temperate zone. Reports say it's "right next door" but it's still 20 light years (120 trillion miles) and it would take hundreds of thousands of years to get there. It orbits a small red dwarf which emits a cooler infrared light with a lot of X-rays. Cooler is good because planet 581g is closer to its sun than Mercury. It's reported to be tidally locked making one side always frying hot, the other side always a dark freezing cold. But maybe there's a "twilight zone" in between. It would be a very stormy windy zone if the planet has an atmosphere with water. This Goldilocks planet sounds like a very difficult place for life to evolve. What we don't know about these newly discovered extra-solar planets would fill a million libraries. A high-powered digital message signal has recently been sent in the direction of Gliese 581g and will arrive in 2029. I wonder if anyone will reply?

Lee Collins

Shooting Stars

I have been trying to photograph the sky for about 50 years. Most of the time I was getting star squiggles on the film. Short exposures were OK. I got comet West in 1976, using 10 inch clock driven Newtonian scope at a Chicago suburb. I also imaged Comet Hale-Bopp with a Schmitt-Cassegrain at Mesquite Springs , Death Valley.

Since then, I image the sky from Claremont with a Schmitt-Cassegrain telescope permanently mounted. It takes less than 5 minutes to get the scope working, but finding the object of interest is another matter.

I use a Mead Deep Sky Imager II, monochrome camera and Mead's Autostar Suite program The telescope is fairly well polar aligned, so I can get more than an hour of imaging easily. Long exposures are subject to sky-glow in the Claremont area, so usually I don't go beyond 15 seconds. The Mead camera however will make multiple exposures and automatically stack them, and will also track the images, correcting for telescope drift. Currently, I am imaging M57, using four filters, luminance, red, green, and blue to get the colors of M57. After processing, it should be a full color image.


Single frame processed to the max

I also use a Canon Rebel XTi SLR camera. It can take automatic exposures as long as 30 seconds, which is as much as the Claremont sky will allow. These images must be stacked you build up the image density. Here I use a program Nebulosity 2, which also has many tools to process the stacked images. To demonstrate the processing , shown below are 3 images of M51. First is one frame processed to the limit. Second are 55 frames stacked and fully processed. Third are the same 55 frames stacked and double processed. I would have shown one raw frame, but it would be all black, the image being so dim.


55 frames stacked and fully processed.

Recently, I found that I could use my computer to locate an object and slew my telescope to it. First, I identify a star in the telescope, this sets up the telescope to track any object. Then I locate the star on the computer star map and sync the telescope to the computer. Now I can find an object of interest on the computer star map, click on it, and slew the telescope to it.


55 frames stacked and double processed

There is one problem here. Whenever an object is selected on the computer star map, be it in the Southern hemisphere or below the horizon, the telescope will attempt to go there and probably cause physical damage to the system.

So after all these years I'm still learning how to shoot the stars.

Raymond Magdziarz

Afton Adventure!

The long anticipated weekend star party in Afton Canyon was finally here! October, and the weather promised to be moderate and clear. Fall brings some our most comfortable conditions for the starry excursions we undertake as observers of the mysteries in the velvet depths that make up our celestial neighborhood. I think I sprained something with that sentence) This weekend was going to be a little better with the inclusion of two other astronomy clubs in the mix. HiDAS, the Apple Valley club, and PVAA, from Pomona and their first visit to Afton Canyon. Like us, they suffer in the search for a reasonably close, yet dark, sky. They liked the Canyon and will be back.

Upon getting to the Afton off ramp, it became obvious that the weeks worth of desert thunderstorms had paid a visit to this part of the desert. And recently. In my ten or twelve trips to this campground, this is the first time the road was in poor repair. Exposed large rocks that one had to carefully straddle on the way down the grade, and almost treacherous sandy patches. If it was commonly this bad, we most likely wouldn't come back here. Making it to the campground in one piece, there were some old friends, Larry and Patty Duell from Hesperia. Larry does imaging at his home observatory, but comes out once a year for a ramble down the Milky Way visually, and the fine companionship. Another desert club member, Barry Bishop, had his little travel trailer set up. A 14" SCT, and his new set of giant binoculars. 100mm (that's four inches!) mounted on a really nice aluminum parallelogram and a fine oak tripod that he built, and was justifiably proud of. Nice work, Barry! At the far end of the campground was a family that just happened to come

out. They had a sixteen inch dob, and a range of smaller scopes. Robin Herndon and Mike Ratcliff, with his very nice sixteen, rounded out the Friday afternoon arrivals. Later, in the dark, two more desert imagers showed up in their motorhome. Now that must have been a spooky ride down that washed out road in the dark!

Now it was the gathering dusk, and an Iridium flare was going to open up the sky show for the evening. I'm back with Barry, when he spots it fading. I missed it altogether, though everyone else got to see it. Good thing I was there to let them know about it! The Giant Binoculars - first light. First, the Comet Hartley, right by the double cluster. Dim, but beautiful. Then the Andromeda Galaxy. Breathtaking! Then a swing over to the wonders in Sagittarius. Wow! And then some! The Lagoon was beautiful, and even the Swan clearly delineated. Big binos are truly wonderful, and they set a nice tone for the evening. As it got deeply dark, Barry, Mike Ratcliff and myself, gathered around the big dobs for the night. An unobstructed southern horizon with stars all the way down is one of the attractions at this spot. Have you ever seen the constellation Grus, the Crane? It can't be seen through the light dome in Johnson Valley, but it is home to a nice group of galaxies, with four in one field as we moved on to other objects. None of us had seen these before. Barnard's Galaxy, dim, but my first time. Mike came up with the Sculptor Galaxy, a very dim member of our Local Group of galaxies. I was unable to see it, but Mike and Barry claimed it. They are both pretty experienced observers, and I hope to aspire to their level of visual acuity with more experience. NGC 55, also in Sculptor. A most interesting galaxy. Stretched long and weighted more on one side than the other, As the evening sky wheeled overhead, Mike thought it had the makings of "a Horsehead night"! Orion wasn't all that high yet, but the SQM reading of 21.78 encouraged us. H-beta filter in place, we could pick up some of the dim nebulosity that B33 is silhouetted against, and could glimpse a slightly dark thumb-shaped notch that is the Horsehead, but it was a weak view at best. The imagers had no problem getting it, of course. It was getting very late, and Barry turned in, leaving Mike and myself to go on alone for a bit longer. Turning our attention to the Fornax galaxy group, we scanned through a snowstorm of galaxies. A first visit to this group for Mike, and he saw at least fifteen galaxies, not as good as we've seen them at other times, but more stuff that can't be seen from Johnson Valley. The guide stars are even lost in the light from that site. And I really like Johnson Valley, but Afton Canyon wins hands down for delving into the southern regions! Three-thirty and we were finally wrung dry, just out of gas. What a fine night!

Saturday should have witnessed more arrivals, but Mike Ratcliff warned Martin Carey about the road conditions, causing some to not challenge it, and observing from Johnson Valley, our old standby. Martin, Scott and John Freeman, and Rudy Rodriguez were reported to have gone there. From SBVAA our new member Clyde King showed up for his first star party. The usual group from HiDAS failed to materialize, but Ron Hoekwater, and two others from Pomona rolled into camp. Ron has a twenty-two, and spends his summer vacation cash and time in the Grandview campground, and many of us have met him up there. Einstein's Cross has been his quarry as of late. That's a gravitationally lensed quasar that is diffracted into four images around the invisibly distant galaxy. he has picked up two before, but you have to see all four at the same time to claim the Cross. It's in Pegasus and I was looking forward to participating in his search, but it was not to be. Ron said that last summer at the White Mountain, the forty-two inch that some of us saw at RTMC was in place at Grandview. He thought that this was to be his chance for this very faint object, but when it eluded him with that aperture at that dark, dark sky, he threw in the towel. At least for now. Saturday night's sky wasn't as fine as it was on Friday night. but we had a good night with that much aperture to use. Another imager from Alhambra, Naoto Sakai, that we met last spring here, was back and joined in the observing. He made a nice little movie of the comet, and it was really moving fast against the background stars. As we were still felling a little drained from the Friday night marathon, Barry and I called it a night around twelve-thirty.

Arising the next morning and taking a little hike by the river bed, a male Prairie Falcon passed by on the hunt. A group of six teal was wheeling around over the marshy areas. A Cooper's Hawk was making her rounds. Then I spotted a Bighorn Sheep leading her group down to the water. Alerting the camp, at least those that were up, we got a great show of a herd of thirteen females and yearlings. That was Larry Deull's observation, he knows more about the sheep than I do. They went about their day, as did our camping group. Some were staying for Sunday night, but the rest of packed up and tackled that bad road out of the canyon. We all made it without mishap, and if Robin's

Observations by Members

Claire Stover was intrigued when she read “the telescope just blew up”. You can find her observation at:
http://wcco.com/local/mike.lynch.telescope.2.1963406.html

John Bratton Sr. related an article by Denise Chow about new information coming from solar measurements. Find it at:
http://www.space.com/scienceastronomy/solar-cycle-impacts-earth-weather-101006.html

John Bratton Sr. also enjoyed “*Could 'Goldilocks' planet be just right for life?*”. Check it out at :
http://news.yahoo.com/s/ap/20100929/ap_on_sc/us_sci_new_earths

Afton Adventure! continued

Camry could negotiate it, it wasn't too terribly bad. As I mentioned at the beginning of this, this is the only time the road was in bad shape in many, many trips out here. Every one that came had a great weekend, and plan to do it again next year. Mark your calendars! Though the turn out was half of last years, it's still a great spot at a great time of the year! A unique opportunity to meet and observe with others in a place of great natural beauty, both day and night, and establish some new friendships with like minded souls.

Cliff Saucier

“I don't need a crowd to enjoy a dark sky**.”**