

The NHAS Observer

and

The Outer Solar System

Newsletter of the New Hampshire Astronomical Society



Vol. 2006 No. 7

"All the news that fits in print"

July 2006

NHAS Field Trip

President's Message

I write this on the 37th anniversary of the Apollo 11 Moon landing. Sometimes, I can almost understand the wing-nuts who believe it was all done on a Hollywood sound stage. How can I say this? Well, it almost seems more plausible than to say that we successfully landed on our nearest celestial body 37 years ago, and haven't really gone anywhere else since! Hopefully this will be rectified in our lifetimes.

Well, the observing weekend up in Dummer, NH was mostly a success! (Slides at the meeting on Friday...)



Photo by Rich DeMidio

We only had good weather on one night, but I hear that's one night more than anyone else had. They still don't have a firm estimate on completing their campground, so this may be an annual observing event for at least one more year before it can evolve into something more.

It's only a little more than a week before I depart to help conduct the National Park Service's summer astronomy program at Bryce Canyon, Utah. I will try to have happy weather thoughts for those you back here while I enjoy the views from 8,000 feet in the crisp, dry Utah desert air. :) And since I will be there all month, I leave you in

the capable hands of Paul Winalski for next month's meeting.

Finally, I have been working on a talk on Black Holes since seeing a similar presentation by Phil Plait at the High Energy Astrophysics Workshop last year in New Mexico. My talk is loosely based on his, but the all the words and graphics are new. I will be giving it a first try at this Friday's meeting. See you there!

* Matthew Marulla
NHAS President 2006

Highlights for this Month

We had our field trip event in Dummer, NH in which several NHAS members participated. The article can be read on page 5 We also had a wonderful sky watch in Goffstown. Finally, we were privileged to have **Dr. Brian Marsden** of the Harvard Smithsonian Center for Astrophysics talk about recent discoveries in the outer solar system at our last meeting (page 2)

* Rich DeMidio
NHAS Secretary 2006

Public Observing

The Goffstown Public Library's sky watch was a great success.



Photo by Gardner Gerry

Over 100 people attended, by the library staff's count, with many children and families.



The club was well represented by **Rich Zore, Herb Bubert, Ed Loss, Gardner Gerry, John Bishop, Joe Derek, Matt Amar, Mike O'Shaunese, Paul Winalski, Chase McNiss and Marc Stowbridge**. Set up began about 7:30 with some solar observing, and telescopes were still out at 11. The Library folks were very appreciative, and said they were getting requests for a winter sky-watch, too. They reported lots of praise for the club's efforts. We also received many compliments from the mosquitoes, as we apparently causing quite a buzz in their community, too.



Photo by Gardner Gerry

The next sky watch is scheduled for August 9th, at the Madison Old Home Week celebration.

<http://www.madison-nh.org/index.php?id=608> We will be part of a larger program, including a Classic cars cruise from 6:30 to 8 pm near where we will be setting up. Come and experience a dark sky site.

* Marc Stowbridge

The Outer Solar System

Dr. Marsden is with the Harvard Smithsonian Center for Astrophysics and is director of the IAU Minor Planet Center. He ran the Central Bureau for Astronomical Telegrams for over thirty years. Minor Planet "1877 Marsden" is named after him.



Dr. Brian Marsden – Photo by Bob Sletten

Dr. Marsden provided a history of our inner solar system including some of the early documents in which Uranus, Neptune, and other objects that were named Asteroids. We learned that this term is not officially recognized and that accepted term is "minor planet". Today, his group catalogs and records the minor planets discovered. Out of roughly 130,000 minor planets discovered, only about 10,000 are currently named. Dr. Marsden shared with the audience how complicated and slow the process of naming a Minor Planet can be. He noted that the current number of Minor Planets discovered today is about 10 times the amount from just six years ago. We learned that the main belt of the Minor Planets is between Mars and Jupiter. In the past, we have called this the Asteroid Belt but there are a lot of politics around this name. Many scientists now refer this area as the "main belt of minor planets". Dr. Marsden showed us copies of some letters and history of how Uranus and Neptune was discovered, including several of the original calculations and observation notes.

Dr. Marsden then lead us into a presentation of what is beyond our inner solar system. We learned about a

comet ring outside the orbit of Pluto, located at approximately 40au as written in a paper by Dr. Fred Whipple. In 1977, Chiron was numbered by the Minor Planet Center (MPC), which turned out to be the last one before Dr. Marsden took over the MPC. It was at that time that the MPC was moved to Cambridge. On a side note, the topic of main belt comets came up. It was thought that the outer solar system contained icy comets but recently, some were found in the minor planet belt resulting in double designations.

Some objects were calculated at over 100au in 1996. One theory is that Neptune may have scattered these objects. We saw a scatter chart of all the known minor planets and their locations. The center has about forty or so satellites around Jupiter. It has been theorized that Jupiter has captured several of these minor planets from what Neptune did not send out into the Ort cloud.

Dr. Marsden showed a Hubble image of Pluto with its moon Chiron, plus two new minor planets designated s/2005 P1 and P2. These are only roughly 100km in diameter and they have become captured satellites. It appears to be common now that minor planets in the outer solar beyond Neptune have satellites. This supports the theory that many collisions have occurred simulating what happened during the early solar system creation. The same could be happening now in the outer solar system.

This led us to the more recent events. One of them is the hotly debated topic at the IAU conference on whether Pluto is a planet, TNO (Trans Neptunian Object), or Asteroid. There have been several committees formed in the IAU to address this matter. There were "Plutocrats" advocating nine and even ten planets, with lively debate addressing the discovery of minor planets larger than Pluto. Dr. Marsden recommends that we go back to eight planets and keep Pluto in the "Transneptunian" belt resulting in a different classification. Objects that are round and equilibrium tend to be classified as planets (big or small) but Pluto does not match this criteria. The

core issue revolves around the definition of what constitutes a planet. Several proposals are currently being debated. One potential compromise involves the definition of four types of planets named Terrestrial, Cisjovian, Jovian, and Transneptunian. The following table summaries the breakdown with examples:

by location	by composition	members
Terrestrial	rocky mid size	Mercury, Venus, Earth, Mars
Cisjovian	rocky ward	Ceres
Jovian	Gas giant	Jupiter, Saturn, Uranus, Neptune
Transneptunian	icy dwarf	2003 ub313

On June 30th, another committee will meet and deliver to the IAU committee their findings and recommendations. The IAU executive committee will either make a decision or recommend that this issue go to the general assembly. At that time, the vote for Pluto might take place.

We found out after the meeting from Dr. Marsden that a decision was made regarding the names of Pluto's minor planets. The excerpt from his email is as follows: "The inner satellite, provisionally S/2005 P 2, becomes Pluto II and is named Nix. The outer satellite, provisionally S/2005 P 1, becomes Pluto III and is named Hydra."

For all of NHAS, we are grateful for Dr. Marsden taking the time to visit our club and to provide his wonderful presentation. The presentation and discussion was very informative, lively and educational. For more information, please visit the minor planet website <http://cfa-www.harvard.edu/iau/mpc.html>

* Article written by Rich DeMidio from notes taken at the meeting.

Astro Photons



Gardner Gerry – Photo by Chase McNiss

This is probably no surprise, but nothing much to report in Astrophotography this month, as the weather has very uncooperative so far this summer. We are going to plan astrophotography 101 "Introduction to Imaging the Night Sky" during the fall months, to held at YFOS, so actual imaging can take place. Members who would like to contribute their time to help beginners get started are urged to contact me.

* Gardner Gerry

Editor's Note: All the following pictures are from the forum on the website. Some of the text was edited to make a better fit into the newsletter.



Photo by Nils Wygant

Looks like most of us were out getting a rare fix. Glad to see it! I wanted to revisit M13. I accumulated lots of data and ended up with one of the smoothest images I've produced to date. Relatively high S/N ratio. I also used my newly constructed light box for generating flat frames anytime I want. Very convenient. I'll bring it for "show and tell" at the next photo meeting I make. This was the first image I processed using API4WIN. I found this program to be VERY easy to use for image calibration. I also used PS for some final tweaks. Full size image can be seen on my WebShots page:

<http://community.webshots.com/photo/550067794/2004089790041172834wIaKyd>

* Nils Wygant



Photo by Matthew Marulla

Well, it was hazy, but there were a couple stars visible, so I tried out the new Vixen 8" VC200L on my AP900 mount. This is my "interim scope" until AP calls me about the 160. All these are straight shots - no stacking. 1/180s for the first one, 0.3s for the others. Some dust is visible in the close-ups - it's probably on one of the surfaces of the eyepiece I was projecting with. One of the reviews on this scope complained about low contrast due to the 39% central obstruction, but I don't think my AP ever recorded subtle tones in the lunar mare better than this. Pretty happy so far!

* Matthew Marulla

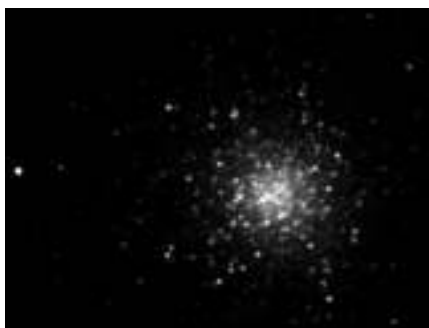


Photo by Dennis Miller

Hello folks! I finally made it outside to try to image my first Globular Cluster, so I chose M-13. The conditions were lousy, poor transparency and a boatload of humidity! I fired up the dew heaters and solved my CCD camera power consumption problem with a 12v inverter coupled to a lawn and tractor battery, which worked great. This image has only been stacked and aligned with no further processing. I used the same equipment as before, 6 inch refractor @f-8 primefocus thru a 2 inch diagonal, a minus violet and a IR blocker. I used about 38 11.3 sec subs and 29 15 sec subs for this shot. What should I do next?

* Dennis Miller

Radio Astronomy



Antenna by Bob Sletten

As everyone knows, we have had some great radio Astronomy dish tours with very positive feedback. The simple message has been, "give us more!" With that in mind, I am trying to set up another radio tour for us to see more big dishes. There is one in our own backyard here in NH that I am targeting and it is located at a satellite tracking station. The date and time will be announced when I can lock a date and time with the site. In September, we will have a non-tour meeting to talk about what the group might actually desire to work on. Several members have inquired about building a radio telescope with some equipment already donated. Remember to please visit the Radio Astronomy forum on the website for any discussions in this area or contact me for any questions.

* Bob Sletten

Deep Sky Object of the Month

*Editor's Note: When preparing my article for this month on our field trip, I mentioned the Bortle scale for measuring dark skies. When I did a google search, I found a repost from our own **Law Gramer**, so I decided to take his post as the deep sky of the month column. The entire article can be found at:*

<http://www.meteorobs.org/maillist/msg21005.html>

THE BORTLE DARK SKY SCALE

by John Bortle

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Class 1: Excellent dark-sky site. The zodiacal light, gegenschein, and zodiacal band are all visible - the zodiacal light to a striking degree, and the zodiacal band spanning the entire sky. Even with direct vision the galaxy M33 is an obvious naked-eye object. The Scorpius and Sagittarius region of the Milky Way casts obvious diffuse shadows on the ground. To the unaided eye the limiting magnitude is 7.6 to 8.0 (with effort); the presence of Jupiter or Venus in the sky seems to degrade dark adaptation. Airglow, (a very faint, naturally occurring glow most evident within about 15 degrees of the horizon) is readily apparent. With a 12" telescope stars to magnitude 17.5 can be detected with effort, while a 20" instrument used with moderate magnification will reach 19th magnitude. If you are observing on a grass-covered field bordered by trees, your telescope, companions, and vehicle are almost totally invisible. This is an observer's Nirvana!

Class 2: Typical truly dark site. Airglow may be weakly apparent along the horizon. M33 is rather easily seen with direct vision. The summer Milky Way is highly structured to the naked eye, and its brightest parts look like veined marble when viewed with ordinary binoculars. The zodiacal light is still bright enough to cast weak shadows just before dawn and after dusk, and its color can be seen as distinctly yellowish when compared to the blue-white of the Milky Way. Any clouds in the sky are visible only as dark holes or voids in the starry background. You can see your telescope and surroundings only vaguely, except where they project against the sky. Many of the Messier globular clusters are distinct naked-eye objects. The limiting naked-eye magnitude is as faint as 7.1 to 7.5, while a 12" telescope reaches to magnitude 16 or 17.

Class 3: Rural Sky. Some indication of light pollution is evident along the horizon. Clouds may appear faintly illuminated in the brightest parts of the sky near the horizon but are dark overhead. The Milky Way still appears complex, and globular clusters such as M4, M5, M15 and M22 are all distinct naked-eye objects. M33 is easy to see with averted vision. The zodiacal light is striking in spring and autumn (when it extends 60 degrees; above the horizon after dusk and before dawn) and its color is at least weakly indicated. Your telescope is vaguely apparent at a distance of 20 or 30 feet. The naked eye limiting magnitude is 6.6 to 7.0, and a 12" reflector will reach to 16th magnitude.

Class 4: Rural / suburban transition. Fairly obvious light pollution domes are obvious over population centers in several directions. The zodiacal light is clearly evident, but doesn't extend even halfway to the zenith at the beginning or end of twilight. The Milky Way well above the horizon is still impressive but lacks all but the most obvious structure. M33 is a difficult averted-vision object and is detectable only at an altitude of higher than 50 degrees. Clouds in the direction of light pollution sources are illuminated but only slightly so, and are still dark overhead. You can make out your telescope rather clearly at a distance. The maximum naked-eye limiting magnitude is 6.1 to 6.5, and a 12" reflector used with moderate magnification will reveal stars of magnitude 15.5.

Class 5: Suburban sky. Only hints of the zodiacal light are seen on the best spring and autumn nights. The Milky Way is very weak or invisible near the horizon and looks rather washed out overhead. Light sources are evident in most, if not all, directions. Over most or all of the sky, clouds are quite noticeably brighter than the sky itself. The naked eye limit is around 5.6 to 6.0, and a 12" reflector will reach about magnitude 14.5 to 15.

Class 6: Bright suburban sky. No trace of the zodiacal light can be seen, even on the best nights. Any indications of the Milky Way are apparent only toward the zenith. The sky within 35

degrees; of the horizon glows grayish white. Clouds anywhere in the sky appear fairly bright. You have no trouble seeing eyepieces and telescope accessories on an observing table. M33 is impossible to see without binoculars, and M31 is only modestly apparent to the unaided eye. The naked eye limit is about 5.5, and a 12" telescope used at moderate powers will show stars at magnitude 14.0 to 14.5.

Class 7: Suburban / urban transition. The entire sky background has a vague, grayish white hue. Strong light sources are evident in all directions. The Milky Way is totally invisible or nearly so. M44 or M31 may be glimpsed with the unaided eye but are very indistinct. Clouds are brilliantly lit. Even in moderate-size telescopes the brightest Messier objects are pale ghosts of their true selves. The naked eye limiting magnitude is 5.0 if you really try, and a 12" reflector will barely reach 14th magnitude.

Class 8: City sky. The sky glows whitish gray or orangish, and you can read newspaper headlines without difficulty. M44 and M31 may be barely glimpsed by an experience observer on good nights, and only the bright Messier objects are detectable with a modest-size telescope. Some of the stars making up the familiar constellation patterns are difficult to see or are absent entirely. The naked eye can pick out stars down to magnitude 4.5 at best, if you know just where to look, and the stellar limit for a 12" reflector is little better than magnitude 13.

Class 9: Inner-city sky. The entire sky is brightly lit, even at the zenith. Many stars making up familiar constellation figures are invisible, and dim constellations like Cancer and Pisces are not seen at all. Aside from perhaps the Pleiades, no Messier objects are visible to the unaided eye. The only celestial objects that really provide pleasing telescopic views are the Moon, the planets, and a few of the brightest star clusters (if you can find them). The naked eye limiting magnitude is 4.0 or less.

* Lew Gramer

NHAS Field Trip

Unless otherwise specified, all photos are provided by Rich DeMidio

It was a dark and cloudy day on Friday, June 23rd as several NHAS members packed their scopes, cameras, fishing poles, hiking gear, games, and food heading for the great White North for a sky watch in the wonderful dark skies of Dummer, NH. This was a long anticipated event from the first time that **Matthew Marulla** did a reconnaissance mission last year. Remember this picture that Matt took last year of the Aurora?



Photo by Matthew Marulla

The event was held at the Great Northern Moose Lodge
<http://www.greatnorthernmoose.com/index.html>

in Dummer, NH. The owners **Richard & Sandy Tessier** were our gracious hosts who let NHAS take over their lodge for the weekend. There were five rooms where guests stayed while several other members made camp in the backyard of the lodge.



The first folks arrived around 3pm on Friday with the skies cloudy. Most of us had watched the Clear Sky Clock and various weather sites for days preceding and had pretty much written off Friday observing. Our best hope was for Saturday, which looked pretty optimistic. Unfortunately, there was no miracle on Friday evening as we were clouded out, but several folks did some sight seeing mostly for moose and birds in the evening hours. The sunset was also a popular attraction and after talking with Matt, I was able to get to

pretty much the same spot where he took his picture last year of the Aurora.



Several of us also tried to get to see a moose and was told that dusk was the best chance. So Nils, Gardner, and I took a ride just down the road where Richard Tessier told us to go. I had both video and still camera. We got some great video and some snapshots. I was driving and Nils took the camera and managed to get a still shot with a 2 second exposure. This was quite amazing with no tripod.



We also treated ourselves to a wonderful potluck dinner in which the food and company made up for the cloudy conditions. There were also plenty of games to play and although there was no campfire, the living room of the lodge had plenty of warmth with the invigorating chat and discussions of various topics. At one point, my brain hit overload with some of the high-end conversations regarding mathematics, astrophysics, and cosmology. I must say that when **Larry Lopez** and **Matthew Marulla** get going, you better be on your best game ☺ It was both educational and entertaining. However, I believe that I stumped both of them when I asked them to define nothingness. This was in the context of what did the Big Bang expand into? I think the last of us finally turned in around 2am.

On Saturday morning, we all woke up to broken clouds and a very large yellow object in the sky. It was big, bright, and you had to shade your eyes for protection. After much discussion, we finally concluded that this was an

object that we thought had abandoned us, but perhaps there was a change of heart. Amazingly, it was our old friend Sol better known as the **Sun** and there was much rejoicing!



After breakfast, several of us ventured out to experience the wilderness area. Some folks went fishing and some when on nature hikes. I went in a group with **Nils Wygant**, **Gardner Gerry**, **Larry and Linda Lopez**, and **Jean Buckley**. **Richard Tessier** provided us with some guidance on a nice trail to hike that was about ten miles away.



The dirt road to the trail was about five miles and we noticed several things on the way. One particularly caught my attention as shown in this picture. They were beautiful butterflies, which appeared to be drinking from the puddle on the road.



Apparently, they enjoy the salt in the water as Larry explained to me later. Continuing on and reaching the trailhead, I could not resist the sign warning us about speed limits.



One of us commented not to run on the trail too fast ☺ Just as we started, Jean spied a bird in the pines and I managed to get a quick shot of it.



I later found out that this was a Cedar Waxwing and it was very beautiful. We also saw several moose tracks on the trail



It probably took us a few hours to hike down to the lake but we purposely went slow to enjoy the scenery. We saw several flowers, insects, and other objects.



When we finally reached the lake, we were looking around for an access road see the lake. After searching for a bit, we strolled into a cottage area and met a very nice couple that invited us to come and visit them by the lake. We chatted for about 90 minutes and saw

several loons and beautiful landscape



It was very nice of them to invite us and it was also refreshing after the hike down to the lake.



We also found that we could just loop back to the road saving a lot of time backtracking the way we came. We returned to the lodge mid afternoon to wonderful, clear skies and everyone started to get observing fever. The scopes were setup and fans started to cool the large mirrors.



Maps were consulted and objects to observe were planned. The group also mapped their tactical mission for bug resistance as rumor has it that they also like sky watches ☺ Finally, the evening arrived and the skies were indeed clear. Transparency was adequate but that is what you would expect during summertime. I can say that my expectations were easily met with the quality of the dark sky. I remember reading a long time ago a Sky and Telescope article regarding the Bortle ranking for dark skies. I felt this was a strong 2 so it does not get much better than that. Many of my deep sky objects were spied with the naked eye including M13 and M31. Jupiter was also out and provided spectacular

viewing. Rather than search for new objects, I chose to look at my favorites under these skies. M13 was of course spectacular and I utilized my 17mm Nagler to nearly fill up the field of view. M81 and M82 were in the FoV of my 27mm Panoptic and that was awesome. I saw the central star in M57 with averted vision. The Veil was a site to behold with the OIII filter. The list goes on including Stephan's Quintet. One problem was the heavy dew so many of us hooked up the heaters right away, which turned out be a very smart decision, as it became a necessity early that evening. I reluctantly turned in around 3am after having had a wonderful time enjoying these skies.

The trip was fabulous and I can only imagine how the skies will look in the fall and/or winter with better transparency. Everyone had a great time and our hosts were not only gracious, but also eager to learn more about Astronomy. We look forward to some future trips back to the dark skies of Northern New Hampshire while several us might go individually for a weekend get away.

The Bottom Line

Starting Balance	\$3737.94 (checking acct)
Deposits/Credits	\$30.00 (membership)
A/P	\$115.65 (Insurance, Porta Potty Service, Mosq Mgnt Ship)
Net Acct Balance	\$3671.12
Cash Balance	Petty cash drawer (195.25) \$3866.37
Membership	130
New members	
Donations	None

* Chase McNiss

Looking Back at Last Month

Opening Matthew Marulla ran an abbreviated business session saving time for our evening program by Dr. Brian Marsden.

Scope of the Month None.

Public Observing. Matt reported for Marc Stowbridge. There were three skywatches canceled due to weather. **Paul Winalski** will run the event on Saturday, June 24th since some members will be at Drummer, NH

Book of the Month. None

Committees. Photo Club **Gardner Gerry** reported that the group is having discussions on some training courses in the fall. Web: no report. ATMs: No report. YFOS No report Membership: **Alan Shirey** has volunteered to be the new membership chairperson. He is just getting started and will share his vision and plans at upcoming meetings and other correspondence.

Miscellaneous. **Matthew Marulla** reported on the upcoming Drummer, NH sky watch. He led a discussion on logistics, plans, and other details. Matt also mentioned that we might have a chance for an Aurora as the sun is currently active with some large

prominences. Finally, he also announced that he will be spending August in Bryce Canyon running an Astronomy program. We will all expect a full report complete with pictures upon his return ☺ **Chase McNiss** showed an animated GIF of Jupiter showing both red spots and the 4 moons. Ganymede can also be seen with some detail. It was produced by Mike Sawlay and can be viewed at www.iceinspace.com.au Chase also provided a picture of Earth taken from one of the Mars rovers. Speaking of the rovers, Spirit is now camped for winter and doing work without moving. Opportunity's odometer recently passed the 5-mile mark while JPL engineers were unable to get the right wheel unstuck.

Evening Program. Dr. Brian G. Marsden – Recent discoveries in the outer solar system (see feature article on page 2)

* Rich DeMidio

Member Blogs

Clearish skies at last! There was still a good bit of background haze, and with the Moon just past full I normally wouldn't have bothered to set up the 14" TScope, but this is the best it's been in well over a month. I set up on Thursday for a couple of hours of observing at home in Merrimack. On Friday I went to YFOS, where I was joined by John Bishop and his family, and by Herb, who was there to image Jupiter's Great Red Spot. The YFOS session was also rather short--we all packed it in around 11:30 because the rising Moon was lighting up the sky.

Thursday the skies were a bit hazy, but seeing was very steady. Jupiter's disk was showing large amounts of detail, including the GRS. Close doubles such as Izar and Epsilon Lyrae were easy splits. M3 and M13 were magnificent. As always, the light pollution in Merrimack was a big problem. With an O-III filter in place I was just able to see the Veil in Cygnus. M47 and M27 were no problem. I spent a good bit of time just roaming around in the Cygnus Star Cloud. I also found carbon star friends T Lyrae, S Cephei, and V Aquilae.

Friday at YFOS the seeing wasn't quite as good. Jupiter was located in some intermittent haze that prevented me from seeing much detail. Seeing was good to excellent. In one particularly steady patch I succeeded in seeing the Antares companion, though I couldn't find it again later in the evening. For most of the evening (until the Moon rose) the sky was very dark, with Milky Way from horizon to horizon. M13, M3, and M22 were magnificent, resolvable to pinpoint stars on a cloudy background haze. M4 was badly placed in the haze near the horizon and was not showing well. M11 and the Lagoon and Eagle complexes were showing well. I added WZ Cassiopeiae to my carbon star bag. There was lots of detail to be seen in the Veil under the darker skies. M51 and M81/M82 were not particularly well placed and didn't show much detail. John did better with them with his 16" scope. He also got an excellent view of the North America Nebula and the Pelican using a nebula filter in the 16".

It was good to get out to do some observing after all the bad weather. Mosquitos were a major problem at dusk, although they went away about an hour after sunset. There was persistent dew during the whole session.

* Paul Winalski

DEADLINE Aug2006 Issue: 5 PM Aug14

E-mail articles to the Editor.

CHANGE OF ADDRESS – Notify the Treasurer of changes to postal or e-mail address.

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2006 Officers

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This month's contributors:

Mathew Marulla, Chase McNiss, Bob Sletten, Lew Gramer, Gardner Gerry, Rich DeMidio, Paul Winalski, Matt Amar, Dennis Miller

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NHAS Upcoming Events

July 21, 2006, Black Holes

Event	Date	Time	Location
Business Meeting	Jul 21	7:30 pm	St. Anselms College
Coffee House	Jul 28	Dusk	YFOS
CMP Skywatch	Aug 4	Dusk	CMP
Business Meeting	Aug 18	7:30 pm	CMP
Coffee House	Aug 25	Dusk	YFOS
CMP Skywatch	Sep 1	Dusk	CMP
Business Meeting	Sep 15	7:30 pm	St. Anselms College
Coffee House	Sep 22	Dusk	YFOS