

## Operations & Technology Working Group Call #7 Meeting Notes (FINAL)

### **TOPIC: GROOMING**

Call Date & Time: Monday, July 28, 2014 at 1:00 PM  
Access Information: 1 (877) 638-1989 Passcode: 8955346#

#### Present:

Name	Affiliation
Bruce Austin	Public
Don Bachman	Public
Kennedy Brown	Two Top
Alicia Murphy	Yellowstone Nat'l Park
Randy Roberson	Buffalo Bus
Wade Vagias	Yellowstone Nat'l Park
Jack Welch	Blue Ribbon Coalition
Randy Baum	Yellowstone Nat'l Park
Jim Knolke	Yellowstone Nat'l Park

#### Not Present

Name	Affiliation
Philip Frankovic	Jackson Hole SM Tours
Jason Howell	Yellowstone Arctic Cat
Deborah Mackey	Gardiner Best Western
David McCray	Two Top
Jamie McCray	Two Top
Dan Stusek	Steve Daines' Office
Scott Carsley	Alpen Guides
Bill Howell	Yellowstone Arctic Cat
Ed Klim	ISMA
Kim Rapp	Trails Work Consulting
Clyde Seely	Three Bear/See Yellowstone
Travis Watt	Three Bear/See Yellowstone

#### Welcome & Attendance

We were joined by Jim Knoelke and Randy Baum who have over 50 years of combined experience with Yellowstone grooming operations.

#### Review and Approval of Call #6 Notes – Bigfoot Project

Call notes were approved.

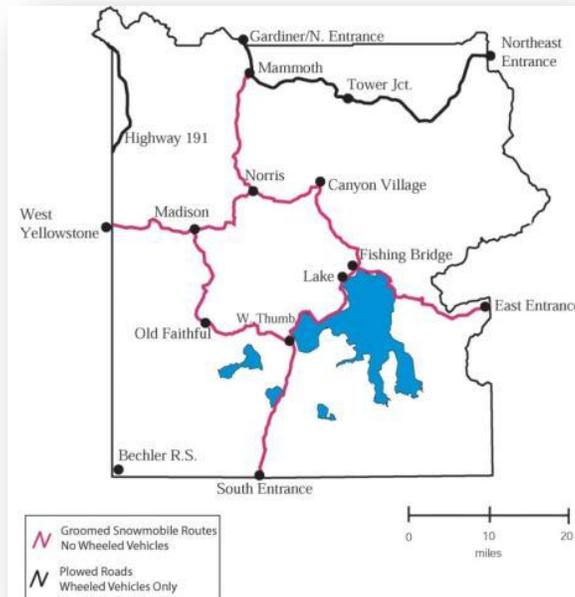
#### Grooming

##### ***Background on Grooming:***

- Each winter, Yellowstone National Park maintains approximately 200 miles of snowroads to support administrative and commercial snowmobile and snowcoach (collectively oversnow vehicles or OSVs) use in the park.
- The park has been actively grooming the roads of Yellowstone using a wide variety of equipment since the mid to late 1960s. The park currently uses a combination of large agricultural track-driven tractors or Piston Bullys or Bombardier groomers towing grooming sleds to groom park snowroads.
- Through the early 2000s, the biggest challenge was addressing the formation of moguls in the snowroads.
- As snowcoaches have increased in number and weight, large linear 'ruts' (or troughs) have become a frequent occurrence. This creates difficult driving conditions, to the detriment of the visitor experience

and the health and safety of visitors and administrative personnel. Ruts can range in depth from an inch or two to more than 18". Formation of ruts is primarily from converted snowcoaches and is believed to be driven by a combination of vehicle weight, weight displacement, track/tread design, road conditions, grooming practices, and ambient weather and snow conditions. In particular, there is growing suspicion that Mattracks (<http://www.mattracks.com/>), with their aggressive tread design and relatively small front bogie wheel, are a primary culprit in the formation of snowroad ruts. There is also grown suspicion that Mattracks aerate the snow at cruising speeds (~25 MPH) causing a significant displacement effect as well as over processing the snow base leaving it uncompactable.

- Figure 1. Roads groomed as snowroads in Yellowstone National Park during the winter.



### ***Discussion Questions Related to Grooming:***

From Kim Rapp, via email on 7/14/14: I'd like to know the following in respect to the park's trail grooming efforts:

1. List of the park's grooming equipment fleet including: A) Make, Model and Year of Tractor including if the tractor is equipped with a front blade (and the blade's width); B) Make, Model, Year and width of grooming Drag; and C) location of each Tractor/Drag combo

- Jim listed the park's grooming fleet:
  - One 2013 John Deere Ag Tractor that operates from West to Old Faithful to North. 11'5" wide from track to track with a 14' groomer
  - Four Piston Bullys (2006, 2008, 2010, 2011) 4'8" tracks with a 12'4" track-to-track width.
  - Two 1996 Bombardiers being traded for a new, 2015 Bombardier. 4'10" tracks with a 12'6" track-to-track width
  - One 2007 Prinoth with 4'10" tracks and 12'7" track-to-track width

- Randy Baum noted that the park used to have Alpine 3s but now has alpine 4s with more horsepower; the park will continue to use that machine
- Jim: Canyon uses the Trailmaster, but most other groomers pull 10x12 Mogul Master – strictly cutting blades with static plans. The Trailmaster is 3 times the weight of the Mogul Master.
- Randy B: The Alpine 4s are 350 horsepower, so we should be able to maintain speed of 9 to 12 mph. Ag tractors are fast, but new Alpine 4s allow us to do it as quickly without packing as hard. Ag tractors pack so hard that it makes it difficult for the opening crew in spring to get through that pack.
- Jim noted that we have 24-28 foot wide roads. Secondary roads are 16 feet wide.

2. Randy R: We've seen a big change in the past several years in quality of grooming – compliment to everyone for improved grooming. With regard to the pan behind the Ag Tractor at West Yellowstone – how deep below the pan will that reconstitute the snow or churn it up?

- Jim responded that that depends on how deep the cutters are.

3. Randy R: Does the groomer adjust the cutters each day or a predetermined depth?

- Jim: They're preset – they change the blades every few years. They extend about 4 inches below the pan.

4. Randy R: I noticed equipment at west doesn't have a front blade. 4 inches is static – how does it deal with a 12 inch rut?

- Jim: The groomer could use hydraulics to make it cut deep as he wants. It's a 37,000 ton tractor.

5. Wade – where are the groomers based?

- The bombardier is out of Mammoth and goes from Golden Gate to Indian Creek.
- West Yellowstone uses the Ag Tractor
- Piston Bully out of Canyon, Lake, Grant, and Old Faithful. The Old Faithful groomer has a tiller attachment for occasional use with cold temperatures; it leaves a harder smoother surface. This is the one being replaced by an alpine 4 this year that has tiller capabilities.

6. When does the park typically starts grooming the snow roads and how much snow is allowed to accumulate before grooming begins, how long in advance of the winter opening date before grooming starts, etc.?

- Wade: This past season, the park started to allowed snow to accumulate around the 17<sup>th</sup> or 18<sup>th</sup> of November, and transitioned to OSVs as conditions dictated. Roads opened park-wide on December 15<sup>th</sup>.
- This coming year the plan be the same as 2013/14. There's a balance between getting equipment in place, but it seemed to work well last year to move it up about 10 days and we intend to stick with that.

7. Typical weekly grooming schedule for each grooming unit (days of the week, road segments covered, total repetitions per segment per week, typical beginning and ending times for each grooming shift, etc.)?

- Most shifts start at 5:00 pm on main roads with exception of Sylvan (day shifts out of Lake) unless there is stormy weather or bad conditions. They groom 7 days a week unless there are particularly cold temperatures.
- Jack: is there a reason you wait until 5:00 to start?

- Jim: Yes – to allow most of the traffic out of the park.
- Wade: The analogy we use is wet concrete. If we groom a road, the worst thing you can do is run mattracks on it immediately after grooming because if it freezes hard, then the ruts freeze into the road. It's difficult to recover from that. The majority of the traffic loads are out of the park by 5:00 pm. In theory, the park is grooming inbound lanes as people are exiting. However, sometimes people will move over to the smooth freshly groomed lane. The groomers work long shifts, and they're often finishing in the early hours of the morning.

8. Any policies that alter typical grooming schedules based upon temperatures, snowfall, wind or other extreme weather events?

- Jim touched on this above.

9. Typical training and experience of grooming equipment operators

- Randy Baum: All of our operators are licensed CDL drivers and district personnel. We send inexperienced drivers with experienced drivers before we let them go by themselves. Most have been here for a number of years, but we have one new person arriving at Grant and one arriving at Canyon, but it could be a seasoned operator. Some are on the spring opening crew.
- Jim: The least amount of experience for our groomers is 3 years; the most is 20-something.

10. Randy: The International Association of Snowmobile Administrators has produced a grooming book on the theory and use of grooming equipment (Guidelines for Snowmobile Trail Groomer Operator Training: A Resource Guide for Trail Grooming Managers and Equipment Operators). There was some information about dealing with ruts. Do you use such a manual?

Available for download here: <http://www.ilsnowmobile.com/Resources/resources.htm>

- Jim: No, our practices are based on experience, and we adjust as types of traffic changes. The groomers know how to cut out ruts. Some of that guidance is probably for grooming snowmobile trails, which is one width; we're dealing with a full road.

11. Typical target maintained 'groomed width' of the roadway.

- ~16 feet for secondary roads/trails and up to ~24 to 28 feet for primary and mainline roads

12. Randy Roberson: I've noticed between West and Madison, and sometimes in Lake and south of West Thumb, that sometimes the groomer uses a blade and no pan. Is that a typical combination?

- Jim: That was probably what the groomer chose that day to get what he thought was the smoothest surface and is not typical.
- Randy Baum: If this was during the day, this could be just a place where there was bad rutting and they were trying to get rid of these as much as they could before normal night grooming.

13. Wade: What do they do with large drifts across Hayden valley?

- Grizzly overlook can be 19 feet deep and coming out of Canyon it can be 4.5-5 feet. If a snowcoach goes off the road in these places, a snowcoach would go all the way through. When you get layers of different harnesses, the park sometimes uses a groomer as a dozer so the dozer doesn't fall through.

14. Wade: Please describe the Park's approach to spring opening of roads.

- Randy Baum: Winter operations affect the cost of summer operations. The Ag tractor is in West Yellowstone because we had lean snow years. The groomer would tear up the road, and we couldn't get the pack back. The rubber tractors were to keep from tearing up pavement. The West side is warmer than the East, so if the snowpack is light, the ice goes down to the pavement and stays. This is exacerbated by the proximity to river (creates humidity), which makes West the most difficult to open. The staff hook two D7s to a grater to open the snowpack. Behind that comes a 470 horsepower truck with wings we try to widen. That's why you see different styles of equipment. The park opens 370 miles of road in less than 2 months. It's a balance between cost and operations.

15. Wade: Can you confirm the long-term plan for use of the Ag Tractor – has it proven its worth and is it a tool we envision we will continue to use?

- Randy B. Yes- we will definitely continue to use that. The Ag Tractor came in 2002, and ever since then we've had Ag Tractor on that route (West Yellowstone). Ag Tractors made a big difference on that section of road.

16. Wade: Have we ever experimented with groomers with dual wheels or have we always used tracks?

- Wheeled groomer tractors would likely present difficulties because they're 18 feet wide – wider than the groom width.

17. Jack: Does the groomer start at Flagg and go up?

- Jim: It starts at Grant and goes down and back up.

18. Jack: Do you groom to Grassy Lakes Road?

- Jim: No. We do nothing on grassy lakes road.
- Jack: Scenic Safaris will be promoting that road because that's a route in and out of Flagg Ranch where you don't have to have a BAT machine.
- Wade: Only one mile of that road is in the park. The Winter Use Plan outlines the terms and conditions for that road. It allows a max of 25 sleds but it doesn't get that much use.

19. Randy R: With regard to the Ag Tractor in West – What are the inside dimensions of the track system?

- Outside is 11 ft 6 inches, with 30 inch tracks.
- Randy is wondering if the tracks are compressing.
- Wade: The tracks are wider than a conventional snowcoach. Inside edge to inside edge would be 78 inches, or 6.5 feet, which would just catch a Mattrack edge.

#### Wade gave an update of where we are in the AMP process:

- Early on, we prioritized monitoring topics. We've looked at 7 topics and we've explored each in depth. I will be inviting individuals in the group to reprioritize the monitoring topics we've discussed. We are interested in which ones are the highest priorities in your opinion, and are not seeking a consensus from group. Wade asked the group to reprioritize topics within the next week to 10 days; he will send an email out. We'll then distribute draft chapter with comment sheet. We'll fold your comments in, and then we'll release plan for full public review.

- We're working on a chapter related to Operations and Technology in the park. We'll share that for an internal working group review, and then we'll roll that up to a draft Adaptive Management Plan which will go out for broad public review this fall or early next spring.

Jack: when will that take place?

- Wade: It will be out for public review later this fall or in the spring of 2015.
- Jack votes for an in-person meeting. Webinars are difficult to get everyone involved.

Jack: Are all the working groups on a deadline to produce chapters by August?

- Wade: that's correct.

Thanks to Jim and Randy B. for joining the call

### Supplemental Reading Material

None

### Operating Principles:

- The Adaptive Management Program will be consistent with the framework contained within the final Plan/SEIS, the Record of Decision (ROD), and the final Rule;
- This working group is a portal to encourage creative ideas and insights on how to best encourage and develop new and innovative ideas for winter use in Yellowstone as related to operations and technology;
- We will be respectful of all ideas and each other and will entertain new possibilities and consider how they might work;
- We'll ask tough questions;
- The National Park Service is the final decision-making body for the Winter Use Adaptive Management Program.

### Additional Comments

Sent by Kim Raap via email on 8/6/14

Road grooming operations are an important issue. Grooming is also a topic which I have personally been involved with for about 35 years, have developed training materials, and personally conduct groomer operator training across the U.S. and Canada. Therefore I'd like to offer a few comments as well as ask a few clarifying questions to try to better understand current efforts. I'll reference these comments and questions to the Discussion Questions numbers as follows:

1. Jim stated that the John Deere pulls a 14' groomer (drag). What width of grooming drags (the implement pulled behind the tractor that does all of the actual grooming work) do the other 7 tractors pull since the notes only list each tractor's overall width? Further down he then referenced '10x12 Mogul Master' drags – please clarify if this means 10' long x 12' wide, vice versa, or otherwise because a Mogul Master will typically be something like a model 18-08, 18-09, 18-10, etc. – meaning the drag is 18 feet long and 8, 9, or 10 feet wide.

Jim noted in the last point in #1 that the main road are 24-28 feet wide. This is important and the reason I'm asking all the questions about grooming drag widths. A properly groomed trail/road requires that there be a substantial grooming overlap in the center of the road to ensure proper compaction across the entire trail width. If grooming passes simply meet in the middle – or worse yet, don't always totally meet or overlap in the middle – there will always be less densely packed trail base in the middle of the road. This is exacerbated by the tendency for drivers to hug the middle of the road due to no 'marked centerline' on snow roads. This will absolutely lead to rough trails whether cross-trail moguling or linear rutting. Both are undesirable but also preventable simply by ensuring drag width is sufficiently wide to fully cover and overlap the full trail width with a double grooming pass.

One other important grooming principle is that probably fits in this section is that, it is important to reverse grooming directions whenever possible to best process snow roads = working the road base (snow in this case) bi-directional. I'm guessing by the stated location of the 8 grooming tractors that all most likely go out and back on the same route. Unless they reverse by grooming every other run on the wrong side of the road, it appears that bi-directional grooming is unlikely. Please clarify if this is the case.

**3 and 4 combined** – in respect to the 'blades' on the drag being '4 inches below the pan': Randy asked how a 12 inch rut is dealt with and Jim stated 'the groomer hydraulics make it cut as deep as he wants cause it's a 37,000 ton tractor.' Probably not. Multi-blade drags like used in the park (and pretty much everywhere) run on its 'side rails' which are actually its outside frame. Since the side rails/frame have to slide along on the snow surface – they are limited in their cutting depth to the 4 inches (or whatever the particular depth is set on each individual drag) the blades extend below the side rail – and they CANNOT cut any deeper irrespective of hydraulics and certainly not because a '37,000 ton' tractor is pulling it (and it is not sitting on top of it to force it magically deeper into the road base with its large weight).

Additionally, since this Ag tractor does not have a front blade, it is not equipped to do any additional snow processing or cutting than what is performed by the drag. Therefore there is absolutely no way a drag with 4" cutting blades can fully process 12" ruts. It can only be done through multiple passes with the grooming drag – but even then it's likely impossible. Therefore what really occurs is that there is a 'cut and fill' process whereby the snow is cut 4" or so, moved around, and then flattened by the drag's pan. In the end the 'filled' ruts (or moguls) are less densely compacted and they will almost immediately begin to reappear because the road base retains a 'memory' just as occurs on a washboard gravel road. If the tractor had a front blade, then the operator could try to doze deeper into the trail base before the drag follows behind to further cut and process – but this destroys lots of compacted base and is essentially really tough to accomplish successfully.

**7.** the discussion about a 5 pm start: 5 pm can be a reasonable start time as long as traffic isn't immediately on the freshly groomed surface since snow trails must setup (refreeze) – which can take from 2 to 8 hours depending upon weather and snow/moisture content conditions. If there is any traffic at all another hour later would be helpful (and it certainly should not be any earlier). However this also depends upon how long (how many hours) each grooming run is. The key is to balance start and end times to maximize setup time before traffic resumes on the road the next morning.

**10.** I'm the author of the grooming book referenced by Randy. Sorry to have to disagree with Jim, but the book does apply to grooming snow roads in Yellowstone. It is no different than lots of snowmobile trails across the U.S. and Canada. And I continually critique grooming quality on snowmobile trails everywhere I ride, including Yellowstone, and will attest that there are tons of 'experienced' operators out there doing things incorrectly which essentially is wasting money and creating trails that could be better with some simple tweaks to their

process. Yellowstone could benefit from some 'training' irrespective to how 'experienced' its groomer operators are.

**12.** Other than when dozing out drifts, there is absolutely no time an operator is running with the tractor's front blade down and the drag blades up. The tractor does not level and compact the trail base, the drag does. Using only the tractor's front blade unnecessarily destroys compacted trail base. Additionally, a multi-blade grooming drag should always have snow in at least one set of its blades since this helps build trail base.

18. I believe Fremont County, Idaho still grooms all the way into Flagg Ranch so that they can refuel their grooming tractor to be able to return to Ashton.

**Kim Raap**  
**Trails Work Consulting**