

Slide 1



Welcome to this short-course on **Top Tips for Effective Trail Grooming** which has been assembled by Trails Work Consulting and the American Council of Snowmobile Associations (ACSA) to help grooming managers and groomer operators be adaptive to changing snowmobile trail grooming needs.

Slide 2

A slide with a blue background. At the top, a yellow box contains the text "EFFECTIVE GROOMING TIP #1: Invest in Off-Season Trail Maintenance". Below this, there are three bullet points in yellow text. To the right of the text are two small photographs: the top one shows a dirt trail in a forest, and the bottom one shows a snowmobile grooming machine. At the bottom right, there is a small logo for "Trails Work Consulting".

- Quality of the groomed trail is directly impacted by the trail bed under it = if rutted & rough, groomed trail will not have consistent compaction
- Remove holes, ruts, rocks & debris to the extent possible
- Brushing & tree limb removal along trail helps snowfall reach trail bed to improve trail

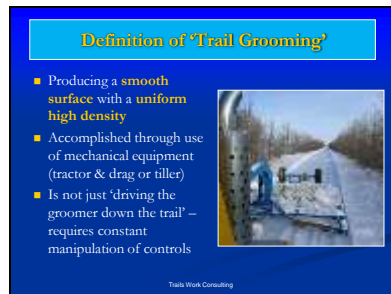
The first and most important thing for a good grooming program actually occurs before the first snowflake falls. It's extremely important to invest in off-season trail maintenance since the quality of the trail bed beneath the snow directly impacts the groomed trail quality. If the trail bed is rutted and rough, there will always be inconsistent compaction beneath the snow surface – resulting in the snowmobile trail being rough and moguled throughout the season. Try to remove holes, ruts, rocks and debris to the extent possible. Brushing and tree limb removal along the trail will help snow reach the trail surface, as well as improve the trail for riders and grooming equipment.

Slide 3



There are a wide range of variables that influence the approach to snowmobile trail grooming in local areas, as well as the quality of the finished grooming product. The better groomer operators understand the purpose and mechanics of grooming, along with the many variables – the better the quality of their trails will be.

Slide 4



Trail grooming is accomplished through the use of mechanical equipment (grooming tractor and drag or tiller) and is not just 'driving the groomer down the trail' – it requires constant attention to conditions and continual manipulation of the controls. The goal is to create a smooth surface with a uniform high (firm) density.

Slide 5



Snowmobile trail grooming management should focus on two primary objectives: 1) Provide a smooth trail surface that creates a more enjoyable experience for snowmobilers, and 2) Create & maintain a firmly compacted trail base to help withstand heavy snowmobile traffic & provide extended riding opportunities

Slide 6

Meeting Trail Grooming Objectives

1. Requires establishing a firm trail base at the beginning of the season
2. Then must provide enough weekly grooming repetitions to keep up with area traffic, weather & snowfall patterns




Trails Work Consulting

To meet these trail grooming objectives requires, first, establishing a firm trail base as early as possible at the beginning of the season – and then provide enough weekly grooming repetitions to keep up with area traffic, weather and snowfall patterns.

Slide 7

Understand What 'Grooming' Snow Does

1. Cuts & mixes snow to help temporarily produce an equal temperature layer of snow within the snowpack
2. Mixing reduces snow particle size, produces different particle sizes & helps maximize the number of bonding sites within the equal temperature snowpack

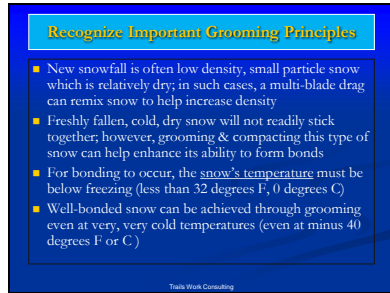


3. Requires sufficient time for bonds to form between the newly mixed, processed snow grains, i.e. it must re-freeze & 'set-up'

Trails Work Consulting

It's important to understand exactly what 'grooming' snow does. Most importantly it cuts and mixes snow which helps level as well as produce a layer of 'equal-temperature' snow within the snowpack. The mixing reduces snow particle size and creates different particle shapes along with sizes – which ultimately helps maximize the number of bonding sites within the snowpack. The freshly cut and mixed snow must have sufficient time for the snow grains to bond or re-freeze and set up – which is aided by the equal temperature which was created in the snowpack by grooming.

Slide 8



Recognize Important Grooming Principles

- New snowfall is often low density, small particle snow which is relatively dry; in such cases, a multi-blade drag can remix snow to help increase density
- Freshly fallen, cold, dry snow will not readily stick together; however, grooming & compacting this type of snow can help enhance its ability to form bonds
- For bonding to occur, the snow's temperature must be below freezing (less than 32 degrees F, 0 degrees C)
- Well-bonded snow can be achieved through grooming even at very, very cold temperatures (even at minus 40 degrees F or C)

Traffic Work Consulting

Several general principles should be kept in mind when grooming snow:

- New snowfall is usually low density, small particle size snow which is relatively dry – meaning it has a lot of air space in it
- Fresh, cold, dry snow generally doesn't stick together well – but grooming can enhance its ability to form bonds
- The snow's temperature must be below freezing for bonding to occur
- Well bonded snow can be achieved through grooming even at very, very cold temperatures

Slide 9



Many Variables Require ADAPTIVE GROOMING

Grooming is expensive, so an **ADAPTIVE** approach is required to ensure funds & time are best spent efficiently & effectively

- Variables that affect grooming success include: temperature, type and depth of snow, terrain, traffic volume and use patterns, wind, current or incoming storms, water crossings & thermal areas
- All can have a huge impact on grooming times, frequencies & methods
- **Must be FLEXIBLE** to best respond to these variables & **ADAPTIVE** to changing needs

Traffic Work Consulting


There are numerous variables, including temperature, type and depth of snow, terrain, traffic volume and use patterns, wind, current or incoming storms, water crossings and thermal areas, all which can make snowmobile trail grooming challenging. Grooming is expensive, so managers and equipment operators must be adaptive to changing needs and conditions to ensure funds and grooming time are best spent efficiently and effectively. Grooming management must remain flexible to best respond to local variables through potentially adjusting grooming times, frequencies and methods.

Slide 10

Four Different Trail Grooming Situations

1. Start of the season:
creates the base (foundation) layer to operate equipment on for the entire winter – must be early, in the right location & have sufficient width

Extremely important that a firm, uniform, dense layer is compacted from the bottom (ground) layer up



Trails Work Consulting

There are generally four different grooming situations that all require different approaches and grooming techniques. The first and most important is establishing the groomed trail at the beginning of the season. This creates the base layer which serves as the foundation for the entire winter. The trail must be in the correct location and it must be compacted to a sufficient width that will work for the entire season. If you start with a trail width that's too narrow, you'll have difficulty widening it (firm from the ground up) later in the season. Consequently it's extremely important that a firm, uniformly compacted, dense layer is built from the ground up, as early as possible, to ensure better trail quality throughout the season.

Slide 11

Situation #1 – Early Season Cautions

- If there is low snowfall at the start of the season, it may be better to **'ride the pan'** versus trying to cut much with the drag's blades on initial passes in early or low snow conditions
- **Go slower** because of potential hidden hazards – even in deeper snow conditions since the base will not yet be firm



Trails Work Consulting


Grooming start-up at the beginning of the season often requires extra caution – and reduced speeds due to potential hidden hazards beneath the uncompacted snow base. If there is low snowfall, it may be better to 'ride the pan' by keeping the drag's blades up of the trail and not try to cut much, if anything, on initial passes in early or low snow conditions.

Slide 12

Grooming Situation #2

2. After heavy snowfall or winds: it may be necessary to re-establish the trail after it was covered with deep new snowfall or high winds

Extremely important that operator knows where the trail should be located & that a new, firm layer is compacted to try to 'cap' old snow beneath



Trails Work Consulting


The second grooming situation can occur any time during the season after deep, new snowfall and/or high winds obliterate the previous trail. This can sometimes be like starting over at the beginning of the season. It's extremely important that the groomer operator know exactly where the trail is supposed to be to take advantage of previously compacted base, to the extent possible – and does not depend upon snowmobile tracks to help locate the exact location of where the groomed trail is supposed to be. It is also critical that a new firmly compacted layer is created – which may actually need to 'cap' the old trail profile if the new snow is extremely deep. In this case the newly compacted / capped snow layer becomes the new 'base layer' which will affect trail quality from then onward. In this situation it's important that the operator slow down and take the time to properly process and compact the new snow layer.

Slide 13

Grooming Situation #3

3. Remove moguls: requires deep cutting to bring trail back into a smooth, firm surface after snowmobiles have destroyed the trail base

Extremely important that operator slow down to allow drag time to work




Trails Work Consulting

This is the most common grooming situation, particularly in high traffic areas, and one of the primary reasons that trail grooming programs exist. Snowmobile traffic will wear snow out and create moguls – the only question is how deep they will get and what you are going to do about trying to keep them under control. It is extremely important that groomer operators slow down when grooming in these conditions – something that we'll cover more in-depth in a bit.

Slide 14

Grooming Situation #4

4. Light Maintenance: use only minimal cutting to avoid destroying compacted base & help increase base. Don't set drag blades too low on smooth trails = use only the rear set of blades to 'skim' smooth or minimally moguled trails; but do need snow working in drag to repair surface chew from the groomer's tracks.



Trails Work Consulting

The fourth grooming situation is when trails are generally smooth or lightly moguled and require only light maintenance. Only minimal cutting is required, so 'skim' the trail surface using only the rear set of blades. Be careful to not cut any deeper than needed to avoid destroying the compacted trail base. Even though the trail may be smooth, some snow is required to be working within the drag to repair the surface chew created by the churning of the groomer's track as it travels over the trail. Having snow in the drag also helps increase the trail's base with every pass with a drag. This is the only situation where an increased grooming speed may be acceptable – BUT be aware that increased speed will result in more snow being churned by the tracks, more snow potentially being sprayed out of the drag, and increased potential for the drag to begin rocking and duck-walking which leads to a wash-board trail surface that was smooth before the operator high-balled across it.

Slide 15

EFFECTIVE GROOMING TIP #3:
Need Equipment That Fits the Job



Trails Work Consulting

Grooming equipment must fit the needs of the local area and be able to be adaptive to changing grooming conditions throughout the season. Proper equipment selection is one of the most important ingredients in a successful grooming program and should be based upon the following factors:

Slide 16

**Grooming Equipment Must Fit the Job
to be Effective and Cost Efficient**



Main process of "Grooming" is primarily performed
by the rear implement (the drag or tiller) – so a good
groomer tractor/drag or tiller combo is critical

Trails Work Consulting

The process of 'grooming' is primarily performed by the rear implement – not by the grooming tractor – so a good tractor-drag or tractor-tiller combo is critical. The grooming equipment must properly fit the job or it will not be effective in fulfilling local grooming needs or be cost efficient to operate.

Slide 17

Selecting the Right Tractor for *Your* Area?

9 FACTORS TO CONSIDER

1. **Power** to pull the right size drag
2. **Width, Height & Weight** limitations
3. **Flotation in snow** (low PSI to stay on top of snow)
4. **Turning and Climbing** ability while pulling
5. **Front Blade** (yes, you need one) type and size
6. **Ease of Operation** by volunteers or employees
7. **Maintenance & Operating Costs** including fuel consumption rates
8. **Parts Availability** in local use area
9. **Purchase Cost** (should be last factor, based on 1 thru 8)

Trails Work Consulting

The following questions must all be considered to help make the right grooming tractor choice for your local area: **1) Power to pull the right size drag:** underpowered units struggle to do the job while increasing operating costs due to over-working the vehicle; overpowered units can cost more than what is needed to do the job while also having higher than necessary operating costs. Groomers with low horsepower need to be matched with narrower grooming drags. **2) Width, Height and Weight limitations:** the unit needs to be able to fit through the narrowest and lowest clearing widths along the trail system while not being too heavy for bridge weight limits. The unit's track width should never be wider than the grooming drag it pulls since this creates poor trails. **3) Flotation in snow:** the unit needs to have a low PSI to ensure it can stay on top of snow rather than having so much weight and poor flotation that it burrows through snow. Heavy groomers with high PSI unfortunately tend to disperse snow off the trail where it is wasted by the unit's burrowing action. **4) Ability to**

turn and climb while pulling heavy loads: this is especially critical if the trail system is not entirely flat and straight. Hills and curves typically need the most grooming work to repair moguls and cover bare spots so the groomer must be able to maneuver well while staying under full power. **5)**

Front Blade: a groomer should always have a front blade to properly keep snow piles cleared from road and driveway crossings, for dozing snow drifts, working down curves, filling creeks and depressions, and working new snow into the trail from along outside trail edges. **6)**

Ease of Operation: the unit should be easily operated by authorized volunteers or employees. **7)**

Maintenance needs: can the unit be easily maintained and/or repaired by volunteers or employees, or does it require most work to be done by authorized service technicians? **8)**

Parts Availability: Are replacement parts readily available in the local use area to minimize downtime, and at a reasonable cost? **9)**

Purchase Cost: this should be the least important factor since improper equipment can ultimately drive operating costs up and result in poor grooming dependability and performance. The answers to factors 1 through 8 above are ultimately what determine whether the unit can properly cover the area's grooming needs, or not. If cost precludes buying the right groomer, opt for used versus new or 'older used' versus 'newer used' to get the right equipment for the area rather than buying the wrong groomer.

Slide 18

Example Comparison of Groomer Models
(Source: 4 vendors' own handout at the MN GREAT SHOW)

FACTOR	Pisten Bully Trail Bully	Prinoth Husky TG	Tucker 2000E 26-6-173	Sur Trac New Holland TZ 185
Horsepower	197	197	173	140
Vehicle Width	98" or 110"	98" or 122"	94"	98" or 115"
Blade Width	106" or 122"	98" or 122"	102"	108" or 122"
Height	112"	112"	112"	123"
Weight	12,800# w/blade	10,119# w/o blade	12,100# w/blade	18,600#
Flotation/PSI	1.11	0.83	1.09	2.8

Trails Work Consulting

This comparison comes from a handout provided by four groomer equipment manufacturers who were displaying their 2013 model grooming tractors at the Minnesota Great Show. It provides an example snapshot of some of the differences between the various models, in respect to the six Factors listed in the left column. The Pisten Bully, Prinoth and Tucker tractors are all original equipment manufactured (OEM) tracked over-snow vehicles while the Sur Trac is an agricultural/farm tractor which has been retrofitted with tracks versus its OEM wheels. There are many similarities between OEM groomers whereas Ag tractor conversions often differ from OEM units in height, horsepower, weight and PSI/flotation comparisons.

Slide 19

Selecting the Right Drag for *Your* Area?

5 FACTORS TO CONSIDER

1. **Must match the grooming tractor's horsepower & overall width:** wide/heavy drags increase costs
2. **Processing Ability:** need multiple cutting blades for superior processing; must be properly spaced to properly work snow & move it to middle of trail
3. **Width:** should be as wide as tractor's tracks; is dictated by narrowest clearing width on trail
4. **Length:** longer units generally produce smoother trails (bridges high spots), but too long can limit tight turns
5. **Weight:** heavier helps cut moguls, BUT too heavy overburdens tractor & uses more fuel

Trails Work Consulting


The following questions must all be considered to help make the right grooming drag choice for your local area: **1) Match the groomer's size:** the drag size must match the groomer's overall horsepower as well as its overall width. Wide and/or heavy drags require higher horsepower groomers, so they can quickly increase operating costs; safeguard against choosing larger groomers and drags than what are needed to properly maintain the area's trails (larger does not necessarily mean proper or best). **2) Processing ability:** the unit should have multiple cutting blades for cutting and processing the snow trail. Snow must roll and churn within the drag for proper processing while also preventing snow spillage outside the

drag – since the goal is to increase snow depth on the trail. Consequently beware of having too few or too many blades, improperly spaced cutting blades, or insufficient snow storage within the drag. The drag must be capable of working snow to the middle of the drag to address ‘hollowed out’ areas often caused by high traffic in the center of the trail. The drag frame must also be square and properly adjusted to ensure even cutting and compaction. **3) Width:** the drag’s minimum width must be at least as wide as the groomer’s outside track width without being so excessively wide that it unnecessarily increases operating costs and necessitates wider trail clearing widths; its maximum width is dictated by the narrowest clearing width along the trail. The wider you groom a trail, the more you invite higher snowmobile speeds. Generally 8-feet, 9-feet, or no more than 10-feet wide grooming drags produce the best quality snowmobile trails. **4) Length:** longer units generally produce smoother trails since this helps bridge high spots in the trail, but too long can limit the groomer’s ability to negotiate tight turns along the trail system. **5) Weight:** while drags must be heavy enough to cut deep moguls, excessively heavy grooming drags quickly overburden the groomer’s pulling ability as well as increase fuel consumption, maintenance issues, breakdowns, and total operating costs.

Slide 20

Match the Drag to the Groomer Tractor

- Pulling a 10' multi-blade drag with a 1974 Ski Dozer (old & small), will overburden the tractor & be inefficient
- If the drag is narrower than the tractor's tracks, the entire trail will never be uniformly dense since the outside edges are never processed



Trail Work Consulting

It is critically important that the groomer tractor and drag are properly matched: 1) the tractor should have enough horsepower to easily pull the drag in deep snow or moguls, and 2) the drag should be at least as wide as the groomer's tracks to ensure proper processing of the trail surface – otherwise the outside edges of the trail will never be worked by the drag, resulting in the center of the trail likely always being lower and dished out. Neither one of the examples shown here properly match the groomer tractor with the grooming drag.

Slide 21

Consider Using a Compactor Bar

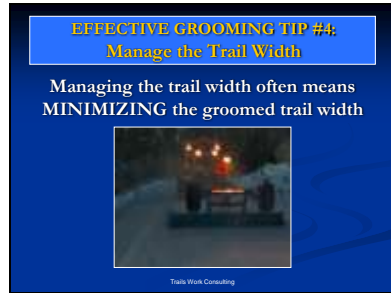
- Can significantly reduce time, effort, & cost of initial trail setup, as well as trail reestablishment after heavy snowfalls
- Can facilitate compaction that helps drive frost into ground & freeze swampy ground faster
- Provides increased tractor maneuverability; saves wear & tear on tractor & drag, better than 'track packing'



Trail Work Consulting

Consider adding a Compactor (Packer) Bar to your tool box of grooming implements to help improve trail quality and reduce operating costs. It is much more maneuverable than pulling a drag in deep snow or during early season set-up – so can reduce time, effort and costs, as well as save wear and tear on the grooming drag. A packer bar can help drive frost into the ground and help freeze wet or swampy areas faster. It is a much more effective option for initial trail establishment or reestablishment after deep snowfalls than 'track packing' with no implement behind the tractor.

Slide 22



Managing the trail width often means minimizing the trail width so that the groomed trail is no wider than what's really needed to provide sufficient width for two-way traffic. Consequently managing the trail width is directly affected by managing the grooming equipment's width.

Slide 23



When the groomed width is managed so that the width is not wider than needed, there will generally be more focused and uniform compaction, which results in better quality trails. Minimizing the groomed trail width can also help lower grooming costs by reducing fuel consumption and wear and tear on the equipment. Keeping trails no wider than needed also helps reduce trail maintenance needs for tasks such as brushing, trimming, grading and rock or stump removal—which in turn can help reduce volunteer or paid labor costs for these tasks. When trails are groomed excessively wide, they can invite higher speeds. And finally, keeping trails only as wide as is really needed can help minimize environmental impacts and improve resource management – which in turn can help improve public relations and the public image of snowmobiling. Super wide trails are rarely necessary or a good idea.

Slide 24

MINIMUM Groomed Trail Width:
Should Be Wider than one Drag Width

- **Widen your trail more than one drag width** if clearing space allows
- Grooming only one drag width is **too narrow**; there is no forgiveness if outside track gets off compacted base (stuck); sled traffic is also more confined (more moguls)



Trails Work Consulting

If clearing space allows, the groomed trail should always be maintained wider than only one drag width since there is no 'forgiveness' if the outside track gets off the compacted trail base, particularly when the uncompacted snow beside the trail is deep. Grooming only one drag width wide is generally too narrow since it keeps snowmobile traffic more confined, resulting in more moguls and less enjoyable riding conditions.

Slide 25

MAXIMUM Groomed Trail Width:
1 ½ to 2 times the Drag Width

- **Control your trail width** – on wide roads or in open areas, don't try to groom too wide; pick a route & stick to it to ensure trail base is consistently built from the ground up
- Grooming wider than 2 times the drag width **WILL** result in soft pockets & a rough trail from inconsistent processing & compaction



Trails Work Consulting

The best maximum groomed trail width is 1 ½ to 2 times the drag width. It's extremely important to control this groomed maximum width – particularly when the trail is located on wide roads or in open areas. The groomer operator needs to pick a route and stick to it throughout the season to ensure the compacted trail base is built from the ground up across the entire trail bed. Grooming wider the 2 times the drag width will absolutely result in soft pockets being created in the trail base – and a resulting rough trail – due to inconsistent processing and compaction of the snow surface.

Slide 26

1 ½ = Ideal Groomed Trail Width

- Maintaining a trail width of 1½ times the drag width consistently grooms the middle third of the trail, which is where many riders favor – so you'll have the best trails
- This requires regular, frequent grooming reps to be most effective



Trail Work Consulting

Maintaining a groomed trail width that is 1 ½ times the drag width generally results in the best quality trails since the middle third of the trail (green arrow) – which is where many riders favor – is consistently groomed every grooming repetition. This also puts the groomer's track in the middle of the trail every repetition, adding a bit of extra processing from the track's churning and compaction from the weight of the tracks. While this approach clearly results in superior quality trails, it does require frequent/regular grooming repetitions (same day or within a day or two) versus long, extended periods (many days or a week plus) between grooming repetitions.

Slide 27

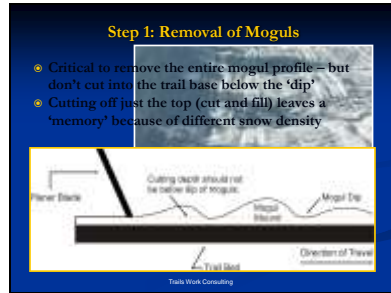
**EFFECTIVE GROOMING TIP #5:
Understand the 'Four Steps' of
Grooming with a Drag**

1. Removal of moguls
2. Processing the snow
3. Compression of processed snow
4. Trail setup



Trail Work Consulting

The vast majority of trail grooming is done with a drag, so it's extremely important that groomer operators understand the four tasks or 'steps' involved with drag grooming – and all which occur or are initiated over a matter of only one or two seconds when the drag is passing over any particular section of trail.



Step 1 involves the removal of moguls from the trail bed. It is critical that the entire mogul profile – from the bottom of the mogul dip to the top of the mogul mound – is removed, but at the same time it's important that the planer (cutting) blades of the drag not cut into the trail base below the mogul dips to help protect the lower, compacted base layer. This requires that the operator pay close attention to mogul conditions and may require frequent manipulation of the drag's cutting depth. If only the tops of the moguls are cut off, depositing the cut off snow into the remaining portion of the mogul dips – a 'cut and fill' situation results in a different snow density where the remaining portion of the mogul mound is likely hard and dense while the 'filled' portion of the mogul dip will be less dense and much softer. The end result is that the 'filled' portion of the mogul dip does not firm up / freeze up well enough to prevent the soft 'fill' snow being quickly displaced by snowmobiles – leaving a 'memory' of the rough moguls which quickly reappear in the trail bed.

Slide 29

Limitations to Effective Mogul Removal

1. **If there are bare spots in the trail:** don't cut deep or try to remove the entire mogul mound since it could damage equipment & destroy whatever hardened trail base there is




Trail Work Consulting

There can potentially be four conditions that limit the groomer operator's ability to effectively remove the entire profile of a mogul. Number one is if there are bare spots in the trail, don't cut deep or try to remove the entire mogul mound since it could damage equipment and also destroy whatever hardened trail base there is. In this case raise the drag's cutting height, perhaps to the point where you're just 'panning' or you may even need to put the wheels down until conditions improve.

Slide 30

Limitations to Effective Mogul Removal

2. **Multi-blade drag:** many models will not cut deeper than the depth the planer blades extend below side rails when blades are fully lowered. If the trail is soft, the side rails may cut into trail bed; but if trail is hard, rails will ride on top & limit the cutting depth



Trail Work Consulting

Many multi-blade drags are limited in the depth their blades can cut below the drag's side rails. Unless the drag's cutting blades extend clear to the outside below the side rails, the side rails will ride on top of hard trails and consequently limit the cutting depth to the distance the blades can be lowered below the side rails. In this case the only way to fully remove the entire mogul mound is to make multiple passes with the groomer. The operator may also try to cut some of the mogul height with the tractor's front blade (but this requires extreme caution to not damage equipment and to not remove excessive trail base!).

Slide 31

Limitations to Effective Mogul Removal

3. **Single blade drag:** if moguls are deep, it's likely that snow will be spilled/wasted outside the drag if trying to cut deep; save snow versus trying to cut it all off



Trails Work Consulting

Since single blade drags don't have side rails to help keep snow contained within the drag, trying to cut deep moguls can result in spilling snow outside the ends of the drag – wasting it from being able to be used to effectively build up a firm trail base. Consequently it's often better to not cut so deep, leaving some of the mogul profile, rather than wasting it off the trail. This factor is a prime reason why multi-blade drags are often superior to single blade drags for grooming trails with heavy traffic and moguls.

Slide 32

Limitations to Effective Mogul Removal

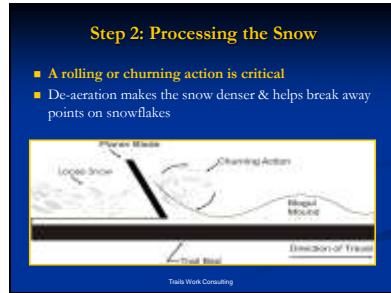
4. **When deep, fresh snowfall covers moguls:** it may not be possible or practical to completely remove the moguls. In such a case it's critical that extra attention be given to compacting a new, hardened trail base to **CAP THE PROFILE** of old moguls below the new layer of snow



Trails Work Consulting

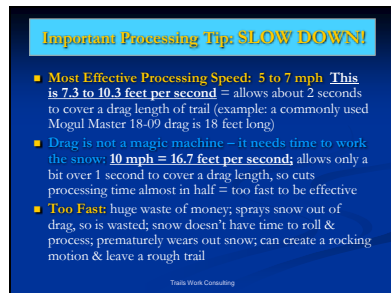
And finally, when deep, fresh snowfall covers up moguls on the trail, it may not be possible or practical to completely remove the moguls. In this case you must re-establish the trail base, so it's critical that extra attention be paid to compacting a new, hardened trail base that effectively 'caps' the profile of the old moguls below the new layer of snow.

Slide 33



After moguls have been cut and removed, the drag ‘processes’ the snow when the cut off snow is rolled and ‘churned’ through the series of blades in front of the spreader / compaction pan. If the snow is not freely rolling and churning within the drag – it is not processing properly, so adjusting the drag upward may be required to get snow flowing freely through the blades. This processing helps de-aerate the snow, break away points on snowflakes, and ultimately makes the snow denser.

Slide 34



If there are moguls to be cut and snow to be processed – it’s absolutely critical that operators slow down and work in the range of 5 to 7 miles per hour. This equates to 7.3 to 10.3 feet per second. So when considering that common drags like a Mogul Master 18-09 is 18 feet long – that allows about 2 seconds to cut and process one drag length of trail. A drag is not a magic machine and needs time to properly work the snow. Increasing grooming speed to just 10 miles per hour equates to 16.7 feet per second – cutting processing time almost in half to just a bit over 1 second to cover one drag length. Grooming too fast is a huge waste of money since snow doesn’t have time to roll and properly process. It sprays snow out the side of the drag, wasting it from helping build the snow base. Grooming too fast can also prematurely wear the snow out and cause rough trails due to a rocking motion created by the drag duck-walking along the trail rather than staying flat on the trail surface. Too

much speed is a leading cause of poorly groomed trails and should not be an acceptable practice.

Slide 35



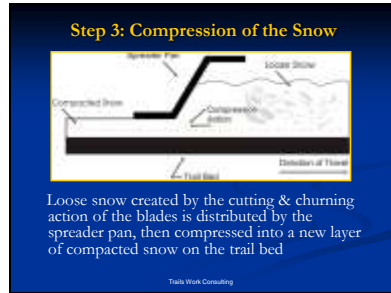
Video clip showing drag processing snow on a relatively smooth trail: the clip shows how snow is cut and works its way back and forth within the drag. Since this is a relatively smooth trail, the operator is traveling at a faster rate of speed than would be advisable if the trail was rough and moguled.

Slide 36



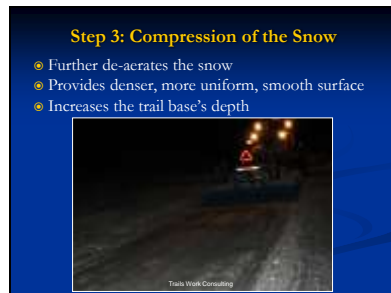
Video clip showing drag that has been plugged with snow: first, it's obvious from all the excess snow built up on top of the drag that the operator had been too aggressive with the cutting blades and plugged the drag – he should have stopped and cleaned all the excessive snow build up off the drag. The drag is still set improperly for the conditions, causing snow to plug and ball up around the rear blades. The drag should be raised to ensure the snow is flowing freely and processing correctly the entire length of the drag.

Slide 37



The third step involves the loose snow created by cutting and then churning through the drag's blades being distributed and compressed under the spreader pan. Every time a multi-blade drag works the trail (and has snow being processed through the blades) the trail's depth is increased by a new layer of compacted snow. If snow is all balled up or plugged in front of the spreader pan, the snow will not flow evenly beneath the rear pan – resulting in an uneven or pitted trail surface.

Slide 38



The compression step helps to further de-aerate the snow, provide a denser, more uniform smooth trail surface while also increasing the trail base depth. If cutting and processing were done improperly or too fast, it's often results in a compressed snow surface (after step 3) that is not smooth or a uniform density.

Slide 39




Video clip showing compressed trail behind the spreader pan: while the drag has processed and compressed the snow, the trail surface is pitted and not entirely smooth. This is a result of the snow not flowing freely within the drag, snow build-up sticking to the blades and pan, and chunking of snow during the cutting and processing steps.

Slide 40

Step 4: Trail Set Up

- **Requires** allowing the snow that has been disturbed by cutting, processing, & compressing **sufficient time to refreeze**
- Generally, the longer set up time that can be allowed, the more durable the trail will be




Trails Work Consulting

The trail must be allowed to set up and refreeze after the cutting, processing and compression steps. The longer the set up time before being disturbed by snowmobile traffic, generally, the more durable the trail will be.

Slide 41

Step 4: Trail Set Up

- Try to maximize set up time by adjusting grooming start & end times
- 2 to 6 or even 10 hours can be required to refreeze
- Night grooming is generally the best = low traffic & lower temperatures



Trails Work Consulting

It is important to maximize set up time to the greatest extent possible by adjusting grooming start and end times to the extent possible (start late afternoon or in the evening when snowmobile traffic volumes are the lowest – and then try to be done early enough to allow set up time before morning traffic resumes). Trail set up time will vary with weather, snow and moisture conditions – so can range from 2 hours to 6 hours to even 10 hours before the freshly groomed trail is frozen enough to withstand heavy traffic. Since set up time is critical to trail durability, night grooming is generally the best due to lower traffic volumes and lower temperatures.

Slide 42



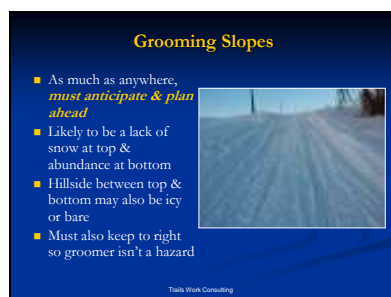
One thing is absolutely certain: set up will NOT occur when riders are following the groomer! Consequently use adaptive scheduling to try to find windows of time when no riders – or at least a lower number of riders – will be present to destroy the freshly groomed trail.

Slide 43



It is extremely important that groomer operators know their trail well enough that they can anticipate needs for changing conditions and different grooming techniques. It important that operators anticipate needs for a wide variety of conditions that include grooming the top versus bottom of slopes; road and driveway approaches along with road and railroad crossings; low spots, swales or creeks which the drag length spans; curves; road ditches or other potentially deep snow locations; and bridge crossings.

Slide 44



As much as anywhere, groomer operators must anticipate and plan ahead when grooming slopes. There is likely to be a lack of snow at the top of the slope and an abundance of snow at the bottom. Along with this, the hillside between the top and bottom may be icy or completely bare of snow cover. AND they must also keep the equipment to the right so that the groomer isn't a hazard for potential on-coming riders.

Slide 45

Grooming Slopes: from top

- **ANTICIPATE NEED TO CARRY SNOW (lower blades before you get there)** for crest/top area = **IF YOU DON'T CARRY IT WITH, YOU WILL HAVE NONE TO USE!**
- Applies to hills as well as the top of road & driveway approaches




Traffic Work Consulting

When approaching the top of a slope, you'll often need to anticipate a need to load up the drag and carry snow to where it can be spread at the crown of the slope – an area which typically can be bare or have a thin snow layer. Therefore lower the drag's blades in advance of the crown and then begin raising as you reach the crown and start downward on the slope. And if you don't raise the blades quick enough, you'll potentially scrape too deep at the top of the slope and make the thin snow or bare issue worse. This same principle applies to when approaching a road or driveway approach.

Slide 46

Grooming Slopes: from bottom

- **DRAG MAY NEED TO BE RAISED** to lighten the load
- Note that tracks have **spun & dug trenches**, which drag can fall into unless it is wider than track stance = tractor can quickly become stuck unless drag is raised




Traffic Work Consulting

When approaching a slope from the bottom, the opposite is true. You may likely need to raise the drag to lighten the load since 1) there is often deeper snow at the bottom of hills – so you don't need to carry a lot with you, and 2) pulling a fully engaged (full) drag up a slope can often cause the groomer to spin out and get stuck. Unless the drag's width is substantively wider than the tractor's track, the side rails of the drag can fall into the trenches dug by the spinning tracks (above red arrow) and potentially result in getting stuck.

Slide 47

Grooming Across Dip, Swale or Ditch

- When going thru a dip, swale, ditch, creek, etc. that the drag length spans: **ANTICIPATE A NEED TO LOWER THE DRAG'S BLADES** before you get there to gather snow
- Goal: carry snow to dump & eventually fill the low spot




Tails Work Consulting

When grooming through a low spot in the trail – whether a small dip, swale, ditch, creek, etc. that the drag length spans – anticipate a need to lower the drag's blades in advance of the depression – so that you can load up snow to carry with and then be dumped into the depression by raising the drag as you reach and cross the low spot. Following this process should eventually result in the depression being filled with enough of a snow base that the trail evens out and the low spot disappears after several grooming repetitions.

Slide 48

Grooming Into Deep Snow

- When approaching a heavily drifted area, full road ditch or other deep snow area – **ANTICIPATE A NEED TO RAISE BLADES** in advance to avoid spinout or getting stuck



Tails Work Consulting

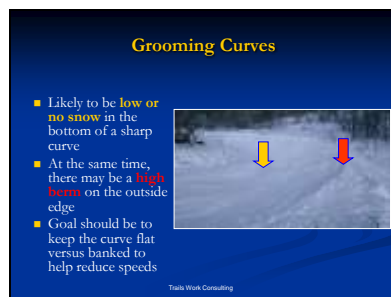
When approaching a deeper snow area such as a full road ditch, a heavily drifted area, or other deep snow areas – anticipate a need to raise the drag blades as the groomer transitions from well compacted areas into deeper snow to avoid getting stuck. And if you're unsure of the snow situation – throttle down a bit as you transition into the deep snow area to maintain better control of the groomer.

Slide 49



In locations prone to reoccurring large drifts, it's often better to work with the drifting rather than continually trying to fight them. Instead of trying to doze large drifts out every time the wind blows (as shown in this photo and which can often be a never-ending process), a better approach may be to try to 'ramp up' to the drift from each direction by using both the tractor's front blade and a full drag of snow to build up approaches from each side. This oftentimes will allow you to eventually be simply 'grooming over' versus dozing the drifts, similar to how filling swales can eventually even out depressions.

Slide 50




Grooming curves can present special grooming challenges, so it's important to know where they're at along the trail well enough to be able to anticipate and prepare in advance for grooming maneuvers you'll need as you work through curves. There is likely to be either low snow or no snow in the bottom of a sharp curve (yellow arrow). At the same time there may be a high berm around the outside edge of the curve (red arrow). This is the result of snowmobiles throwing snow outward with their tracks as they spin and power around corners. The goal should be to keep curves fairly flat – versus allowing them to become 'banked' – to help keep trail speeds down.

Slide 51

'Safety First' When Grooming Curves

- Beware that dropping too far down into the center of a sharp or blind curve can be dangerous; so never deviate over the **imaginary centerline** with the groomer by more than 2 feet



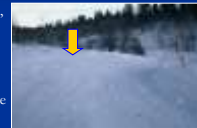
Trails Work Consulting

Always think 'Safety First' when grooming through curves. Beware that dropping too far down into the center of a sharp or blind curve can be very dangerous; never deviate over the imaginary centerline (yellow arrow) of the trail with the groomer by more than a couple of feet to ensure any potential on-coming traffic has a place to go.

Slide 52

Grooming Curves

- If the groomer gets **too high on outside edge**, it risks getting high-centered & stuck
- Use the front blade on the groomer to pull snow from outside edge of trail into bottom of curve




Trails Work Consulting

Be cautious that the groomer could get high-centered and become stuck if the groomer is operated too high on the outside edge of the berm (yellow arrow). Use the front blade on the groomer to help pull snow from the outside edge of the trail into the bottom of the curve.

Slide 53

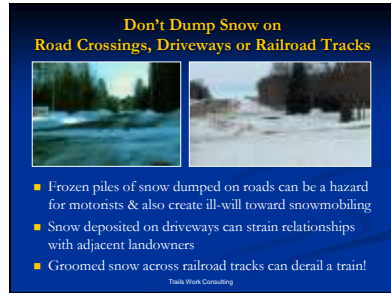
Groom Across Bridges

- All too often operators fail to ***groom*** across bridges; this can lead to rough & less safe conditions before, across & after bridges
- Start by panning across to avoid damage; use the groomer to bring snow onto bridge & eventually you will build enough base to groom across every pass



Trails Work Consulting

All too often, groomer operators fail to ***groom*** across bridges since they are afraid of damaging the bridge decking. Failing to groom across bridges can quickly lead to rough, unsafe trail conditions on each side of and across the bridge. Operators should start by just panning across the bridge to avoid deck damage. Use the groomer to carry snow onto the bridge, a little bit with each pass, and then you'll eventually build enough snow base on top of the bridge decking to be able to fully groom with the drag, as needed to keep the trail from getting rough.




It is imperative that that groomer NOT dump piles of snow on roads and driveways when crossing them. This is a huge no-no that can create hazards for motorists, create ill-will toward snowmobiling, and strain relationships with adjacent landowners. Creating a groomed path across railroad tracks can also derail a train – creating a huge mess and liability. The groomer operator needs to ensure that the drag feathers the snow out of the drag as the wheels are raised to cross a road, driveway or railroad tracks. A pile of snow cannot be dumped on the road, driveway or train tracks – and a pile of snow also cannot be dumped onto the snowmobile trail, which could create a potential safety issue for riders. If a snow pile is left on the trail, road, driveway or tracks – the operator should stop and shovel it off before continuing. While having to get out and shovel is no fun – it can be avoided by anticipating your grooming needs before reaching the crossing and properly feathering the drag's wheels down as the groomer transitions from the trail into the crossing.

Slide 55

**EFFECTIVE GROOMING TIP #7:
Pay Attention to the Basics**

- Don't simply drop the drag & forget it
- Operator must **constantly** respond & adjust to ever-changing trail and snow conditions

Example of over-grooming a smooth trail



Trails Work Consulting

Sometimes it's the simplest things that make the difference between good or poor trails. Therefore it's important that groomer operators pay close attention to some of the basics. Grooming requires constant attention to details and is not a matter of simply dropping the drag and forgetting about it. The operator must be constantly responding and adjusting groomer settings to ever-changing trail and snow conditions. Clearly this operator was not paying attention, which resulted in over-grooming a smooth trail.

Slide 56

**Stay to the Right & Reverse Directions
for Best Trail Quality**

- **ALWAYS** groom on the right side of the trail – **NEVER** groom against traffic on left side of trail
- **Reverse** the grooming **direction** the next pass to widen trail & improve processing




Trails Work Consulting

The groomer must ALWAYS be operated on the right side of the trail with the traffic flow versus NEVER against traffic on the left side of the trail. This is a safety issue as well as a factor that helps improve trail quality. The opposite side of the trail should then be groomed by reversing the grooming direction if possible the next grooming repetition (example: rotate between clockwise to counter-clockwise). This helps widen the trail but more importantly provides bi-directional processing of the snow in the middle of the trail, which receives the highest wear and tear from snowmobile traffic.

Slide 57

Constantly Watch Behind

- Pay attention to what's in the rearview mirrors – even though it may be difficult to see in the dark or through snow dust
- You may have to spend up to 75% of your time monitoring the product behind the tractor




Tails Work Consulting

The real 'grooming' work occurs behind the grooming tractor where either a drag or tiller processes and re-lays the finished trail surface. The operator must constantly watch behind the groomer to monitor how snow is processing and what the finished product looks like. Even though it may be difficult to see in the dark, through snow dust, or from the cab of some groomer models – it's imperative that the vast majority of attention is paid to what's going on behind the tractor (while at the same time ensuring that the groomer stays on the trail and avoids obstacles along the trail ahead of it...)

Slide 58

Take the Time to Do It Right



- Regulate tractor speed & cutting depth of implement according to trail conditions & grooming needs
- If there is a particularly rough area & a place to turn around – groom the trail a second time (or it will likely be even rougher the next time you return)

Tails Work Consulting

Anticipating your needs also involves 'taking the time to do it right' the first time. If there is a particularly rough section of trail that you know is a problem spot – if you have a safe place to turn the groomer around – consider grooming the trail a second time or it will likely be even rougher the next time you return. This also means regulating the tractor speed and cutting depth of the drag or tiller according to trail conditions and grooming needs. If the trail is generally smooth you can get by with a little more ground speed – but if the trail is rough or drifted, you'd better slow it down to give the equipment time to properly work the trail.

Slide 59

Pull Snow to Middle of Trail

- Often a lack of snow in middle of trail = where most sled traffic is at
- Outside 2 or 3 feet of a trail will often be softer than middle of trail due to compaction by sleds in the middle
- Use front blade to pull snow in from outer edge
- Operate drag on outer edge of trail



Trails Work Consulting

Taking the time to do it right also involves knowing where to best focus grooming efforts while anticipating exactly what you need to be doing. Heavily used trails often have a lack of snow in the middle of the trail because that's where most sled traffic is at due to two-way use and the tendency for many riders to ride more toward the middle than the outside edge. This results in the middle of the trail often being dished out and harder – but which also means there is likely to be 2 to 3 feet of trail on the outside edge where the snow is deeper and softer. Use the front blade to help pull some of this softer snow from the outer trail edge while also operating the drag's outer edge on the outside edge of the trail. But make sure you know exactly where the outside edge of the trail is at versus guessing by where the sled tracks are at (which is almost always wider than where the actual groomed edge is at).

Slide 60

Protect Your Base on Smooth Trails

- If only minimal moguls, don't set drag too low since it unnecessarily processes into the hard base
- Tractor's tracks still churn up the surface of smooth trail
- Skim with only rear blades, which protects & helps increase the trail's base



Trails Work Consulting


Being adaptive requires that the operator adjust from 'heavy grooming' to much less aggressive operation as trail conditions change from rough to less rough or smooth. If there are no or only minimal moguls, don't set the drag blades too low since it unnecessarily processes into the hard base. Understand that on smooth hardened trails, the tractor's tracks will churn up the trail surface – requiring some minimal grooming to help restore the disturbed surface. Skim with only the rear drag blades engaged – which helps protect the

hard base while also helping to increase the depth of the trail base (since any time there is snow in a multi-blade drag, the trail base will be increased).

Slide 61

Remove Backup Piles

- Backing up a groomer on the trail can leave tire ruts or a 'back-up' pile of snow on the trail. This could be a safety hazard, so should be removed
- Always re-groom the trail immediately or remove/repair the damage with a shovel



Trails Work Consulting

Whenever a groomer is backed up on a trail it can potentially create a 'back-up pile' or tire ruts that must be removed to prevent creating a potential safety hazard to snowmobile riders. The operator must either re-groom that section of trail immediately or get out of the tractor and shovel the pile of snow off the trail before proceeding.

Slide 62

Don't Leave Holes in the Trail

- Holes in the trail caused by being stuck, drag malfunction or operator error can be a hazard & cause poor trail quality
- Always remove them (shovel or re-groom)




Trails Work Consulting

Holes left in the trail from being stuck, drag or tiller malfunction, and/or operator error can become a hazard for riders, as well as create uneven trail density that ultimately produces a lessened trail quality. If left unfilled the ruts, depressions or holes will be a void in the compacted trail base and subsequently remain a less dense void in the trail after subsequent grooming repetitions. Holes should always be removed by the operator – either by re-grooming the segment or getting out and shoveling/packing them in.

Slide 63

Remove Debris from the Trail

- Debris & rocks on or in the trail can be a hazard
- They can also attract heat from sunlight, having an unwelcome thawing effect on the trail base
- Always remove rocks & debris from the trail bed, & fill any holes left to help restore uniform trail compaction




Trails Work Consulting

Rocks and debris like tree branches often end up on or in the groomed trail bed. While they can potentially be a hazard to riders, they also attract heat which can have an unwelcome thawing effect on the compacted snow base around buried debris. Operators should always stop and remove rocks and debris from the trail. Any holes left from rock or debris removal should be refilled and compacted to help ensure uniform trail compaction.

Slide 64

Think Visibility

- Always operate grooming tractors with their warning beacon/strobe & lights **"ON"** at all times – day or night
- Always display a **SMV** sign at rear of unit




Trails Work Consulting

Whether operating during the day or at night – groomers need to be as visible as possible to potential snowmobile riders on the trail. Grooming tractors should always be operated with their warning beacon / strobe, as well as front at rear lights, 'ON' at all times. The rear of the implement should also display a 'slow moving vehicle' (SMV) sign.

Slide 65

If Stuck – DO NOT Spin the Tracks

- Always let off the throttle as soon as you feel spin / getting stuck
- **Proceed with caution!**
- **Remember:** a groomer is rarely stuck in a level position unless it spun out while climbing a hard packed, icy hill; in this case, raise the implement & back down the hill



Trails Work Consulting

Getting stuck when grooming is frequently caused by operator inattention. If you feel the groomer start to spin out or fall off the compacted trail base – let off the throttle immediately to try to prevent getting stuck or more stuck. Whatever you do – DO NOT spin the tracks in an attempt to 'power through' since this is rarely successful, can damage the equipment, and most often makes the situation worse. Once stopped – proceed with caution. Remember that a groomer is rarely stuck in a level position – unless it has spun out while


climbing a hard packed, icy hill. In this case, raise the implement (drag or tiller) and carefully try to back down the hill. If this is successful – you'll likely have a back-up pile to deal with – but removing the pile will be much easier than getting unstuck.

Slide 66

If Stuck – DO NOT Spin

More often than not: the tractor will be tilted to the right / outside edge of trail because it fell off the compacted base

1. **Unhook the drag**
2. **Get the tractor level**
 - It's likely high-centered
 - = **get the shovel out!**
3. **GENTLY** rock back & forth to help pack snow




Trails Work Consulting

More often than not, a 'stuck' groomer will be tilted to the right / outside edge of the trail because it fell off the compacted trail base. (1) it's usually best to unhook the drag from the tractor sooner versus later since it will make the tractor more maneuverable; (2) get the tractor level – it'll likely be high-centered, so get the shovel out! (3) once the tractor is more level, try to GENTLY rock back and forth – which will help begin packing snow beneath the tracks. But DO NOT spin the tracks because that will just quickly high-center the groomer again.

Slide 67

If Stuck – DO NOT Spin

- Whether stuck in snow, mud or ice – proceed with caution & don't spin the tracks to prevent equipment damage
- If gently rocking the tractor doesn't work, you'll have to: shovel some more, let the snow setup, winch, or call for assistance



Tails Work Consulting

Whether you're stuck in the snow, in mud or ice – proceed with extreme caution and DO NOT spin the tracks or you'll likely damage the equipment (even more). If gently rocking the tractor doesn't work, your choices are going to be (1) shovel some more, (2) perhaps wait for the snow beneath the tracks to set (firm) up a bit, (3) trying winching if you have one along with a suitable anchor point, or (4) call for assistance. When you're at this point, you've not only thrown the grooming schedule way off track but have also caused a huge expense / commitment of resources for the grooming program. The moral of the story is: pay attention to the trail and conditions – and slow down – to help prevent becoming stuck!

Slide 68

**EFFECTIVE GROOMING TIP #8:
Don't Over Use the Front Blade**

- Preserve snow on the trail = DON'T DOZE IT OFF!
- A smooth trail doesn't require the use of the front blade – at all!
- Front blade is best used *only* to level drifts or to pull new snow into the trail. Snow is then best processed, compressed, & leveled by the drag



Tails Work Consulting

Many groomer operators overuse the front blade on the groomer, which often does more harm than good. The goal should be to preserve as much snow as possible on the trail to help improve trail conditions and extend riding opportunities – so don't doze it off like what's being done in this photo. A smooth trail doesn't require the use of the front blade – at all – so keep it up off the snow. The best use of the blade while going down the trail (versus when working road or creek crossings) is for leveling drifts or pulling new snow into the trail. Snow is best processed, compressed and leveled by the drag. Keep as much snow as possible on the trail.

Slide 69

DO NOT Continually Raise & Lower Blade

- Don't think you will 'groom' with it by having it down full time = will result in uneven trail surface
- Use TILT adjustment instead of UP/DOWN




Trails Work Consulting

If you're using a blade while grooming, don't be continually raising and lowering it since this can create an uneven trail surface due to the tractor's track's also raising and lowering when following the blade cuts upward or downward. It is much better to use the 'tilt' adjustment rather than the 'up/down' adjustment.

Slide 70

Working Snow with the Front Blade

- Use caution whenever bringing snow into trail with outside edge of front blade in tilt or curl position
- Snow should be rolling in front of the blade (yellow arrow) for the best 'processing' versus just plowing a huge pile ahead of blade



Trails Work Consulting

The front blade can be a great tool for helping pull snow into the trail from the outside trail edge. This is best accomplished by dipping into the outside edge by tilting or curling the blade rather than by raising and lowering the blade. However extreme caution should always be exercised when working snow on the outside edge when the blade is in the tilt or curl position to avoid equipment damage or operator injury from colliding with hidden objects. Slow down for better effectiveness and operator safety.

The snow in the front blade is most effective for the grooming process when the snow 'rolls' ahead of the blade versus accumulating a huge pile that is pushed ahead of the blade. See video in the next slide for example.

Slide 71

Use Front Blade Properly – Video

- **IT IS NOT A BULLDOZER!**
- Keep the blade low, not high, when grooming for better use & safety
- 'Roll' the snow when dozing while grooming (see video)



Tails Work Consulting

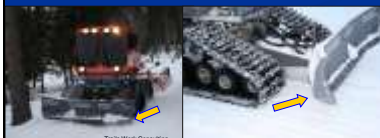
A groomer's front blade is not a bulldozer – regardless of the make/model of the tractor – so it must always be used properly. When in use while grooming (traveling down the trail), it is best to keep the blade low rather than having it high in the air. When the blade is low, it also serves somewhat like a cow-catcher which would deflect on-coming snowmobiles rather than having them go underneath the groomer in the event of a head-on collision with the groomer.

The video clip shows how snow should be 'rolling' ahead in the front blade rather than building up and balling up while grooming. This is similar to the churning action desired within a drag to help process snow.

Slide 72

Blade Use at Grooming Speed with Drag

- Run with bottom of front blade set **4 to 6 inches above** bottom of tracks – not at ground level & not up high
- Watch **behind** blade to monitor its height (yellow arrow)
- This allows for day-lighting drifts, keeps blade safe from hitting buried hazards & keeps it close if needed



Tails Work Consulting


When using the front blade at grooming speed, it is best to run with the bottom of the blade about 4" to 6" above the bottom of the tracks (shown by yellow arrow) – not up high or right at ground level. This allows for daylighting drifts and keeps the blade safe from buried hazards – while keeping it close for when it's really needed.

When grooming, watch **behind** the front blade (shown by the yellow arrow) to monitor its height in relation to the bottom of the tracks. Compare the outside edges to monitor whether the blade is level or engaged into the trail in a tilted position.

Slide 73

Always Use Caution & Beware of Hazards When Using the Front Blade

- Watch for rocks, trees & stumps since hitting them can put a great deal of stress on the equipment
- If the blade or tracks hit something, let go of the steering momentarily; this can reduce stress on critical parts by allowing some give in the steering system



Teals Work Consulting

As much as the front blade can be a useful tool for grooming, it can also result in significant equipment damage and potentially injury to the operator if extreme caution is not used. Always be careful of obstacles and hidden hazards along the trail. Keep the blade up off the trail a few inches when not actively engaged in dozing to help prevent this. Be careful to avoid rocks, trees and stumps which could stress or damage the groomer during a collision.

If the blade or tracks do hit something, letting go of the steering momentarily can sometimes help reduce stress on critical parts by allowing a degree of 'give' in the steering system.

Slide 74

Take Multiple Cuts When Snow's Deep

- When working deep snow or large drifts – take multiple cuts to be most effective & to reduce stress on equipment – rather than trying to cut / remove everything in one pass



Teals Work Consulting

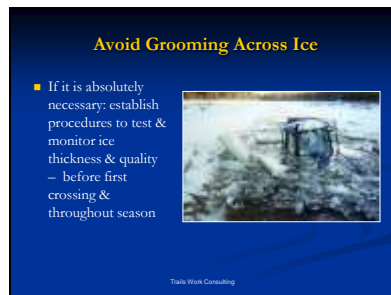
It is best to make multiple cuts when working deep snow or large drifts with the front blade. Removing and processing the snow in layers helps improve trail quality as well as reduce stress on the groomer (particularly when pulling a heavy drag while also trying to doze heavy snow). Subsequent passes will eventually allow the trail to be sufficiently flattened and widened.

Slide 75



It is critical that groomer operators know their trail and stay on it at all times. Trail grooming is constructing and compacting a snow road for the groomer to safely operate on for the balance of the season. When the groomer gets off the compacted trail base while pulling a drag or carrying a tiller, disaster can quickly happen. Whether stuck or sunk, the minimum result is lost grooming time. In worse cases getting off the trail can lead to expensive repairs or even injury or death. The groomer must stay on the compacted trail route absolutely 100% of the time to avoid potentially dangerous and disastrous situations.

Slide 76



Groomed snowmobile trails should generally try to avoid ice crossings. When it's absolutely necessary, procedures should be established – and followed – to test and monitor ice thickness and quality before the first crossing and regularly throughout the grooming season.



- Following tracks will get you in trouble quickly since riders cut corners & 'widen' the trail
- Risk hitting rocks, stumps, culverts, road back-slopes; or dropping into holes & unpacked areas

Following snowmobile tracks can quickly lead a groomer operator into trouble since snowmobilers cut corners, 'widen' the actual trail, and also ride completely off-trail cross-country in some areas. When the groomer is operated off the designated groomed trail route, there is an extreme risk of hitting rocks, stumps, culverts, or road back-slopes with the equipment – as well as potential to drop the groomer into holes and uncompacted areas where it will become stuck.

The left photo shows a groomed trail through an open area: while there appears to be a wide path where snowmobiles have ridden, the blue 'yes' arrow on the left shows where the actual groomed trail route is located (next to the stake line visible at the left edge) whereas the red 'no' arrow shows a large amount of snowmobile traffic that is totally off the trail in uncompacted snow – where the groomer could become stuck or hit large rocks.

The right photo shows a groomed trail located on a wide gravel roadway: while there has been a substantial amount of snowmobile traffic on the right half of the photo around the 'no' arrow – this is actually in the road's borrow ditch where there are rocks, stumps and the back-slope embankment – and the road bed for the groomed trail is actually only on the far left of the photo where the blue 'yes' arrow is located. In both cases the groomer operator must know the trail well enough to stay on the designated, compacted trail route

to avoid being led astray by sled tracks.

Slide 78






Slide 79

ACKNOWLEDGEMENTS & DISCLAIMER


This grooming education program was developed by Trails Work Consulting for the American Council of Snowmobile Associations (ACSA) to enhance snowmobile trail safety and access education. Funding was provided by the Recreational Trails Program (RTP) administered by the U.S. Department of Transportation – Federal Highway Administration (FHWA). It supplements previous groomer training materials developed by ACSA and the International Association of Snowmobile Administrators (IASA).

The sole purpose of this report is educational only. The authors, contributors, FHWA, Trails Work Consulting, ACSA and its members accept no liability resulting from the compliance or noncompliance with the findings or recommendations given herein, or for the accuracy or completeness of information contained herein.



Slide 80

NOTICE



This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of information contained in this document.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of this document.


The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official policy of the U.S. Department of Transportation.

This report does not constitute a standard, specification, or regulation.

Slide 81

Provided by: American Council of Snowmobile Associations
(ACSA)
271 Woodland Pass, Suite 216, East Lansing, MI 48823 (517) 351-4362
www.snowmobilers.org and www.snowmobileinfo.org

Copyright © 2015 Owned by the American Council of Snowmobile Associations
All Rights Reserved.
*Information may be reproduced and used for training without permission
by not-for-profit organizations and public agencies
for recreational trail safety or access education purposes.*



Project Manager and Author: Kim Raap – Trails Work Consulting
3400 S. Florence Ave., Sioux Falls, SD 57103 (605) 371-9799 Trailswork@twc.com