



1 Day Winter Safe

The Team O'Neil Mission is:  
To provide a safe and realistic environment for students of all abilities to develop a high level of driving (driver) performance and automotive awareness through world-class instruction, teamwork, and development of state-of-the-art technology.

## Disclaimer

The material contained herein is a compilation of recent information obtained from a number of sources. It was prepared with the best information available; however, racing is a dangerous sport and can result in injury or even death. No responsibility can be taken by anyone associated with this course, or Team O'Neil, for injury or loss sustained as a result of or in spite of the information provided at this school or herein. The information provided herein is by no means an exhaustive compendium of all the information that exists about rally racing. It is up to the individual participant to find as much information as is necessary to make an informed decision about his or her own personal safety. In plain language, no one associated with this rally school or the information herein, can be held responsible for the consequences of decisions you may make as a result of any information presented at this school or herein.

# **INTRODUCTION**

**We are happy that you have chosen to spend some time at Team O'Neil Rally School. Whether you are here to improve your driving skills for public roadways or an aspiring Rally contender, your attitude WILL change, your responses WILL improve, and your confidence WILL grow while behind the wheel, and you WILL have fun! (Well, we always do!)**

**Over the years the automotive industry has improved vehicle handling, performance, maneuverability, and safety features on all cars. We go faster, smoother, with more comfort as we travel towards our destinations, yet most of us haven't had the chance to develop correct responses to keep ourselves safe in adverse situations. You may have logged thousands of miles behind the wheel, so this is your chance to add more experience to those miles.**

**Our lectures, exercises, and skill building sessions are specially designed to teach you about vehicle dynamics, weight transfer, skids, and you will gain confidence as you handle your vehicle on our low friction course surface of either gravel, clay, snow or ice.**

**Whether you are a rallyist who wants to learn how to get your car through a turn as quickly as possible or someone whose goal is accident avoidance, we're here for you.**

**Team O'Neil Rally School offers you a chance to learn some skills you can't live without, and practice some techniques you never thought possible!**

**So let's get going!**

## **GOALS**

### **Discuss, demonstrate and practice safe winter driving techniques**

Today is designed to improve your existing skills and to give you a chance to develop and practice correct responses in a safe environment. This is the basis and foundation for all other advanced driving techniques.

1. Understanding weight transfer
2. Exposure to the 5 basic types of skids
3. Using throttle to transfer weight to steer the vehicle
4. Emergency/accident avoidance techniques
5. Vehicle preparation for winter driving

Application: Skid pad - Understeer and Oversteer Skids, and what causes them  
Braking Area– Threshold Braking and Avoidance  
Slalom– Slower speed weight transfer

# **TEAM O'NEIL PRINCIPLES**

**1) STAY ON THE ROAD**

**2) KNOW YOUR VEHICLE/EQUIPMENT**

**3) KNOW THE LIMITS  
YOURS  
VEHICLES  
ROADS**

**4) DRIVE WITHOUT EMOTION**

# **I. Accident Avoidance**

## **Why do we have accidents?**

- A. Incorrect hand and seating positions
- B. Distractions and eyes
- C. "Too Much Speed for Conditions"  
Ways of determining conditions
- D. Improper vehicle preparation
- E. "One Maneuver at a Time"
- F. Judgment vs. Skills  
Driving attitude  
Skills can be taught...judgment cannot

# **II. Skid Control**

- A. Weight Transfer/ Maintaining Grip
- B. The 5 Types of Skids

## WEIGHT TRANSFER

All the weight of your vehicle is supported by the tires - just 4 contact patches to grip the road. Every time you brake, corner, or accelerate, the weight transfers and changes the amount of load on the tires. This weight transfer affects the amount of **grip** each tire can generate.



**Deceleration, Braking,  
and cornering**



**Acceleration, Releasing the  
brake, and unwinding the wheel**

**The behavior of your  
vehicle is effected any  
time you change from a  
neutral state...when you  
decelerate, braking  
change direction,  
or  
accelerate!**



# Most Common Driving Mistakes

Driving with Emotion  
Driving While Distracted  
Lifting  
Turning  
Late CS  
Not looking up  
Target Fixation  
Braking too late  
Not braking enough  
Braking too long  
Late accelerators  
Turn in too late  
Turn back too late  
Starting maneuver too late at junctions  
Accelerate on understeer  
Wheel spin understeer  
Brake Jabbing

<b>Type of Skid</b>	<b>Effect</b>	<b>Cause</b>	<b>Solution</b>
<b>Wheel Spin</b>	Tires spin/ Have lost grip	Too Much Acceleration	Lift off accelerator OR Left Foot Brake
<b>Wheel Lock up</b>	Tires stop turning/ Have lost grip	Braking Too Hard  Shift lock	Release brake
<b>Understeer</b>	Front Tires have lost grip  Car does not turn	Too much speed for the conditions Doing more than one maneuver at a time  Too much steering angle too quickly  Too much acceleration weight transfer to rear wheel spin on FWD	Decelerate to transfer weight onto the front  Unwind the steering wheel until you feel the tires grip then return steering input  Lift off the Brake
<b>Oversteer</b>	Rear tires have lost grip  Rear end is sliding around to the front	Too much speed for the conditions  Doing more than one maneuver at a time  Sudden deceleration or braking while turning—too much weight transfer to the front  Wheel spin on a RWD	Steer in the direction you want to travel  Gently accelerate to transfer weight to the rear, providing no wheel spin on a RWD  Steer back to the center as soon as the vehicle starts to straighten out  Gently decelerate back to normal
<b>Counter Skid</b>	Rear tires have lost grip and rear end is fish tailing	Overcompensating for an oversteer  Too much steering and acceleration input  Poor timing and anticipation with steering and throttle during oversteer recovery	Be quicker to steer and accelerate on an oversteer skid  Anticipate how much to steer back beyond center once the tires have regained grip  Lift off the accelerator once the rear tires have regained grip Practice oversteer in a safe place

# FIVE TYPES OF SKIDS

## 1) WHEEL SPIN

<b>Effect</b>	<b>Cause</b>	<b>Solution</b>
Tires spin/ Have lost grip	Too Much Acceleration	Lift off accelerator Or Left Foot Brake

# FIVE TYPES OF SKIDS

## (CONTINUED)

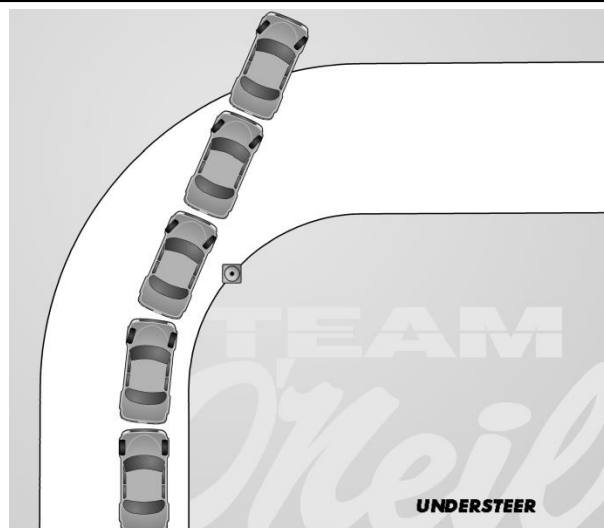
### 2) WHEEL LOCK UP

<b>Effect</b>	<b>Cause</b>	<b>Solution</b>
Tires stop turning/ Have lost grip	Braking Too Hard	Release brake gently

# FIVE TYPES OF SKIDS (CONTINUED)

## 3) UNDERSTEER

Effect	Cause	Solution
<p>Front Tires have lost grip</p> <p>Vehicle wants to go straight ahead/ does not turn</p>	<p>Too much speed for the conditions –</p> <ul style="list-style-type: none"> <li>* Excessive speed while entering a corner</li> <li>* Excessive braking</li> <li>* Excessive acceleration</li> </ul> <p>Doing more than one maneuver at a time</p> <p>Too much steering angle too quickly</p> <p>Too much acceleration-</p> <ul style="list-style-type: none"> <li>* weight transfer to rear</li> <li>* wheel spin on FWD</li> </ul>	<p>Decelerate to transfer weight onto the front</p> <p>Lift off the Brake</p> <p>Unwind the steering wheel until you feel the tires grip then return steering input</p>

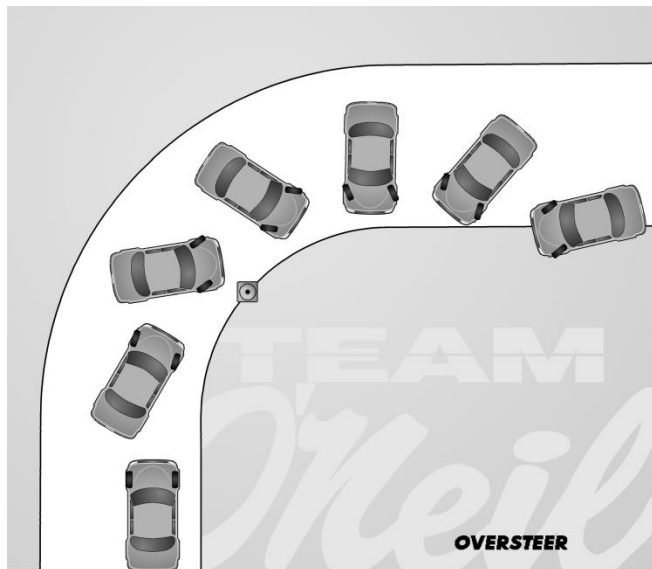


# FIVE TYPES OF SKIDS

## (CONTINUED)

### 4) OVERSTEER

Effect	Cause	Solution
<p>Rear tires have lost grip</p> <p>Rear end is sliding around to the front/wants to spin</p>	<p>Too much speed for the conditions</p> <p>Doing more than one maneuver at a time</p> <p>Sudden deceleration or braking while turning—too much weight transfer to the front - deceleration while entering a curve</p> <p>Wheel spin on a RWD</p>	<p>Steer in the direction you want to travel</p> <p>Gently accelerate to transfer weight to the rear, providing no wheel spin on a RWD</p> <p>Steer back to the center as soon as the vehicle starts to straighten out</p> <p>Gently decelerate back to normal</p>

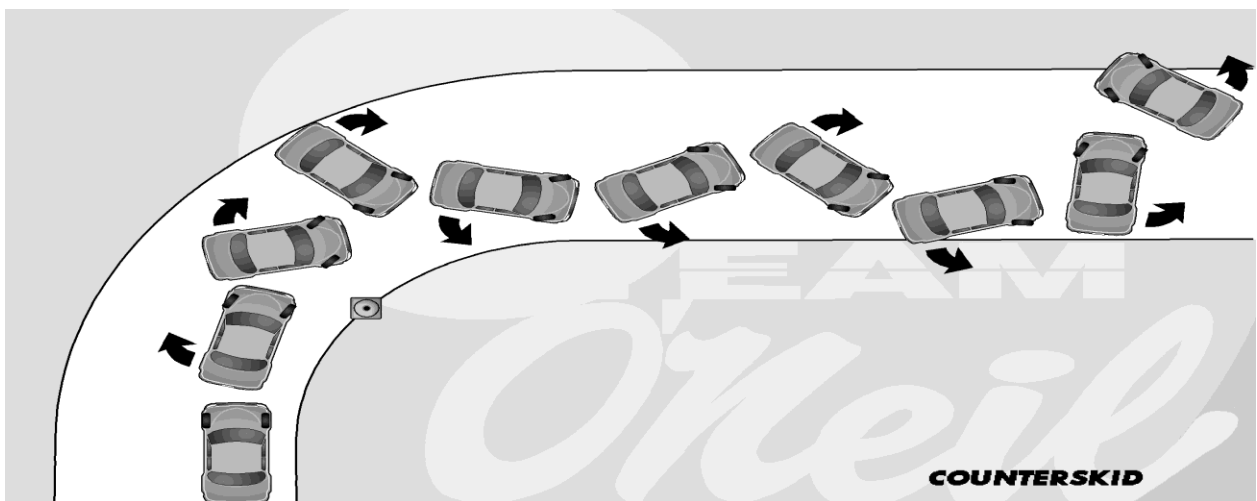


Oversteer can also lead to a counter-skid (next page)

# FIVE TYPES OF SKIDS (CONTINUED)

## 5) COUNTERSKID

Effect	Cause	Solution
<p>Rear tires have lost grip and rear end is fish tailing (swinging back and forth)</p>	<p>Overcompensating for an oversteer</p> <p>Too much steering and acceleration input</p> <p>Poor timing and anticipation with steering and throttle during oversteer recovery</p> <p>rebound action of the suspension and overzealous steering input. Beginning with oversteer,</p>	<p>Be quicker to steer and accelerate on an oversteer skid</p> <p>Anticipate how much to steer back beyond center once the tires have regained grip</p> <p>Lift off the accelerator once the rear tires have regained grip</p> <p>Practice oversteer in a safe place</p>



## TOTAL STOPPING DISTANCE

This chart was compiled by law enforcement training. It is a rule of thumb, there are many variables that can change the actual stopping distance. Note the distance traveled and reaction distance.

Speed in MPH	Distance Traveled in ft/sec	Distance Traveled During 1.5 sec perception/ reaction time	Braking Dist.	Total Stopping Dist.
20	29.32	43.98	17.78	61.8
25	36.65	54.98	27.78	82.8
30	43.98	65.97	40.00	106.0
35	51.31	76.97	54.44	131.4
40	58.64	87.96	71.11	159.1
45	65.97	98.96	90.00	189.0
50	73.30	109.95	111.11	221.1
55	80.63	120.95	134.44	255.4
60	87.96	131.94	160.00	291.9
65	95.29	142.94	187.78	330.7
70	102.62	153.93	217.78	371.7
75	109.95	164.93	250.00	414.9
80	117.28	175.92	284.44	460.4
85	124.61	186.92	321.11	508.0
90	131.94	197.91	360.00	557.9
95	139.27	208.91	401.11	610.0
100	146.60	219.90	444.44	664.3



**LOOK  
HERE**

**MOST IMPORTANT RULE:**  
*Always look for your exit point  
when you realize you can't stop*

**LOOK  
HERE**



*Stop before obstacle or slow to 5 mph.*



Never lock up wheels on pavement.  
Locking up wheels on loose  
surfaces can be helpful.

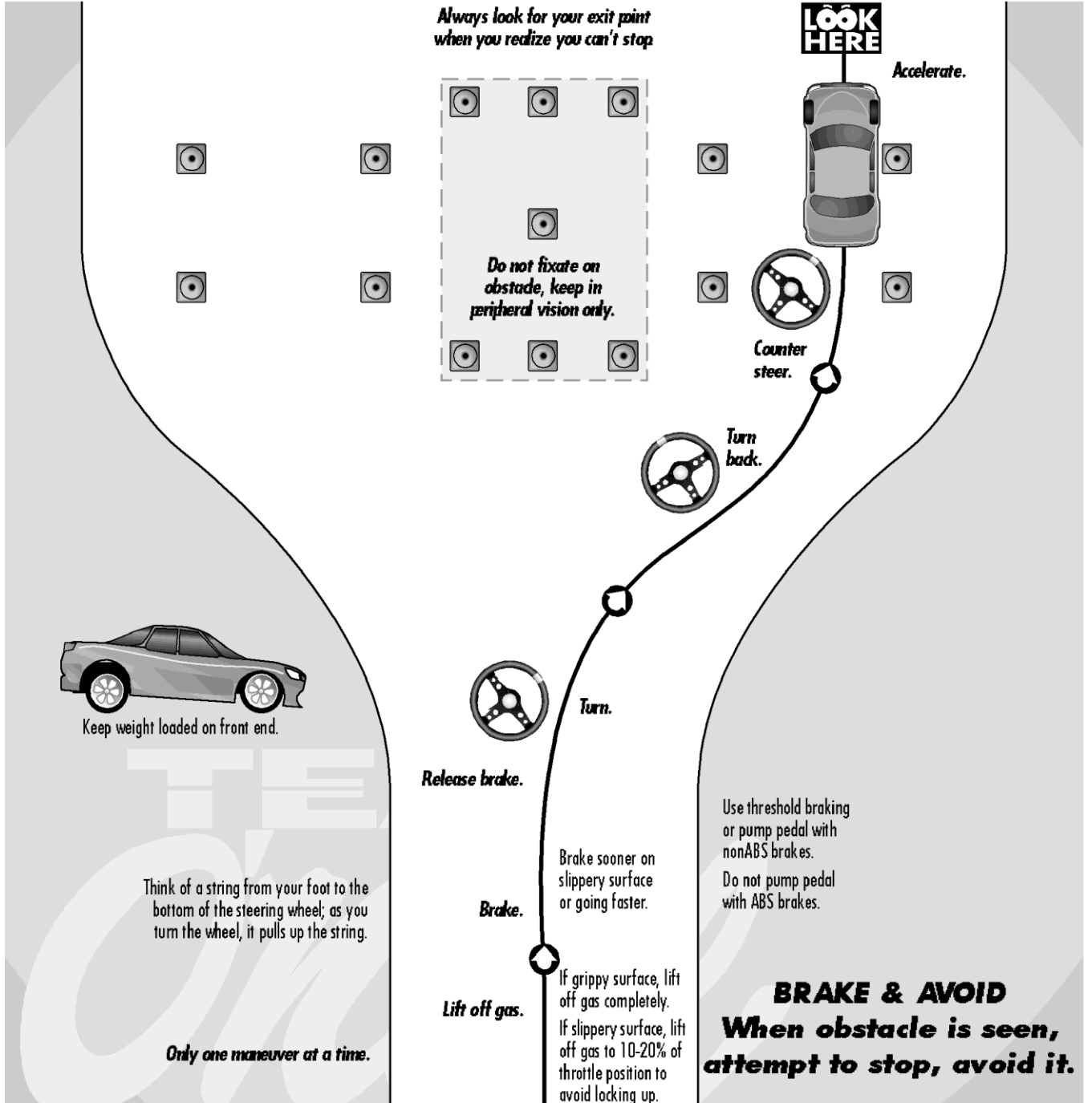
*Only one maneuver at a time.*

**Brake hard.**

**Lift off gas.**

Use threshold braking  
or pump pedal with  
nonABS brakes.  
Do not pump pedal  
with ABS brakes.

**EMERGENCY BRAKING /  
THRESHOLD BRAKING**  
**When obstacle is seen  
in time to stop.**



**MOST IMPORTANT RULE:**

*Always look for your exit point when you realize you can't stop*



**LOOK HERE**

*Accelerate.  
 Left-foot-brake if necessary.*



*Turn back.*



*Turn.*



*Lift off gas completely.*

*If you have time to brake, you must release brake when you turn.*

**LANE CHANGE**

**When obstacle is seen but no time to brake, pick a lane and avoid.**

*Only one maneuver at a time.*

## VEHICLE PREPARATION FOR WINTER DRIVING

Keep your vehicle in good technical repair. Have a trusted technician service your car.

Some considerations:

### Electrical System-

Battery: Good condition, secured, connections clean & tight.

Cold weather can dramatically affect the life of a battery.

Belts in good condition, proper tension

### Ignition System and Lights,-

Check to insure in good condition.

### Brakes-

Are they operating properly, equal braking on wheels.

### Exhaust-

Any leaks in the system, carbon monoxide

### Heating & Cooling System-

Radiator & Hoses any leaks? Sufficient antifreeze and rating

Insure Defroster Front and Rear is working properly.

### Wipers & Fluid-

In good repair and top off Fluid frequently

### Keep Fuel Tank Full-

In event of emergency, your only source of heat.

## TIRES

There are numerous tire manufactures that offer many different winter tires choices, offering a wide range of cost options.

Selecting a tire that is right for you may depend on what type of traveling you do. Do you only drive in winter months a short distance after the roads are clear? Or do you have to commute regardless of the weather? You should purchase the same tire type for all four wheels. Having snow tires on just the front wheels of a front wheel drive while just keeping all seasons to the rear can lead to an accident.

Check tire pressure regularly (cold check) and place at manufactures recommended rate. Pressure will drop 1 psi for every 9 deg. drop in temp. Check tire wear and rotate tires as needed (6000 miles).

Basic Tire choices:

All Season - provide little traction during winter months.

M + S Designated Tires - Step up from an all season rated tire, but still not specifically designed for winter driving conditions.

Studless Winter Tires - May have Mountain Snowflake symbol, special rubber compound(s) and tread design for winter travel. They often have rotation specific designs. Bridgestone, Nokian, and Hankook are some manufactures that have these season specific designs.

Studded Winter Tires - Know your states restrictions. These can provide better traction in snow and ice conditions, however stopping distances can actually increase on wet/dry pavement.

Innovative Tires - Tire companies have created innovative designs that incorporate the benefits of studded tire performance for traction without the road wear and noise concerns. Green Diamond, Toyo and Goodyear have tires with this design. Hard granules of varying materials are constructed into the tire compound which are exposed to the road surface even as the tire wears. In actual , on ice , testing some showed better performance than studded tires.

Tire Chains - Variety available, know the states restrictions to use. Some states have mandatory use for specific vehicles under specific conditions. [TireChains.com](http://TireChains.com) has a good array of chains to choose from.

## IN THE VEHICLE WINTER KIT

Again, consider the driving conditions that you expect to encounter. A little preparation could save your life. Any special medication you require should be with you. Do you have a cell phone? Charged? Under contacts I.C.E. do you have in case of emergency numbers for rescue personnel to call.

Consider having:

Safety Equipment

Emergency Cash

Shovel

Tow Strap

Scraper

Jumper Cables

Sand/Kitty Litter

Tire Chains/ Traction Assist Devices

Road map

Flashlight w/spare Batteries (check often cold will discharge)

Break Down Kit

Flares/Lights/Triangles

Extra Clothing, Blankets

1<sup>st</sup> Aid Kit

Non perishable Food & Water

De-icer Fluid & Fuel Treatment

Matches/Emergency Candles

Call Police or Bright Banner

Consider full size spare tire

## STUDED TIRE RESTRICTIONS BY STATE & PROVINCE

(Caution: States are constantly revising their restrictions, insure you check  
Current State/Local laws. Fines can be costly)

### STATES THAT PROHIBIT USE YEAR ROUND:

Alabama, Florida, Illinois, Louisiana, Maryland, Michigan, Minnesota, Mississippi, Texas, Wisconsin,  
Ontario

### STATES THAT HAVE NO RESTRICTIONS ON USE:

Colorado, Kentucky, New Hampshire, New Mexico, North Carolina, Vermont, Wyoming, Alberta, N.W.  
territories, Saskatchewan, Yukon territory

### STATES WITH PERMISSABLE DATES OF USE:

Alaska 30 Sep-15 Apr	Arizona 1 Oct-1 May	Arkansas 15 Nov-15 Apr
California 1 Nov-30 Apr	Connecticut 15 Nov- 30 Apr	Delaware 15 Oct-15 Apr
D.C. 15 Oct- 15 Apr	Idaho 1 Oct- 15 Apr	Indiana 1 Oct- 1 May
Iowa 1 Nov -1 Apr	Kansas 1 Nov- 15 Apr	Maine 1 Oct- 1 May
Mass. 2 Nov- 30 Apr	Missouri 1 Nov- 30 Mar	Montana 1 Oct- 31 May
Nebraska 1 Nov- 1 Apr	Nevada 1 Oct- 30 Apr	New Jersey 15 Nov- 1 Apr
New York 16 Oct- 30 Apr	N. Dakota 15 Oct-30 Apr	Ohio 1 Nov- 15 Apr
Oklahoma 1 Nov- 1 Apr	Oregon 1 Nov- 1 Apr	Penn. 1 Nov- 15 Apr
Rhode Island 15 Nov- 1 Apr	S. Carolina All yr, 1/16	S. Dakota 1 Oct- 30 Apr
Tenn. 1 Oct- 30 Apr	Utah 15 Oct- 31 Mar	Virginia 15 Oct- 15 Apr
Wash. 1 Nov- 1 Apr	W. Virginia 1 Nov- 15 Apr	B.C. 1 Oct- 30 Apr
Manitoba 1 Oct- Apr 30	New Brunswick 16 Oct- 30 Apr	Newfoundland 1 Nov- 30 Apr
Nova Scotia 15 Oct- 30 Apr	P.E.I. 1 Oct- 31 May	Quebec 1 Oct- 1 May
Georgia Permitted Only for Snow&Ice		