



**Department of
Environmental
Conservation**

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MANAGEMENT GUIDANCE

**CROSS COUNTRY SKI TRAIL DESIGN, CONSTRUCTION AND
MAINTENANCE
ON FOREST PRESERVE LANDS IN THE ADIRONDACK PARK**

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Contents

Overview	1
History of Skiing in the Adirondacks.....	1
Background Guidance for Cross Country Ski Trail Development	2
Adirondack Park State Land Master Plan (APSLMP)	2
Trail Construction and Maintenance Manual by NYSDEC Division of Operations.....	2
Unit Management Plan (UMP) – Trail Classification System.....	3
Cross Country Ski Trail Development Goal.....	3
Definitions.....	4
Types of Cross Country Ski Trails.....	4
Ski Touring Trail.....	4
Backcountry Ski Trail	5
Skintrack Ski Trail.....	5
Design, Construction and Maintenance of Cross Country Ski Trails.....	5
Trail Standards.....	5
Trail Guidelines.....	6
Ski Touring Trails and Backcountry Ski Trails.....	6
Skin Track Ski Trails.....	10
Enhancing Other Types of Trails for Cross Country Ski Use	10
Resources.....	12

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Overview

Providing trail users a recreational experience is an important part of trail planning. This document intends to provide guidance for the development of cross country ski trails to ensure a variety of recreational experiences while protecting the natural and cultural resources within the Adirondack Forest Preserve. This document only applies to the lands administered by the Division of Lands and Forests.

Advancements in skis, bindings, boots, poles and other equipment have opened up many variations of how cross country ski trails are used. This document recognizes the variety of types of cross country skiing and provides guidance for purpose-built cross country ski trails to satisfy different user's needs. Although cross country ski trails may be managed for specific purposes, they will simply be referred to as "ski trails" in this document.

History of Skiing in the Adirondacks

The Adirondacks have a rich history of skiing. Early ski trail development in the region started in the late 1920s and continued well into the 1930s. These trails were cut or improved by the Conservation Department and provided a spectrum of skiing opportunities including down-mountain skiing. With the rise of lift-serve ski centers, such as Whiteface and Gore Mountain, backcountry skiing became less popular and many backcountry ski trails disappeared. The Marcy Ski Trail, constructed in 1936, is one of the few remaining backcountry ski trails from this era.

Today, skiing on trails in less developed areas has seen a renaissance. Interest in skiing outside of ski resorts has greatly increased as the result of several influences, including: a greater variety of equipment, lighter equipment, different ski techniques and desires for a backcountry experience.

Existing trails within the Adirondack Forest Preserve provide over 1,000 miles of skiing opportunities. Some trails are more popular than others. Trails such as the Whiteface Landing Trail or the Marcy Trail will have ski tracks from the first snowfall to the last fleeting cold temperatures of spring. Looking to encourage use and provide a pleasurable trail experience, land managers should consider how trail design and layout impact use levels.

Background Guidance for Cross Country Ski Trail Development

The Forest Preserve Cross Country Ski Trail Development Guidelines are based on existing restrictions and guidance for Adirondack Forest Preserve trails. The following are the existing restrictions and guidance for Forest Preserve ski trails utilized in developing this document.

Adirondack Park State Land Master Plan (APSLMP)

The APSLMP defines improvements¹ including cross country ski trails. The definition of a cross country ski trail² describes the trail as having “the same dimensions and character and may also serve as a foot trail...” (emphasis added) Cross country ski trails are included in the list of permitted improvements conforming to Wilderness, Primitive, Canoe and Wild Forest guidelines. The APSLMP defines a foot trail as “*a marked and maintained path or way for foot travel located and designed to provide for reasonable access in a manner causing the least effect on the surrounding environment.*” (emphasis added) Cross country ski trails should be “located and designed” in essentially the same manner as foot trails and they are to have the same dimensions and character.

Trail Construction and Maintenance Manual by NYSDEC Division of Operations

The Trail Construction and Maintenance Manual by NYSDEC Division of Operations list the following dimensions for Cross-country (Nordic) ski trails:
Clearances:

Wilderness:
Width: 4'
Overhead: 10'

¹ **Improvement**--any change in or addition to land, which materially affects the existing use, condition or appearance of the land or any vegetation thereon, including but not limited to foot and horse trails, roads, jeep trails, state truck trails, snow-mobile trails, cross country ski trails, improved cross country ski trails, trail heads, picnic areas and individual primitive tent sites. (APSLMP)

² **Cross Country Ski Trail** -- a marked and maintained path or way for cross country ski or snowshoe travel, which has the same dimensions and character and may also serve as a foot trail, designed to provide reasonable access in a manner causing the least effect on the surrounding environment and not constructed, maintained or groomed with the use of motor vehicles. (APSLMP)

In contrast, an "Improved Cross Country Ski Trail" is defined as "a marked and maintained path for cross country ski use designed for competitive or intensive use conditions which may be constructed, maintained or groomed with the use of motor vehicles." These trails are only permitted in Intensive Use areas and may be maintained and groomed using motor vehicles. This guidance does not apply to improved cross country ski trails.

Wild Forest:
 Width: 8'
 Overhead: 10'
 Bridges:
 Width: 5 – 6'

Unit Management Plan (UMP) – Trail Classification System

The High Peaks Wilderness Unit Management Plan (1999) and other recently adopted UMPs use the following guidance for ski trail management:

Ski Trail – Focus on removal of obstructions, maintenance should be low profile, tread determined by clearing 6' (Should be slightly wider at turns and steep sections. Provide drainage using native materials to protect resource). (page 257)

Cross Country Ski Trail Development Goal

A trail's recreational value is one of the most important factors determining its potential level of use (State of Minnesota, Department of Natural Resources, 2007). Trails that have high recreational value are those that include:

- scenery;
- natural, open space;
- continuity;
- variety; and
- limited impediments (State of Minnesota, Department of Natural Resources, 2007).

Popular trails provide most of these elements. Many management options exist to facilitate skiing on existing trails. Not all trails, however, can be improved to increase their recreational value for skiing. Terrain constraints, user conflicts, or other limitations may prevent efforts to improve the recreational value of some trails. As has always been the case, skiing is allowed on all trails within the Forest Preserve whether they are designed and managed specifically for skiing, or not.

The goal of these guidelines is to provide specifications for cross country ski trail maintenance and construction that afford visitors a more desirable experience, facilitate an increase in use, and create sustainable trails. The guidelines provide management guidance to cross country ski trails, as defined in the APSLMP. The guidelines identify three classifications of cross country ski trails: Ski Touring Trails, Backcountry Ski Trails and Skin Tracks. Each of the following ski trail

classifications includes construction and maintenance standards. These specifications provide trail users consistent alignments, grades, features and challenges throughout a particular segment of trail.

The following guidelines apply to new ski trail construction and alteration of existing ski trails. These guidelines should also be utilized in identifying the classification of existing trails that are suitable for skiing. These guidelines provide management options to improve skiing opportunities in cases where a trail (other than a cross country ski trail) is suitable for skiing.

Definitions

The following definitions apply to cross country ski trails on the Forest Preserve:

“Loop trails”: a trail or series of connecting trails that result in the ability to return to the point of origination without backtracking on the trail.

“Radius”: distance to the center of the arc corresponding to the turn.

“Runout”: a flat area at the end of steep section of trail that provides skiers the opportunity to reduce speed.

Types of Cross Country Ski Trails

Ski Touring Trail

These types of trails provide skiers of all skill levels a wide range of opportunities in a setting that is not overly challenging. These trails limit obstacles to negotiate. Beginner skiing speeds are a distinguishing characteristic of the trail’s design. Gentle curves and mild slopes require a limited ability to control speed and navigate variable terrain.

Forward sight distances are not as critical on Ski Touring Trails as they are on Backcountry Ski Trails. Ski Touring Trails should not be designed with features where significant sight distances are critical (e.g. steep downhill runs). Significant sight distances are critical where the trail crosses other potential hazards that cannot be avoided such as roads, bridges other trails. In these cases, gentle approaches (less than 5 percent grade) with forward sight distances of at least 50 feet should be used.

Several existing trails exemplify this trail category, including: the Hays Brook Truck Trail (Debar Mt. Wild Forest) and the Old Farm Clearing Trail (Siamese Ponds Wilderness). They were not constructed and they are not currently managed utilizing this ski trail management guidance; however, they demonstrate the character of a Ski Touring Trail.

Backcountry Ski Trail

These types of trails provide skiers with an intermediate to advanced skill level in a setting that provides challenges and utilizes a variety of terrain. These trails should have limited obstacles to negotiate and fast cruiser sections. The trails should be designed with speeds and challenges associated with intermediate to advanced level skiing as a distinguishing characteristic. Curves and slopes on the trails require an ability to control speed and navigate variable terrain.

Backcountry ski trails include steep downhill runs, sharp turns, and other potential hazards. Forward sight distances are important to safely navigate these obstacles. Where possible, adequate forward sight distances should be provided.

Several existing trails exemplify this trail category, including: the Avalanche Lake Trail (HPW), and the Wright Peak Ski Trail (HPW). They were not constructed and they are not currently managed utilizing this ski trail management guidance, however they demonstrate the character of a Backcountry Ski Trail.

Skintrack Ski Trail

To access slides or other skiing opportunities, skintrack trails may be developed with a steady climb that enables skiers to gain elevation at a sustainable pace.

Design, Construction and Maintenance of Cross Country Ski Trails

Trail Standards

The following chart provides objective measures that apply to the design and construction of cross country ski trails on Forest Preserve lands and for carrying out maintenance activities on them.

Trail Standards			
	Ski Touring Trail	Backcountry Ski Trail	Skintrack
Trail Width	One-way traffic: 6 feet* Two-way traffic: 8 feet*	One-way traffic: 8 feet* Two-way traffic: 9 feet*	4 feet
Trail Height	12 feet	12 feet	10 feet
Turning Radius(In side)	Min. 30 feet	Min. 20 feet	N/A
Average Trail Grade	4-10% (2.3-5.7 degrees)	10-30% (5.7-16.7 degrees)	N/A
Maximum Trail Grade	20% (11.3 degrees)	40% (21.8 degrees)	N/A
Trail Outslope	Max. 10% (5.7 degrees)	Max. 20% (11.3 degrees)	N/A
Trail Sight Distances	At least 50 feet ³	At least 100 feet ⁴	N/A
*Trails may be up to 12 feet wide where the running grade exceeds 10%, excepting skintrack trails.			

Trail Guidelines

Ski Touring Trails and Backcountry Ski Trails

Trail Layout

Trail layout should consider loop trails. Linear trail layouts may also be utilized. Trail planning utilizing loop trails is advantageous for several reasons, including: facilitating access to multiple destinations rather than a single one; managing and encouraging access efficiently; providing greater opportunities for solitude; and helping the entire experience be a new experience for visitors.

Loops with a single access point are preferable.

Loop trails may be designed utilizing a “figure 9” layout to encourage travel in a preferred direction. Figure 9 trail loops should include an access trail that leads users directly into the loop, while users returning on the loop would meet the access trail at a right angle.

³ Where the trail crosses potential hazards such as roads, bridges other trails.

⁴ On steep downhill runs or where the trail crosses waterways, or other potential hazards.

Single direction traffic may be utilized. Managing traffic direction should utilize light-handed management approaches and applied where appropriate. Single direction trails may prevent potential collisions with uphill and downhill users, minimize concern skiers may have regarding collisions with other users, and provide for greater opportunities for solitude.

When selecting trail routes, favor north or northeast-facing slopes, or protected or leeward facing basins where snow settles and cover is generally greatest.

Newly constructed trails should be laid out to avoid rocky areas, wetlands, streams, and water bodies to the greatest possible extent.

Where possible, trail layout should utilize terrain to avoid extended fall lines.

Where possible, trail layout should avoid double fall lines.

Clearing Width

As ski trail surfaces should generally follow the existing contours of the natural forest floor and not be graded flat, trail clearing may have the greatest impact on a trail's dimensions and character. The extent of clearing should be limited to minimize effects on the surrounding environment and provide a high quality recreation experience. For example, wider widths may be necessary on steep up hills to allow skiers to herringbone up or on two-way traffic trails to provide skiers space to pass each other. However, wider widths are not necessary on trails with low average grades and minimal elevation changes or on one-way traffic trails where skiers do not need additional space to pass each other.

One-way and two-way traffic ski trails should be maintained to the widths identified in the trail standards chart above.

Clearing Height

All trails may be kept clear to a maximum height of 12 feet, as measured from ground level. In cases where snow pack requires additional clearing height, cutting beyond the maximum height may be performed after documentation of the need for additional clearing height by DEC staff.

Trail Surface

Trail surfaces should utilize the undisturbed, natural forest floor. Vegetative ground cover should be maintained to reduce erosion and assist with retaining snow cover.

Drainage - Drainage management should rely on grade reversals, rolling grade dips, and outslping. These features are to be used to allow water to drain in non-erosive sheet flows. Construction of water bars should be avoided; if they are constructed, they should not feature exposed rocks and have the lowest profile as possible while still being able to function properly.

Grading - Trail surfaces will generally follow the existing contours of the undisturbed, natural forest floor and not be graded flat. Limited leveling and grading may be undertaken where conditions restrict skiing. The need to excavate the ground surface within the trail is minimal as snow is the primary surface of the trail for skiing.

Woody Debris - Remove logs and other woody debris from the trail surface that may be an obstruction to use. Downed logs should be cleared beyond the trail's edge.

Rock Removal - Removal of boulders and rocks from trail surfaces should be minimized to the greatest extent possible. Any removal will be pursuant to an approved Work Plan.

Rock removal on trails should be primarily limited to uncommon, major obstacles that present demonstrable safety hazards to skiers and which cannot be avoided by appropriate trail layout or rerouting.

Boulders or rocks outside the cleared trail width should not be removed.

Alternatives to rock removal should be considered to minimize the need for disturbance of the ground, to reduce the likelihood of creating drainage problems and to reduce the potential need for fill. Such alternatives may include covering rocks with soil or debris or minor relocation of the trail where a boulder or rock may be too large or the number of rocks too great to deal with by any other method.

When rocks are used for tread development, there should be zero vertical presentation.

Side Slope Management - Trail surfaces should generally be the natural forest floor. Any elimination or reduction of side slopes by means of bench cuts should be accomplished primarily using hand tools. All bench cuts should be full bench cut that establish the desired tread width with the soil removed from the backslope. The maximum amount of cut, measured vertically, should be 20% of the tread width.

Tree Cutting

Cutting of overstory trees should be avoided in order to maintain a closed canopy wherever possible.

Cutting trees to create new trails, expand a trail from its current width or otherwise improve a trail will be carried out pursuant to LF-91-2 Tree Cutting Policy and an approved Work Plan.

No trees, except trees that present an immediate hazard to the safe use of the trail because of structural problems or fallen/tipped conditions will be cut outside the cleared trail width.

Trees should be felled away from the trail, if possible, to minimize the amount of material that needs to be moved. Felled trees should be delimbed and cut to lie flat on the ground. Material cut out of the trail width should be dispersed off trail and not piled along the sides of the trail. If tree trunks are used to help delineate the trail, the cut ends of the trunks should be located well outside the intended edge of the trail for safety reasons.

Woody vegetation on the trail surface should be cut flush with the ground. Root masses should be left in place.

No brushing may occur outside the cleared trail width of any trail. Pruning is allowed for branches that extend into the trail.

Runouts on downhill sections

Trail layout should include runouts after steep downhill sections of trail to provide an opportunity for skiers to regain control and lose speed. Runouts should be part of the trail design, not a separate feature (i.e. a separate skiing opportunity diverging from the trail). Runouts may include a trail perpendicular to the slope and/or grade reversals. As a trail's grade increases, the runout length and turning radius should increase.

Wetlands

Trail development activities within or involving freshwater wetlands in the Adirondacks are subject to review by the Adirondack Park Agency and potentially the Army Corps of Engineers. Any proposed trail development activity located within 100 feet of a wetland shall be reviewed by the appropriate agencies to determine whether a permit is required prior to undertaking the project. In all cases, potential wetland impacts shall be avoided to the greatest extent possible.

Water Crossings

Bridges and boardwalks should be utilized at water crossings to prevent exposure to water and ice buildup on the bottom of skis. Approaches to water crossings should allow skiers to reduce speed or stop prior to crossings. Trails should not cross frozen lakes or streams.

Bridges

To ensure longevity and a safe crossing, bridges must be located above the ordinary high water mark.

Bridge decking should have narrow gaps, or no gaps, between boards to allow for snow accumulation and compaction. Bridge decking should include a toe rail or curb rail to assist with snow accumulation.

Maximum Width: 8 feet. This is a maximum dimension and reflects the maximum clearing width of two-way traffic trails. Bridges on single direction trails should be no wider than 6 feet. Bridge width should be evaluated by considering the following: safety, conduciveness to use, the impact of the development on the wild character of the area, and impacts to natural resources (e.g. wetlands).

Compatible Uses

Winter: None—Restricted to skiers only.

Summer: None—Restricted to skiers only. These trails should be restricted to winter use to minimize the need for erosion control associated with summer time use that can accelerate erosion. Trail tread should remain vegetated and limit the need for erosion management structures.

Skin Track Ski Trails

Switch backs should be developed where features, like tops of rocks and buried stumps, create benches and flat terrain, exist. The width of vegetative clearing for skin tracks should be limited to 4 feet. Direction of travel should be one way—uphill.

Enhancing Other Types of Trails for Cross Country Ski Use

Skiers utilize many trails although some trails are often not designed, built, or maintained primarily for skiing. Trails designed primarily for other uses (e.g.

snowmobiling, hiking or horseback riding) often include structures that present undesirable challenges for skiing. For example, water management features on hiking trails, such as rock waterbars, present obstacles that require careful navigation by skiers. To enhance existing facilities for skiing, the needs of skiers must be considered. Although there are many options for making existing trails more conducive for skiing, not every trail should be managed for this use. The following provides assistance to manager's making a decision to prepare an existing trail for skiing or not.

Before enhancing an existing trail for skiing, the area's manager should evaluate the trails appropriateness by utilizing the following criteria:

- Will actions to enhance the skiing opportunity increase the likelihood of impacts associated with other uses (e.g. erosion, widening and braiding)?
- Will existing types of use and levels of use pose a safety concern for skiers (e.g. a heavily used community connector snowmobile trail)?
- Is parking and access available during the winter?
- Would accommodating skiers impact access for current users (e.g. a trail popular with snowshoers, hikers may not be a suitable location to expand use for skiers due to possible user conflicts)?

Plans to manage trails for skiing should be listed within a Unit Management Plan (UMP) or UMP amendment. A UMP or UMP amendment is not necessary to manage an existing trail for skiing.

Resources

British Columbia State Park Trail Design & Construction Standards Manual. Retrieved from <http://www.trailstobuild.com/Articles/BC%20Trail%20Standards/contents.htm>

Cross Country Ski Trail Design. (2001). Retrieved from http://www.prm.nau.edu/prm423/xc_ski_trail_design.htm

Parker, Troy Scott. *Natural Surface Trails by Design: Physical and Human Design Essentials of Sustainable, Enjoyable Trails*. Boulder, CO: Natureshape, 2004. Print.

State of Minnesota, Department of Natural Resources, 2007. "Trail Planning, Design, and Development Guidelines." Trails & Waterways Division, 500 Lafayette Road, St. Paul MN 55155-4052. 306 pages

Grade Conversion Chart	
Slope (degrees)	% Grade
0.57	1
3	5.24
5.74	10
9	15.8
12	21.3
14	24.9
17	30.6
19	34.4