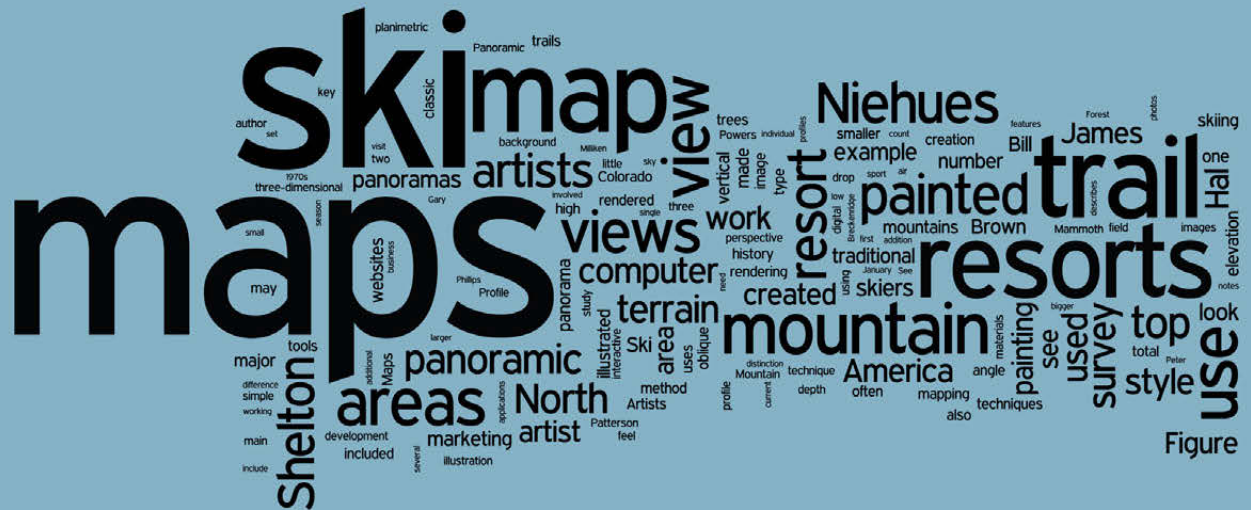


Mountain Ski Maps of North America: A Preliminary Survey and Analysis of Style

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ABSTRACT

This article examines mountain ski resort trail maps in North America in 2008. It looks at the styles of maps used by resorts and at the main artists involved in producing the maps. The survey included maps from 428 resorts with additional analysis of maps from the 100 largest resorts. Point of view and creation method are the primary factors in determining the style of each ski trail map. Artists have employed three main types of views for ski mountains: panoramas, profiles, and planimetric maps. Panoramic views are by far the most common type of map (86% of all maps and all of the maps at the top 100 areas). Profile views are used in 8% of the maps and planimetric views in only 6%. Production methods for ski trail maps fall into three main categories: painting, illustrating, and computer rendering. Maps created with painting techniques are the most widespread, in use at 72% of all resorts and at 89% of the top 100 areas. Those created in a hard-edged vector-based illustration style are in use at 20% of resorts and those created through computer modeling and rendering at 3% of resorts.

Many artists have created ski trail maps for resorts in North America but one artist, James Niehues, has produced by far the most maps in current use. His maps are in use at over a quarter of all ski areas and at half of the top

100 resorts. Niehues follows in the footsteps of two other Coloradans, Hal Shelton and then Bill Brown, and this Colorado School has been key in the development of a classic painted panoramic style of North American ski maps. Additional research is recommended to provide further details of the history of the maps and their creators as well as to analyze the artists' terrain manipulations and to look at the growing use of electronic trail maps.

KEY WORDS

Ski maps, 3D-maps, panoramas, North America, map design, Hal Shelton, James Niehues

MAPPING SKI MOUNTAINS IN NORTH AMERICA

Trails maps for ski areas are iconic images of the nature of the sport of skiing and its relation to the terrain on which ski resorts are built. Canada and the United States have well over 400 ski areas that are large enough to merit a trail map. The development of the maps has paralleled the development of the sport of lift-served skiing. As skiing in North America has grown and more money has flowed to building bigger resorts and marketing the resorts to skiers, more attention has been paid to marketing materials (Fry, 2006). The combination of bigger areas to map and an increase in money in the sport led to a shift from simple wayfinding maps to more elaborate mountain portrayals.

This study looks at the total number of ski maps in use during the 2007-2008 winter ski season and categorizes them by angle of view, method of creation, size, and artist, if known. An evaluation of these factors is provided in the context of how they affect the style of the ski map. In addition, an examination of the artists involved in the maps' creation yields information about the history of mapping ski resorts.

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SURVEY OF SKI MAPS IN CURRENT USE

A mountain ski map as defined for this paper is a map of the trails and ski facilities of a lift-served ski area. Maps are included for any ski area that has a vertical drop (top to bottom elevation change) of at least 200 feet (60 meters). In addition, due to the limit on time and expenses for gathering materials, the study includes only ski areas and resorts with established websites, indicating that they are both currently operating and that they are marketing to the public to entice skiers.

The resulting survey of ski maps does not include very small areas—because of the vertical minimum—and it does not include some of the smaller private and non-commercial ski areas that do not have websites or advertise in the manner of a commercial ski resort. Many of these areas have trail maps but are outside the main ski area focus of the industry and of this paper. Most resorts have additional maps in their marketing materials and on their websites that display Nordic or cross-country skiing trails, base lodge areas, resort towns, and lodging. These maps are not included in this study.

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The survey was conducted during January 2008 by searching the Internet for ski resorts and then for ski maps used by each resort during the 2007–2008 ski season. Compiled lists of resorts data were accessed at www.skitown.com and www.skireport.com. Each ski map was obtained directly from the individual ski resort website. A visit to the individual websites confirmed that each resort was currently operating and allowed viewing of the trail maps provided by the resort. In cases of a resort with multiple trail maps, for example different maps for print and on-line use, the map designated for print and on-slope use was used. An electronic file was available for 428 out of 429 resorts researched (the only exception was Apple Mountain in Michigan, not included as part of the survey).

For each trail map the following information was catalogued: view type, creation method, artist, existence and type of interactive web map, and size of resort (vertical drop, number of lifts, number of slopes). In addition, subjective style notes were made to assist in categorizing maps and assigning authorship. View type describes the general nature of the view of the mountain, i.e. the location and orientation of the cartographer's (or photographer's) point of view in relation to the terrain. Creation method describes the technique used to construct the final image.

In order to isolate some of the more important trends in the creation of ski maps, a distinction was made between major resorts and minor resorts. The major resorts are the top 100 ski areas as defined by a size index calculated by multiplying the vertical drop (top to bottom elevation difference) by the number of lifts and then by the number of trails. The use of vertical drop in the index aided in putting the larger mountains (in terms of terrain covered) toward the top of the list. Many of the smaller mountains did not make it into the top 100 resorts.

The initial results of the survey are summarized in Table 1. Some immediate trends emerge, such as the preponderance of ski maps using the panoramic view. Indeed for the major resorts it is the only type of view used. Also, the painted technique—originally using traditional art tools and now often using computer painting applications—is the dominant method used to create the trail maps. Painted panoramic views have a strong tradition in ski mapping in North America and much of this dominance in the current survey can be attributed to just a few artists.

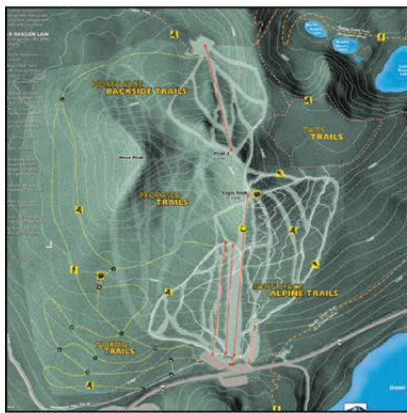
	All Ski Resorts	%	Top 100 Ski Resorts
View type			
panoramic	368	86%	100
profile	36	8%	0
planimetric	24	6%	0
Total	423	100%*	100
Creation method			
painted	307	72%	89
illustrated	85	20%	7
annotated photo	24	6%	1
computer rendered	12	3%	3
Total	428	100%*	100

*All percentages have been rounded

Table 1. Survey of North American mountain ski maps, counts, and percentages by view type and creation method.

TYPES OF VIEWS

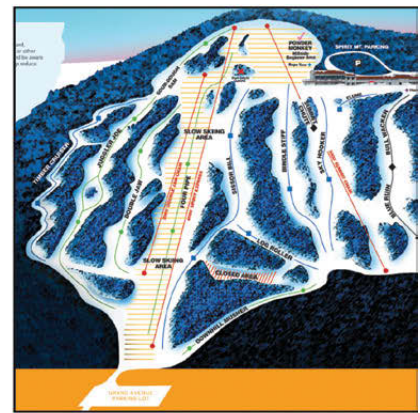
Three general types of views exist in the set of maps evaluated in the survey (see Figure 1). Planimetric views are images viewed from directly above all portions of the skiing area. Panoramic views are oblique perspective views of any angle—there are a great variety of angles used, from very low to very high. Panoramic views are often not topographically accurate. Artists distort the terrain to better show certain features and to emphasize certain areas for detail or accent (Patterson, 2000). Profile views are generally very simple elevational views of the mountain from a very low oblique angle or ground level that have little or no three-dimensional character and look into the mountain with little or no perspective. Assignment of some low oblique views to either panorama or profile groups was a difficult task. Those exhibiting little or no attempt at shading or perspective were labeled as profile. An important difference between panoramas and profiles is that a panorama usually shows the landscape context of the resort mountain and the profile only a single slope.



Planimetric view



Panorama



Profile

Figure 1. General types of views utilized in mountain ski maps
(left to right: Willamette Pass, Oregon; Crested Butte, Colorado; Spirit Mountain, Minnesota).

Panoramic views comprise 86% of all ski trail maps and 100% of maps for the top 100 resorts. There are several probable reasons for this. Patterson (2000) notes in discussing the work of Heinrich Berann, one of the earliest panoramic mountain ski map painters, that with a panorama, “[s]omething truly magical happens. Readers feel drawn into the panorama as if they were flying high above the land.” The panoramic ski map may be particularly evocative of the mountain terrain for skiers and potential skiers for whom the feel of the image may replicate the feel of flying down the mountain on skis.

Profile maps constitute about 8% of the total ski maps in this survey. While in some ways a subset of panoramic maps, they generally lack the key features of panoramas such as depiction of a true depth of field. Resorts with smaller mountains often use profile maps perhaps because they can make small mountains look larger than they would in a panoramic view. Profile maps have other advantages for smaller resorts: they are easier and less expensive to produce and they are easily made more schematic to match simple trail layouts.

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Planimetric views are relatively rare in the survey of current ski trail maps, only 6% of the total. In a brief examination of cross-country (Nordic) ski trail maps associated with ski resorts, the planimetric map is much more prevalent. Given the high accuracy of trail and feature placement it may at first seem surprising that planimetric maps are not used more. They can be better wayfinding instruments for experienced map users. Wayfinding, however, is only one reason for creating the map and can be minor compared to the need for the map to market the ski area and entice new skiers to visit.

The apparent preference for panoramas, and to a lesser extent profiles, may be attributable to the desire for resorts to look impressive to potential visitors. The need to attract visitors exerts a strong influence on all publications for a ski resort including trail maps. The demands of the marketing department can be at odds with an accurate portrayal of the mountain (Phillips, 2007; Powers, 2008). Ski areas often ask for the mountain to “look bigger” and for the artist to distort the mountain for this purpose. At other times requests are made for the trails to appear more clearly delineated and map-like. These two requests coming at the same time can pose a serious challenge that in some cases is resolved by local distortion of the mountain terrain and camera view.

METHODS OF CREATION AND GRAPHIC STYLES

Ski trail map artists use three basic production methods: painting, illustration, and computer rendering. Artists creating maps in the painted and illustrated styles use both traditional fine arts tools and computer paint and illustration applications. The author made an initial distinction between computer tools and traditional tools but because the resulting maps are very similar, this distinction was dropped.

The painted style is used in 72% of all ski trail maps and 89% of maps for the top 100 ski areas. For an example of a map created with traditional painting techniques, see the image of Mammoth Mountain ski resort painted by Hal Shelton (Figure 2). For an example painted on the computer see Mount Bachelor by Peter Powers of Terragraphics (Figure 3). Painted maps are primarily characterized by the use of brushwork. They provide the artist with great flexibility in terrain depiction and full control of all aspects of the image but they also require the greatest artistic skill. Despite the fine work by artists such as Hal Shelton and James Niehues, examples abound of unconvincing painted maps.

Illustrated maps are more prevalent in use for smaller ski areas (20% of all areas) than for larger areas (7% of top 100 areas). They are characterized by hard lines and sharp edges. While all maps use illustrated elements for some lines and for text, the group of illustrated maps uses vector-based art for the terrain itself. The illustrated maps of Gary Milliken (VistaMaps) are in use at several major ski areas and are the largest and most extensive of the vector art images encountered in the survey (see Figure 4 showing Vail, Colorado ski resort which replaced a painted map by James Niehaus). These maps usually rely on vector software programs—though some are illustrated with traditional tools—and have a mechanical, less natural feel than the other techniques.



Figure 2. Hal Shelton painted view of Mammoth Mountain ski resort in California using traditional painting techniques.

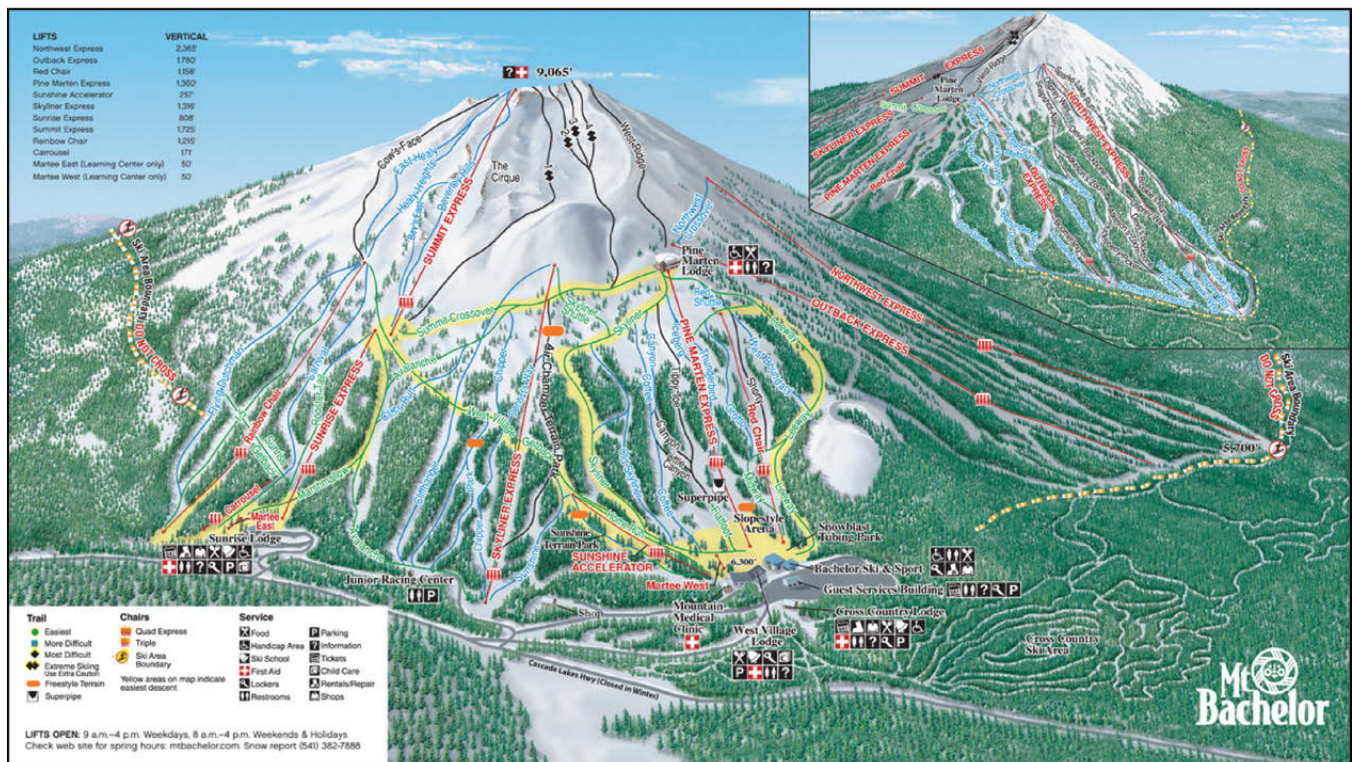


Figure 3. Peter Power's painted view of Mt. Bachelor ski resort in Oregon using computer painting techniques.



Figure 4. Gary Milliken's illustrated view of Vail ski resort in Colorado (image is from 2006-2007 season but mountain illustration is the same as for 2007-2008 season).

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A surprisingly small number of resorts use computer rendered images for their trail maps, only 3% of all resorts and 3% of top 100 resorts. Computer rendered trail maps are virtual landscapes created in three-dimensional modeling applications. The author has created two such views for major California ski areas. See the example below (Figure 5) for Northstar-at-Tahoe. This view uses procedural textures and modeled trees to mimic the patterns of slope and forest on the mountain. Breckenridge is another resort that recently converted from a painted trail map by James Niehues to a computer rendered map (Niehues, 2008). The Breckenridge map (see Figure 6) employs a standard satellite photograph draped over a digital elevation model. It includes computer modeled and rendered three-dimensional buildings for the town of Breckenridge.

Six percent of all resorts use an annotated aerial photograph—taken from an oblique angle—in place of artwork for their trail map, although only one resort of the top 100 does. Annotated air photos are relatively simple to create and can be effective for some compact ski mountains. They suffer from the fixed nature of a photographic image, there is little or no ability to control generalization, selection or emphasis of terrain features as an artist can in a painted, illustrated, or computer rendered trail map. For a nice example of an annotated air photo trail map, see Figure 7, showing Whitewater resort, British Columbia.

INDIVIDUAL ARTISTS AND SKI TRAIL MAPS

The array of ski maps in use today reflects the history of artists involved in the business. Maps by Hal Shelton, Bill Brown, and Don Moss, are still in use though some were created 30 to 40 years ago. Hal Shelton was the first prominent ski

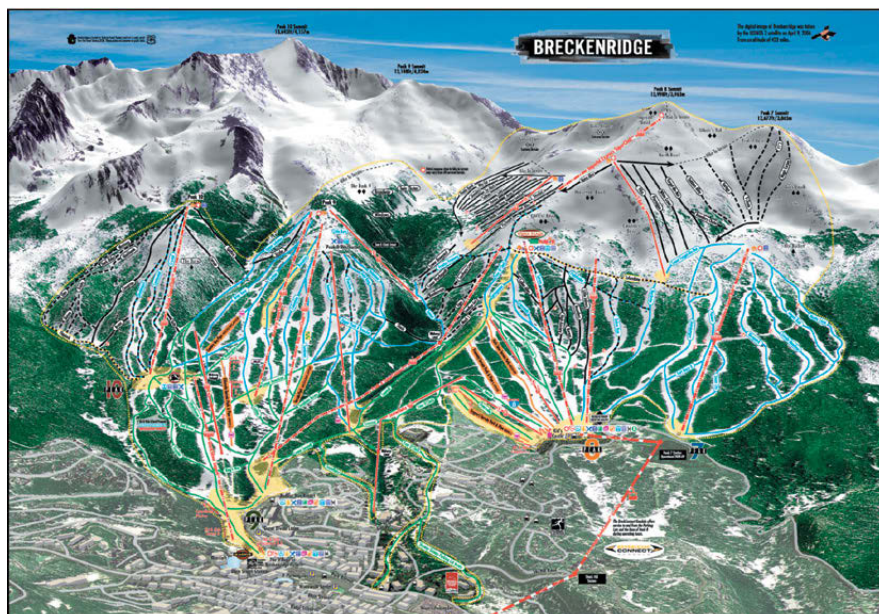




Figure 7. Annotated air photo trail map for Whistler, British Columbia (author unknown).

trail map artist and he came to the work from both landscape painting and cartographic backgrounds. Shelton had a distinguished career as an innovative map designer with the U.S. Geological Survey and with the Jeppeson Map Company (Patterson and Kelso, 2004). Painting ski maps was a bridge for him between his work as a cartographer and his later work as a fine artist painting landscapes (Masia, 2005).

Shelton was most active in the 1960s and 1970s. Later in the 1970s and into the 1980s the bulk of ski trail mapping work passed to Bill Brown and then in the 1980s to James Niehues, forming a progression of Colorado based artists (Phillips, 2007). Niehues (2008) describes this passing of the baton and notes that the business of ski trail mapping is a niche market that has been dominated by a single artist at most times. During this era of painted panoramas there were other important artists working in North America, they include Don Moss working out of the northeastern United States in the 1960s and 1970s (Masia, 2005) and Murray Hay working out of Alberta, Canada.

In the last decade, a greater number of artists have been making ski trail maps. Recent entrants into the business have included Peter Powers of Terragraphics, Gary Milliken of VistaMap, and this author. These artists have produced maps with a variety of computer-based techniques: vector-graphics illustration, digital painting, and three-dimensional modeling and rendering.

For January 2008, the count of ski trail maps by credited artists with at least two views is as follows. James Niehues tops the list with 112 total maps and 57 out of the top 100. Peter Powers' company Terragraphics counts 25 total, Gary Milliken 8, Don Moss 4, Murray Hay 3, Bill Brown 2, K.M. Mastin 2, Hal Shelton 2, and the author 2. Note that only about one-third of maps had clear attributions, additional research will be needed to identify more artists and obtain a more accurate count.

HAL SHELTON

Hal Shelton's painted view of Mammoth Mountain ski area in the Sierra Nevada Mountains of California is truly a masterpiece (Figure 2). Its natural coloring, panoramic view, trees textures, and depth of field combine to produce a pleasing and easy to read trail map for skiers. A second painting of the mountain in summer appears to also have been painted by Shelton and uses a different view (higher oblique) but is no less effective. (Note that by the 2008–2009 season the Shelton maps for Mammoth had been replaced with newly painted maps by James Niehues.) Shelton was the first major ski trail map artist in North America and he set the bar very high for all those who have followed.

Of particular note in the Mammoth Mountain view is the effective depth of field achieved. Shelton used a slightly blurred effect for the background ranges, a light haze intensifying toward the horizon and careful placement of the mountain in relation to the background and sky. Though the summit does not break into the sky, it is the focus of the view and gives the impression of a big mountain, a desire that is always high on the list for any ski resort's map.

BILL BROWN

Bill Brown's views of Ski Santa Fe, New Mexico and Arizona Snowbowl (see Figure 8) show a continuation of the classic painted panoramic trail map style initiated in North America by Hal Shelton. The individually painted trees, the use of haze to bring depth of field and the overall naturalistic look are key elements to this style. Brown's positioning of the subject mountain against the sky, without multiple background ranges, brings an intimacy to the view and also makes the mountain taller in the mind's eye.

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Figure 8. Bill Brown painted views of Ski Santa Fe, New Mexico and Arizona Snowbowl.

JAMES NIEHUES

PERHAPS THE MOST DISTINCTIVE ELEMENT OF NIEHUES' WORK IS THE RENDERING OF TREES. HIS PAINSTAKING PAINTING OF EACH TREE, ITS FORM, ITS HIGHLIGHT, AND ITS SHADOW GIVE HIS WORK A FORESTED TEXTURE UNLIKE MOST OTHERS.

The distinctive signature of James Niehues appears on more ski trail maps in North America in the period of this study than any other. He has painted mountain ski maps around the world, over 120 by his count. Niehues sits firmly in the classic school of painted panoramas, he credits Hal Shelton and Bill Brown as his mentors but also the panoramic views from Europe, such as those created by Heinrich Berann (Niehues, 2008). See Niehues' view of Whistler Blackcomb (Figure 9) for an example of his trail maps

Perhaps the most distinctive element of Niehues' work is the rendering of trees. His painstaking painting of each tree, its form, its highlight, and its shadow give his work a forested texture unlike most others. The difference between evergreen and deciduous trees in areas such as Vermont (see his panoramic map of Jay Peak for example) is a tribute to the care he takes in preparing each map view. Other distinguishing characteristics are his buildings and cars parked at ski area bases.

Niehues does not use computer elevation models for visualizing terrain. He uses topographic maps and reference air photos, often taking the photos himself. He then prepares rough sketches for approval and completes the work with traditional brushes and paints (Phillips, 2007). Because of the variety in Niehues work it is hard to describe a single technique for positioning and distortion of terrain and camera for his panoramas. His view of Whistler Blackcomb uses the classic technique of a progressive projection (as described by Jenny, 2004) that renders the foreground with a steeper angle than the background.



Figure 9. James Niehues painted view of Whistler Blackcomb in British Columbia.

CONCLUSIONS AND FUTURE RESEARCH

This survey of mountain ski trail maps shows that the painted panorama style is preeminent. A series of three Colorado-based traditional artists—Shelton, Brown, and Niehues—have been key in the development of this classic style of North American ski maps. Digital techniques introduced by a new set of artists have brought changes around the edges of the Colorado style.

Much work remains to provide a complete picture of the history of ski maps in North America and the influences upon their style. A more extensive survey could evaluate North American ski trail maps at several dates from the early years of ski resorts in the 1930s through the decades to the present. It could also look at the succession of maps at individual resorts with long histories such as Vail, Colorado and Stowe, Vermont. Another aspect of the history of these maps is their relationship to the growing needs of resorts for advertising. When did the marketing need outweigh the wayfinding purpose of the map? Finally, one could examine the influence of the U.S. Forest Service on ski resort tourism. Approximately one half of the nations skiing is done on National Forest land and the Forest Service developed its own marketing materials and maps (Fry, 2006).

An analysis of panoramic view construction in the ski trail maps would be fertile ground for more research. Artists have altered vertical exaggeration, perspective, and many other aspects of the panoramic views. How exactly have they modified the physical mountain terrain? What objectives are driving these alterations? Is it possible to reconstruct the view from digital elevation data to see what the mountain should look like in the panorama versus what the artist's eye has created? (See Patterson 2000 for an example of reconstructing a panoramic view using digital elevation data.)

One final area for exploration is interactive maps. In this survey of ski trails maps, a note was made during the visit to each resort website of the existence of an interactive web map. In January 2008, for all ski area websites, 76 out of 428 (or 18%) had an interactive map, for the top 100 resorts, 52 websites had them. How fast have these on-line maps been adopted? How useful are they to skiers? Are they used on-slope with mobile phones? This may be the future of ski mapping for the next generation of skiers.

A SERIES OF THREE COLORADO-BASED TRADITIONAL ARTISTS—SHELTON, BROWN, AND NIEHUES—HAVE BEEN KEY IN THE DEVELOPMENT OF THIS CLASSIC STYLE OF NORTH AMERICAN SKI MAPS.

REFERENCES

- Fry, J. 2006. The story of modern skiing. Hanover: University Press of New England, 380 pp.
- Jenny, B. 2004. Bringing traditional panorama projections from the painter's canvas to the digital realm. Proceedings of the 4th ICA Mountain Cartography Workshop, Nuria, Spain, 151-157.
- Masia, S. 2005. The trail map artists. *Skiing Heritage*, 17(4):14-18.
- Niehues, J. 2008. Personal communication with author.
- Patterson, T. 2000. A view from on high: Heinrich Berann's panoramas and landscape visualization techniques for the US National Park Service. *Cartographic Perspectives*, 36:38-65.
- Patterson, T. and Kelso, N. 2004. Hal Shelton revisited: Designing and producing natural-color maps with satellite land cover data. *Cartographic Perspectives*, 47:28-55.
- Phillips, D. 2007. Peak painter. *Colorado Springs Gazette*. November 2, 2007, 31-33.
- Powers, P. 2008. Personal communication with author.
- URLs, all accessed January 2008.
1. Skireport, <http://www.skireport.com/>
 2. Skitown, <http://www.skitown.com/>
 3. Whitewater Ski Resort, <http://www.skiwhitewater.com>

