LAND USE AND OTHER CONSIDERATIONS NEEDED FOR DEVELOPING WINTER SPORTS AREAS IN MICHIGAN

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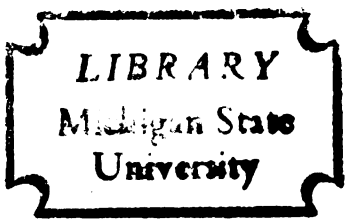

ABSTRACT

LAND USE AND OTHER CONSIDERATIONS NEEDED FOR DEVELOPING WINTER SPORTS AREAS IN MICHIGAN

by George Charles Besch

Snow skiing is growing faster in the Midwest than anywhere else in the country. Michigan already leads the Midwest in winter sports participation, and it still has the region's greatest undeveloped potential for providing more outdoor winter recreation. To keep pace with the surging demand for winter sports areas, new ones must be developed and established ones improved and expanded.

The objective of this study was to examine the kinds information needed for making sound plans in developing a winter sports area. The major categories of information are: (1) The natural resource base, (2) The market and demand, and (3) Capital needs and sources.

Under the section on natural resources, topographic maps, climatic maps, and aerial photographs are discussed. A major section is one designing slopes for maximum use and safety. The reasons for serious consideration in the initial acquisition of sufficient land to permit designing the area for optimum complementary facilities and safety are given.

The section on market and demand analysis outlines a method for determining the "customer" potential of an area.

The effect of the transportation system on the market area is examined. A discussion of the need for information on the type of people most likely to be interested in skiing is a major part of this section, because not only must it be known from where the customers will come, but also what type of customer will come.

The sources of capital needed for development are mentioned in the section concerned with initial development and expansion. Banks and investment houses are compared to Federal agencies involved in advancing technical assistance and venture capital. The cost of developing an area increases each year, but the sources of capital may be increasing too. The reasons are given for making an exhaustive study of all sources for obtaining venture capital. The feasibility of investing in a partially developed area already in operation is also discussed.

Although not intended to give all the information needed in designing a winter sports area, the study does present basic facts that will probably not be changed in time or by the quality of management. The quality of business management is, of course, a prime factor needed for successful operation. It is not discussed in detail in this work, being worthy of a complete study in itself.

LAND USE AND OTHER CONSIDERATIONS NEEDED FOR DEVELOPING WINTER SPORTS AREAS IN MICHIGAN

By

George Charles Besch

A THESIS

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PREFACE

The information for this study was gathered through extensive interviewing at winter resorts in all sections of the state, by questionnaires mailed to a cross section of Michigan ski and winter sports centers, and with the aid of state and federal agencies interested in the development and safety of these areas. The National Ski Patrol System and private insurance companies also expressed interest and supplied valuable information used in the study. Personal experiences in skiing at a number of Michigan ski centers, as well as extensive nation-wide ski experiences, were helpful in the analysis.

Appreciation is extended to Dr. M. H. Steinmueller, thesis committee chairman, for his counsel; to Professors L. H. Reid and L. F. Twardzik for their assistance at various stages of the work; to the Michigan State Highway Department, especially W. Bailey, for their cooperation; to C. A. Gunn, of the Hotel, Restaurant and Institutional Management School; and to Dr. D. Brunnschweiler, Geography Department.

Most important of all though, is the author's indebtedness to his parents, whose hard work and patience made possible the many years of education that enabled this piece

of work to develop. They made reality of aspirations by letting him chase his dreams to heart's content. One has been caught. To his mother, an extra note of thanks is due for her long hours of typing and continual moral support, without which the study would never have been completed.

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CHAPTER I

INTRODUCTION

The Setting

The fact is, many people today want to be identified with or as skiers. If they haven't actually joined the throngs of avid shussboomers[1] on the slopes, they hope to be mistaken for a skier by borrowing his clothes, his jargon, his style and flare for living.

The world's magazines claim that to make a mark on society, one must also be willing to make his mark on one of the nation's ski slopes.[2] Boy Scout troops and high school gym classes are frequently encountered on the slopes; and behind a cloistered convent in northern Michigan, ski tracks and stitzmarks[3] are not an uncommon sight.

The magic of skiing has touched the whole nation. It has touched everyone who is young of heart, regardless of age, money or talent. But before a formal presentation is

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[1]Skiers who make their downhill runs as fast as possible.

[2]John Fry, "Skiing: The Sport of Establishment," Ski Life, Volume 27 (January, 1963).

[3]Holes in the snow made by the skier who fell in that place.

made with statistics to show just how many enthusiasts the sport has won over, perhaps a look at how it all began would prove both interesting and valuable to the study of developing winter sports areas. The following is a chronological view that traces the colorful history of skiing right up to the setting found today in Michigan.

The Historical Development of Skiing

Well over three thousand years ago the first schussboomer was born. In the peat bogs of Finland, skis dating back to 1500 B.C. have been found.[1]

The first men to set foot on skis did not get started because they thought of sailing down the mountainside as an enjoyable way to pass their leisure time. At that time skis were only a modified form of snowshoes, turned up at the front end and smooth on the bottom to make travel down slope faster. (Turning on skis was apparently not tried until hundreds of years later.) They were used for centuries strictly as an improvement in transportation.

Relics found in the Scandinavian countries indicate various forms of brakes were invented and tried on the skis in an effort to make them safer, and as a substitute for turning. Obviously some of these first attempts to spare life

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[1]Elkins and Harper, World Ski Book, Longman, Green and Company, New York (1949).

and limb must have worked, because a few of those pioneers in skiing survived the treacherous beginnings to pass along what is now fast becoming a national pastime.

Since their purpose at first was practical rather than recreational, climbing skins were attached to the bottom of the ski to enable the wearer to progress uphill when it was necessary to have a bottom surface that gripped instead of slid. They could then be easily removed and carried in the backpack until needed again.

In Europe today, and especially the Scandinavian countries, there is a marked difference between their skiing and ours. It is true that both Europe and the United States have made the transition from skiing merely as a means of mobility, during the long winter season and deep snows, to skiing purely for the fun of it. But tradition is strong in the mountains across the Atlantic; climbing to ski and touring cross country are still part of many a skier's day.

In the parts of Europe more frequented by the tourist skier, many kinds of lifts to the top can be found. Gondolas, chairs, trains or buses appear to be the most popular. To be sure, where the lifts do exist, the European boomer has taken to them with much enthusiasm, but not to the complete abandonment of climbing and touring.

Many parts of Europe, especially in Norway, Finland, and Sweden, are without the modern convenience of a ride to the top. It may be difficult for us to understand how a

Finn or Swede could call that recreation. Nevertheless, thousands over there do just that; climb up and over mountains, picnic lunches in their knapsacks. The whole family goes--not just those supposedly in their prime for athletics.

There is no such thing as being too young. If it's a baby that can't walk yet, he is put in a backpack, built especially for that purpose. Without going into detail, it is suggested that this background and conditioning may have something to do with the fact that European skiers have no equal when it comes to racing.

How is the United States different? We took half of what the Europeans seemed to be having so much fun doing--going up and down hills--and developed the going down part. But that's not to imply that we have only half as much fun. Fun, enjoyment, and recreation are relative and no attempt will be made in this study to establish which type of skiing is more recreational.

In the United States there are two stories depicting the early development of skiing. One version claims that United States skiing got its start when pioneers of Scandinavian descent used long wooden skis, twenty feet in length, to help carry mail across the Sierra Nevada Mountains in the 1850's.[1] It seems they didn't know how to turn either,

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[1]Tyler Micholeau, The Story of Squaw Valley, A. S. Barnes and Company, New York (1953).

and came straight down hill until they thought it was time to slow down. Then they would drag a long pole, with a large cupped apparatus on one end, behind them. The Westerners used their long skis with a pole-disc brake to do more than carry mail. In 1854 they formed clubs and had races, straight down the hill with no change in direction.[1]

Another version claims that the Upper Peninsula of Michigan hosted the first ski competition, about the same date, at Ishpeming.[2] Again Scandinavians got credit for bringing the sport to this country. The latter version is mentioned in its place because it is the one to which most credence is given, and probably has much to do with Michigan's leading role in the national ski picture. The National Ski Hall of Fame honors Michigan as the first state to have competitive skiing (in the form of jumping).[3] It appears the miners in the Sierras did have the first Alpine races.

In the 1880's ski clubs began to materialize and they soon formed the Central Ski Organization in 1891.[4] The National Ski Association, consisting of sixteen member-clubs,

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[1] Ibid.

[2] Zig Bulanda, "America's Shrine of Skking," Skiing Magazine (February, 1961).

[3] Ibid.

[4] L. J. Kassner, Story of Skiing, Reynolds Press, New York (1946).

was organized in 1906; still very much in existence today, its power may be noted by the fact that there are now 757 member-clubs.[1]

Ishpeming, Michigan had all the notoriety to be garnered from the new sport until 1921 when Denver, Colorado, entertained the member clubs for their annual races.[2] Since 1924 the clubs have met at the site of the highest bidder.[3]

In 1932 the Third Winter Olympic Games were held at Lake Placid, New York. The National Ski Patrol was formed in 1938 in the interest of safety on the slopes.[4]

The end of World War II brought changes that affected everyone and everything, including: increased expenditures on such things as road building and improved communications; a tremendous increase in births; and, of course, more leisure time with a greater disposable income. The effect of the post-war baby boom on skiing will be discussed later, because it did not really affect recreation until years later. But the other things did have a more immediate effect on the sport.

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[1]William Pain, The American Ski Directory, Permabooks, New York (1961).

[2]Elkins and Harper, op. cit.

[3]Ibid.

[4]National Ski Patrol System, National Ski Patrol System, Inc., Denver (1963).

National Skiing Boom

Winter sports, and especially skiing, were no longer known only to the advocates of living dangerously for the sheer thrill of doing the unusual. The coverage and publicity given the Winter Olympics at Lake Placid and the National Ski Patrol, an organization formed for safety's sake in itself, had taken care of that just prior to World War II. The Federation of International Skiers (FIS) Games were hosted in 1950 by the United States of America. Coupled together, these unrelated factors brought on a surge of enthusiasm for skiing that was like the primer in a shotgun shell. It went almost unheard and was a relatively minor explosion compared to the boom it was about to set off. Just when the primer actually set off the real explosion would be a difficult date to pinpoint--because no one was watching for it. People in every walk of life that would be affected by this new demand were caught looking the other way; the primer didn't even turn their heads, and when they did turn around to see what was making the big noise--it was too late to see it coming.

Probably most people became aware of the fact that a boom in skiing had occurred, and was growing during the Winter Olympic Games of 1960, held at Squaw Valley, California. The radio, television and newspaper coverage was showing everyone how much fun skiing could be. But it also showed people sitting in trees and hanging from the roof

tops to watch the races. People were camped all over the area in sleeping bags, tents, and trailers. It was obvious to the observer--skiing had arrived. It was big business.

Recreation men, business men, and governmental agencies were soon aware of some of the problems about to be caused by the "new" and fast-growing winter sports activity. These were made even more obvious by the fact that it had caught them unaware; they didn't know how to handle the situation, didn't know who to ask for help, because it was not like European skiing. There are not many more answers to the questions today than there were in 1960.

Throughout the development of United States skiing as a form of recreation, radically different concepts of what the sport should offer have come into play to create a new kind of skier and to provide a different kind of recreation than was formerly enjoyed in Europe. It is not suggested here that we have created a new sport. A European would thoroughly enjoy himself over here on a ski holiday and vice versa.

Contrary to what most people think, we influenced Europe as much as they influenced us. They originated skiing. But riding to the top was an innovation we pursued to near perfection because Americans demanded it and were able to pay for it. Skiing probably would never have expanded greatly in the United States if climbing and touring remained the dominant pattern, as it was only twenty years ago

in most places, and ten years ago in many others.

This blending of ideas resulted in a situation ananogous to that of an infant that has grown to the size of a giant, but still hasn't reached maturity. When people think of skiing now, they think of this new child, not the sport that Europeans outside of the big-name resorts have enjoyed since the 1800's and will continue to enjoy.

Perhaps a summation of all the aforementioned factors might be in order to determine why the sum is equal to a modern "big business" ski resort.

The babies of the post-World War II baby boom are now the twelve to sixteen year old bundles of energy that enjoy the excitement offered by a downhill run at substantial speed. Also, the better roads; the more leisure time; the higher percentage of income being devoted to recreation in general; and the fact that winter was formerly a dull season with people ripe for a suggestion of how to spend some time, tend to have a multiplying effect. Publicity and resulting knowledge in just how safe a sport skiing really is, provided by the Olympic Games--and the fact that the American people want sociability plus all the work taken out of the sport, also contributed to the growth. Because of these factors, winter resorts have been springing up <u>everywhere</u>.

Today there are resorts that offer a ride to the top in many ways and shapes for a wide range of costs; a guaranteed

apres'[1]--ski life with plush lodges and entertainment; and plenty of opportunity for the family to participate as a group, with prorated charges and baby sitting service for those too young to walk. The word everywhere is underlined above because it really is more true than most imagine. Resorts are found even where the hills are the result of bulldozers and tectonic forces; where the snow comes from nozzles instead of clouds; and where many people won't even go out-of-doors to give it a try.

The Growth of Midwestern Skiing

The State of Michigan was honored as the first state to have ski competition. It got started early and hasn't shown any signs of losing its lead. Possessor of suitable slopes and deep snow near the large areas of relatively level land and population concentrations in the Midwest, it was, a short time ago, the only state a person thought of when skiing in the Midwest was mentioned.[2]

The large number of people willing to drive the hundreds of miles from Cleveland and Cincinnati, Toledo and Indianapolis, and even as far as St. Louis, Missouri every

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[1]A French term used universally by skiers to describe the social life after the day's skiing.

[2]Barb Messer, "The Midwest is Booming," Ski Life, Volume 1 (January, 1959). "By Skiing Obsessed," Ski Life, Volume 27 (January, 1963).

weekend has naturally caused an expansion of the already existing winter resorts in Michigan, as well as the development of many new ones.[1] The establishment and success of winter resorts in Ohio, Illinois and Indiana was not expected but ski hills and tows are found now in all three.[2] Although the hills may have been helped a little by a 'dozer, and operation without the recent invention of snow making equipment would be absolutely impossible, the number continue to grow.

The State of Michigan now boasts of eighty-six winter sports areas. Of these, 15 are in the upper peninsula, 43 within a 200 miles radius of Detroit, and 10 are less than 50 miles from Detroit. Six areas are new this year (1963). Winter sports areas in Michigan offer 19 chairlifts, 44 T-bars, and 382 rope tows to its 200,000 skiing clientele.[3] Since the 1959-60 winter ski season, the number of visits to Michigan's ski resorts has increased 68.8%.[4]

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[1] Ski Life, Volume 27 (January, 1963), op. cit.

[2] Ibid.

[3] Pain, op. cit., and the Michigan Tourist Council's 1962-63 bulletins.

[4] Figures for statistical inference obtained for computation by comparing The American Ski Directory, op. cit., data with that received by questionnaire and interview.

CHAPTER II

THE NATURAL RESOURCE BASE

Finding a Suitable Environment

In considering the development or expansion of a winter sports area, whether it is to be developed with public funds or by private enterprise, a primary step is the critical analysis of the location and site already owned or intended for purchase.

There are, of course, many factors other than the natural resource base which should be thoroughly analyzed and considered, but these will be dealt with in turn. The content of this chapter is designed to indicate only the order, detail and method of the natural resource base approach to the problem.

The two most important aspects of the resource base are topography and climate, and each one of these will be subdivided for a more detailed study.

Topography

The relative relief available for development is the most obvious to the eye, whether topographic maps, air photos, or personal observations are the indicators used. The actual mean elevation of the area is also important, because of its

relation to the climate, although this may not be obvious to the observer.

Because they are easy to obtain, inexpensive, and encompass a large area, examination of topographic maps is the first step in studying the area. The United States Geological Survey[1] and the United States Army Map Service[2] both provide topographic maps adequate for preliminary investigation.

Climate

Rather than proceed to a more elaborate study of the relief in any number of areas that may have passed the preliminary tests in this aspect, some basic climatological data should be studied in view of the first draft choices. In this way some detailed work and added expense can be eliminated.

It is useless to continue analyzing the topography of an area not endowed with adequate snowfall or cold weather. Maps indicating mean annual snowfall and temperature are available for the State of Michigan from the United States Weather Bureau Station in Lansing.[3]

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[1]Geological Survey Distribution Section, Washington 25, D. C.

[2]Army Map Service, Corps of Engineers, United States Army, Washington, D. C.

[3]United States Weather Bureau, Capital City Airport, Lansing, Michigan.

Proceeding to a more detailed study

Only when the macrostudy of an area's climate and relief have both been completed should any attempt of microstudy be pursued. When it has been determined that in general an area possesses adequate physical resources for winter sports development,[1] then more elaborate, and more expensive research is in order.

Aerial photographs, scaled one inch equal to 1667 feet,[2] are the most feasible tools for use in the next step, economy and time considered. Separate maps could be obtained showing the land use patterns, vegetative cover, drainage and microrelief. But individual maps would be more expensive and take longer to get than the air photos which show all four of these valuable aspects at once.

Using this scale photograph, which covers approximately eight square miles, the observer can get an updated

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[1]No figures have been given here because the influence of market distance changes the values. As the distance from the market increases, naturally the minimum physical requirements for drawing power must be increased. The market-demand considerations are discussed in Chapter III. Michigan ski resorts offer a mean 292.5 vertical feet and 1380.8 feet of horizontal run. The range in vertical feet of skiing in the lower peninsual varies from 500 feet to a meager 100 feet, with the possibility of developing an area having over 600 vertical feet existing at a number of locations. The highest in the upper peninsula has 628 vertical feet of skiing, but 900 foot potentials have gone undeveloped as yet.

[2]Eastern Laboratory, Compliance and Aerial Photography Division, Agricultural Stabilization and Conservation Service, U. S. Department of Agriculture, Washington 25, D. C.

(compared to maps of the same area) picture of the land use in the areas under study. The ground cover and drainage pattern may be easily discerned, while an extremely good view of the relief is provided by using an overlapping photo along the same flight line and a simple stereoscope.

Careful analysis is in order here, diligently heeding the sections following this one, on laying out slopes, altering the natural endowment, laying out supplemental winter facilities and planning use during other seasons.[1]

Soil and Water Considerations

While topography and climate were declared the two most important aspects of a resource base, with drainage and ground cover also quite critical, the study is not complete without a knowledge of the soil, availability of water, and microdrainage in the area.

Before options to purchase are negotiated, it is absolutely necessary to consider how much water will be needed in the planned operation and whether or not it can be supplied without incurring prohibitive costs. Water in excess of eighty gallons-per-minute may be needed when all the services,[2]

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[1]It is with these in mind, plus lodge area, parking lot and dormitory or motel buildings, that actual acreage is decided upon. A sample survey of existing Michigan ski areas indicated a range from forty acres to one thousand acres, an average of 265 acres in a development.

[2]Such as lodge area snack bar, first aid and rest rooms, as outlined in more detail under Chapter IV.

snow making equipment and supplemental facilities[1] are considered.[2]

The soil must be capable of supporting a good grass turf on the ski slopes; have sufficient drainage for drive and parking area construction; and be suited to building and lift terminal constructions. Regarding microdrainage, it is also important to note the effect of small springs on the use of an area. Since they won't freeze in the winter, skiing or tobogganing over a spring covered area becomes impossible. Summer use as a golf course may also be limited.

Information on these important considerations is best obtained from professionals in the field, which does not necessarily mean private consultants. Personnel in the Geological Survey Division and Lands Division of the State Conservation Department,[3] the Soil Conservation Service, U. S. Department of Agriculture, as well as the local Cooperative Extension agent, will prove most helpful.

Land acquisition and zoning ordinances

Having decided on the potential of an area or

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[1]Details found in this chapter under Laying Out Supplemental Winter Facilities and also Planning Use During Other Seasons.

[2]C. A. Gunn, Planning Winter Sports Areas (East Lansing, Michigan; Tourist and Resort Series Circular R-306, Cooperative Extension Service, Michigan State University, 1958), p. 5.

[3]Conservation Department, State of Michigan, Steven T. Mason Building, Lansing, Michigan.

areas,[1] no further study of the resource base should be made until it is determined that the desired properties are purchasable and local zoning laws would present no problems.

A Farm Plat Book, showing each parcel of land and its owner(s) by township, is available for most counties in Michigan.[2] Where these are not available, information on land ownership can be obtained from the township supervisor or the county treasurer.

Public properties labeled "U.S.A." or "State of Michigan" are usually controlled by an agency within the federal and state governments respectively. These agencies are authorized to sell or lease the land controlled by them, and it is with them alone that all transactions for public property takes place.

Zoning is not retroactive. Only laws already in effect concern the developer. But when determining the nature of the township and county zoning ordinances, it must not be overlooked that the winter sports area may include motel accommodations, retail equipment sales and liquor sales.

Laying Out the Slopes

At this point it is assumed that a suitable area has been purchased for development as a winter sports area. The

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[1]Here it is assumed that the potential was determined by combining the criteria outlined in the section on transportation in Chapter III and market-demand in Chapter III, not the natural resource approach alone.

[2]Rockford Map Publishers, 4525 Forest View Avenue, Rockford, Illinois.

slopes should be cut with a number of considerations in mind. The designer must carefully plot the slopes with each of these factors playing an important role in his decisions: orientation, determined by the effect of the sun and the effect of the wind; the curves and grade, from a maximum use and enjoyment outlook, as well as the safety standpoint; ground cover beneath the snow and microrelief; and vegetation between the slopes.

Orientation relative to sun and wind

Wherever possible, slopes should be laid out facing to the east or northeast. During winter months the sun has little chance to affect the northern facing slopes. Since the wind blows from the west or northwest during the same season, theoretically a combination of what is best by each climatological factor must turn out to be a northeasterly slope. But experience and data gathered during the winter of 1962-63 has made it apparent that the sun is less damaging to the snow cover than a strong wind, which resulted in better skiing on the eastern facing slopes. This is contrary to what many believe about the supremacy of northeasterly slopes.

Of course, both should be considered for development, but maximum use should be planned for the eastern facing slope, rather than the northeastern facing slope, if it is not possible to develop both at one time.

Figures one and two show two ski areas approximately three quarters of a mile apart. Following a particular

Figure 1. Oblique aerial view of [illegible] looking south. The slopes on the extreme left are facing directly east, those in the middle are facing directly north. The east facing slopes consistently have [illegible].

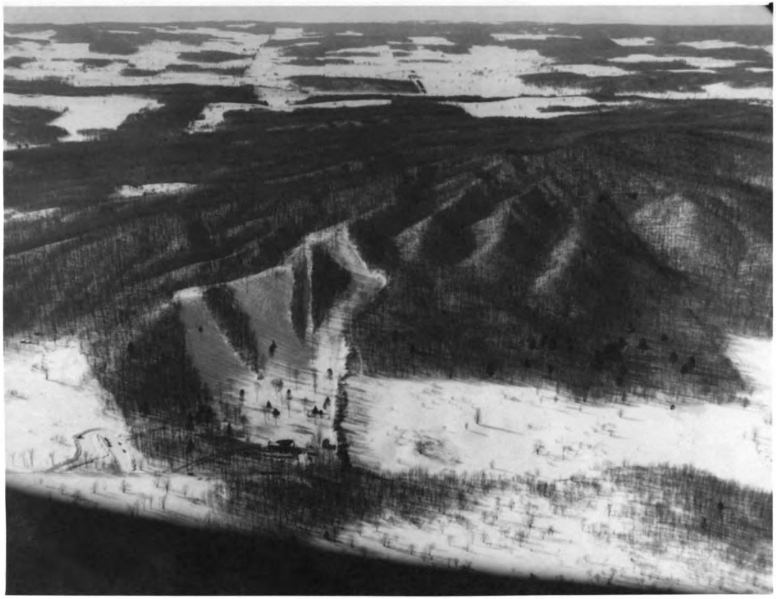

Figure 2. Oblique aerial view of ski area looking west. The slopes are facing east northeast, well protected from the wind and receiving little direct from the sun.

snowfall it was evident that the eastern facing slopes held their snow against the wind, making for an excellent weekend of skiing, while the northern facing slopes were stripped bare of their cover, yielding to the wind and resulting in very poor snow conditions for skiing.

Southern facing slopes with greater vertical and horizontal potential than any of the operating slopes go undeveloped. This is due to the universal premise that skiing is not possible on thoese slopes that must bear the winter sun.

It is true that skiing could not start as early in the season, nor last as late in the year, as the eastern and northeastern facing slopes. But there are a few noteworthy advantages in developing these slopes too, apparently overlooked by most area operators.

During the peak of the season, when overcrowded conditions frequently occur, the differential in snow conditions would usually be unimportant. Skiing could be pursued on these southern facing slopes earlier in the day and longer in the afternoon, because of better light conditions and comfort resulting from the warm sun.

While it is not recommended that the investor-developer depend on slopes facing south, possibilities to expand in this direction are too frequently overlooked when the potential is worth developing.

Cover between the slopes

The type of trees left standing as breaks between slopes does not influence the snow cover and wind nearly as much as the amount left standing to serve this purpose. Of course, evergreens, because they still have their needles during the winter, provide more wind breaking and shading power than hardwoods. But they also keep the snow in their branches and off the ground, where it is not of any value to the skier.

It is absolutely essential that ample cover be left standing to reduce the prevailing wind's snow moving power and discomforting effect on the skier. Again the point will be made that wind must be reckoned with as one of the major determinants of success. It is definitely more important than most area developers have recognized.

Areas that attempted to increase attendance by indiscriminant cutting over and enlarging their slope acreage found that new snow would not hold on these wide open spaces, and lost business because of it. Lack of snow cover on their cut over slopes could be directly attributed to the wind's erosive power and could not be blamed on the effect of the sun or less total precipitation for that period compared to the other areas.[1]

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[1]This was ascertained by actual check of snow conditions at two areas having received equal amounts of snowfall overnight. Protected slopes in both cases had excellent conditions; cut over areas had very poor conditions. There was dense cloud cover and thus the sun had little if any effect on conditions. Customers were moving from the area which had only one protected slope to the area with a number of them.

Ground cover on the slope

It was pointed out earlier that a check of soil conditions is essential to making a wise choice in site selection. The soil must be able to support a good grass turf, because a well groomed slope adds weeks to the ski season. Consideration must also be given to the possibility of a summer golf course operation.

The developer does not have much choice in selecting what type of trees exist as windbreaks, the wise use of what already stands being the critical point in this regard. However, decisions in regard to slope grooming will definitely fall on the developer. All earth moving should be completed before planting takes place, of course.[1]

Although there may be no possibility of using any of the slopes as part of a golf course during the summer, the area should be groomed as close to those standards as physically possible. This seemingly unimportant factor can make a significant difference in early and late season skiing. It does seem unimportant to many because during the middle of the winter season it may be buried beneath three feet of snow. But when the first few inches fall in November or there are only a few inches left in April, a well groomed

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[1]See also the section on Altering Natural Endowment in this chapter and the division of Chapter IV that deals with Safety.

slope is skiable while an ungroomed one is not. This means removal of debris such as stones, logs, and even twigs.

The actual nature of the ground cover planting will depend on the soil type plus plans for uses other than skiing. Creeping red fescue and winter wheat seem to be the most favored in Michigan. The chance for experimentation in this field to provide longer and better seasons is very real.

It should be a well known fact that once a dark spot appears in a field of snow, it spreads extremely fast. Principles of basic physics prove that the darker a material is, the faster it absorbs the sun's rays, converting them into heat energy. Yet many areas have no cover at all, permitting mudded sections to spread and thus limit or prevent early and late season skiing.

No one has made any attempt to move ahead in prolonging their ski season by trying a light colored cover such as pink iceplant.[1] A cover of this nature could not be used if golfing was planned, but it certainly would bear some consideration for planting on slopes to be used for skiing only. For specific details about kinds of turf a particular soil can support, the Cooperative Extension agent should be contacted for expert advice.

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[1]This is only one example from a group of light colored flowering plants, chosen solely as an illustration and not as a recommendation.

Making the slopes safe for all skiers

The actual plan for cutting of trees to provide open spaces for skiing should be a product of the factors previously presented on orientation and vegetation between slopes, plus maximum safety considerations[1] to be discussed now.

Here it is important to consider the skiing ability of the recreator patronizing the ski area, when and where most accidents occur, and why they happen. See Table One.

At least one half of the skiers at an area will be in the beginner or novice category, the balance in the intermediate or expert class. It is an extremely wide range to satisfy. No slope is too steep for the expert and no slope too gradual for the beginner. Problems exist in keeping the beginner off the more advanced slopes and keeping the expert out of the beginner's area.

The reason for keeping beginners off steep slopes is obvious. The reason for keeping the expert off the beginner's slope may not be so obvious, but it is every bit as critical. For one thing, if an expert skier must run the beginner's slope in order to reach the lift for his uphill return, he will be apt to seek another area to pursue his

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[1]The section on Safety, Chapter IV, deals with safety factors other than those affected by slope layout.

Table 1.[a]--Who gets hurt skiing, when does it happen and where does it happen?

1. Skiing is far less dangerous than most school sports and on any skiing weekend fewer than one per cent are injured. Considering the tremendous growth of skiing since 1946, this percentage is statistically insignificant. Of the injuries that do occur, most could be avoided.
2. The bigger the area, the smaller the percentage of accidents; the big areas have both better facilities and better skiers.
3. Teen-age boys are the most frequently injured. While only 10.5% of all skiers are between the ages of thirteen and seventeen, thirty per cent of those injured are in this age group. Overconfidence combined with a daredevil attitude and great energy make skiing injury statistics mirror automobile insurance rates for teenagers.
4. More men are injured than women, at a rate of about six to four.
5. If the reckless student is excepted (he accounts for almost half of the accidents), physical conditioning has a bearing on accidents--athletes have few injuries.
6. Experience helps. Those having two years of skiing experience are less likely to have accidents.
7. A third of all those injured are injured on their first day of skiing.
8. Instruction helps, too. Half of all those injured had no instruction. Of the other half, most had only a few lessons.
9. There is no such thing as a "safety" binding. Release bindings, to be effective, must be carefully and constantly adjusted. No binding or other gadget will save the reckless skier, or those he hits, from injury.
10. Most injuries are to the lower limbs (ankle, 39.98%) lower leg, 21.23%) (knee, 20.66%), and are either sprains (45%) or fractures (37%).
11. Sharply pointed ski poles are a potential danger, as are skies without Arlberg straps and improper clothing.

[a]Compiled from the National Ski Patrol Manual, personal observations and interviews with particular area patrolmen.

Table 1 - Continued

12. Seventy-five per cent of those injured were out of control.
13. The majority of injuries take place at the end of the day and at the bottom of the slope.
14. The "last run" is the one that 'hurts.'

pleasure. More important, though, is the fact that he is a threat to the safety of the beginner skier as he comes schussing through at speeds of thirty to sixty miles an hour.[1] The rather bewildered and wobbly newcomer doesn't know which way to jump, and neither does the expert. The result may be serious injury to one or both skiers. Therefore, slopes for the beginner should be separate entities, not merely the lower portion of more advanced slopes.

Other factors being equal, the wider the slope, the safer the slope. But a marginal point is reached at which additional width is not necessary, and in fact is undesirable because the snow on the open slope becomes subject to wind damage.

Narrow, steep trails, three to five yeards wide and over fifteen degrees, should definitely be kept to a minimum for safety and for maximum use considerations. Few people can actually ski these well, so one trail of this nature should be enough at most areas.

[1] Page 118 in the Appendix explains just how these remarkably fast speeds are attained.

Trails over gentle undulating terrain, however, are not only safe, but an overlooked potential for attracting and stimulating skiing as a family or group activity. Presently it is a rather insignificant part of the total ski picture. With the slopes becoming increasingly crowded, and as the opportunity to participate as an integral group diminishes, more and more people will welcome the advantages of cross country skiing or touring.

Curves in the slopes should be gentle and preferably on the check point terraces. Check point terraces are flat or relatively flat sections of a run which allow the skier to slow down or rest comfortably. In designing the slope, special effort should be made to include these check point terraces as safety factors, rather than eliminating them in an effort to produce a high speed run without so called "stagnant" sections.

To argue that terraces ruin a ski run is to deny the facts of geometry and safety. A check point terrace does not reduce the total vertical feet of skiing, but does in fact increase the total length of run.

Frequently an area is laid out so that the inclined slope runs right up to the lower terminal of the lift. This accident-inducing condition must be eliminated for the well-being of everyone involved. Ample flat ground should be provided at the end of all ski runs. This is the place where lift lines form and new skiers decide they are close enough

to the bottom to run the remainder of the hill unchecked. Most injuries occurring at the bottom of the slope today could be eliminated by better planning and allocation of flat terrain where lift and run meet.

Beginners' slopes should range from zero degrees to about twelve degrees, and intermediate slopes from twelve degrees to thirty-five degrees. Expert slopes at seventy-three degrees have been successfully used in Vermont, but this is a very rare and isolated example. Slopes ranging from thirty-five degrees to sixty-five degrees may realistically be classed as expert slopes. The steepest slope in the lower peninsula of Michigan approaches forty-five degrees.

Altering the Natural Endowment

Modern earth moving equipment can make changes in the microreflief and, sometimes, in the macrorelief. It is a common practice today. Not all of these changes are wise and many planned "improvements" never materialize because it becomes apparent that the idea was not soundly based in the first place.

Changing the microterrain features

Using earth moving equipment to create or destroy microrelief features in the terrain is the most frequent change made in the natural environment. Often the leveling process is used to remove small mounds known as moguls so the microrelief is nearly flat.

Beginners' areas especially are made completely smooth. Then the new skier must make a transition from smooth, gently sloping terrain to steep, moguled slopes. Therefore, moguls are commonly thought to be synonomous with difficult skiing. This is a misconception, no matter how many uninformed people may argue to the contrary. Skiers who have learned the correct method of skiing moguls know that they definitely make skiing easier, safer, and more enjoyable. Rather than making the sport more difficult, the turns harder to maneuver, they perform the opposite function and make it easier and safer.[1]

Most skiers find the moguls difficult to handle because the beginners' slopes offer no build-up to what lies ahead. The transition should be gradual, and it should be made when the fundamentals of skiing are being taught. Once it is understood how moguls increase turning ability, they become a pleasure to ski.

A beginner gets in the habit of straight running the slope because it is gradual and has no moguls. It is a bad habit and a dangerous habit. Naturally in trying to straight

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[1]Allen C. Willman, "Ride Those Bumps," Ski Life, Vol. 1 (January, 1959). Doug Pfeiffer, "How to Ski Moguls," Ski Life, Vol. 1 (February, 1959). Olaf Rodegard, "Don't Let Moguls Throw You," Ski Life, Vol. 2 (March, 1960). Jim Snobble, "Bunny Hope Off Bumps," Ski Life, Vol. I (March, 1959). Stein Erikson, "Come Jump With Me," Ski Life, Vol. 27 (January, 1963).

run a steeper slope there will be trouble, both because it is too steep for schussing and because the moguls, hit head-on, buffet and throw the novice like running a boat against breaking waves.[1]

Thus, to increase safety and enjoyment, moguls should be included in the planning of a ski area, proportional in size and number to the grade of the slope. They should not be considered as undesirable or dangerous as long as the skier is taught proper technique and understands basic ski principles from the beginning. If each ski area would approach the microrelief development rationally, its accident rate would be reduced.

Increasing total vertical drop

The possibilities for developing top ski areas by artifically building up the total relief is often over-estimated. In fact a mediocre ski hill will never become a great ski hill. Some improvement on the total vertical feet of skiing available can be made, but even small additions are expensive and lack vegetative cover to protect the skier and hold the snow. When an addition is made to the top of a hill, the nob protrudes above the natural forest cover. Thus it is bitterly cold and quickly denuded of snow as it falls, or soon thereafter. Really noteworthy supplements

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[1]Rodegard, op. cit., and Duncan Grandin, "Traversing Moguls," Ski Life, Volume 2 (February, 1960).

would be extremely expensive. The reason for this is a fundamental engineering principle often overlooked by would-be developers who purchase properties intending to build a hill.

For every foot of elevation added there must be approximately twenty-five cubic feet of base added.[1] Thus the expense of adding more than a few feet rises geometrically with the increase in elevation, becoming excessively expensive for any major consideration.

Snow machines

Without a doubt the two most significant advances made in the resource base adjustment to demands in the ski industry have been snow machines and night lighting of slopes. Presently Michigan has twenty-two ski resorts with snow machines and thirty-five areas with lights for night skiing.

Snow machines can add many days to a ski season. They even make skiing possible where previously it could not have existed.[2] Decisions in favor of or against purchasing snow making equipment should be made only after carefully weighing several considerations.

The water needed for operation must be readily available at a reasonable cost. Assuming that water is available,

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[1]It is analogous to building a pyramid with blocks, so simple and obvious, yet overlooked by many investors.

[2]Jack Zanger, "Snow Machines: A Boon to Eastern Skiing," Ski Life, Volume 1 (December, 1959).

serious question will remain in terms of how much increase in demand, and therefore revenue, can be expected as a return for the investment in artificial snowmaking equipment.

The cost of the machinery itself has such a wide range that figures indicating the capital expenditure needed to get started must be weighed carefully. This range is wide because the principle involved is so basic and simple that a snow machine can be made with a multitude of different raw materials. If there happens to be surplus or second-hand parts available in the area, it may be possible to build one from these spare parts at a very reasonable cost.[1] If new equipment must be purchased from a snow machine manufacturing firm,[2] the cost could become extremely large.[3]

Basic components are a compressor and water pump, pipeline capable of carrying water and air under pressure, and the nozzles.[4] In any case the cost of the entire outfit will not exceed the cost of a T-bar installation, and frequently can be obtained as inexpensively as the installation

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[1]Ranging from $300 to $1,000 for a 350 foot hill.

[2]Ranging up to $50,000 in some cases.

[3]The only firm, known to the author specifically in this business is Larchmont Snow Machines, Inc., Larchmont, New York.

[4]A typical operation would require eighty gallons of water per minute to be pumped at sixty pounds of pressure per square inch, and air pumped at 1000 cubic feet per minute.

cost of a rope tow.[1]

Since this is a capital expenditure and not a repeated investment cost, the main consideration will be the operational expense. As in other phases of the total development, vertical feet involved in the operation greatly affects the cost of making snow. The most expensive phase in making snow is transporting the water uphill. The higher the hill, the more expensive it becomes, and when water must be pumped up a 500 foot hill, the cost can be prohibitive.

The average cost of making artificial snow in Michigan is twenty dollars to cover one acre of slope to a depth of one inch of snow. One nozzle covers about 120 square feet with one inch of snow every half hour of operation.

The greater the competition from other ski areas nearby, the more advantage gained by having snow making equipment. Or, if not an advantage because they too have this kind of equipment, it becomes a requirement for maintaining demand.

The machines usually add days to the season by permitting an earlier opening and operation during extended periods of inadequate snowfall. The season will also extend longer into the spring because of a greater base accumulation which is not so quickly lost through sublimation. However,

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[1]This analogy is made because the height and length of the hill are major determinants of the cost in both cases.

there is little chance of making new snow in the spring.

The best temperature for making snow is between 25 degrees F. and 28 degrees F. The colder it is, and the more air supplied per unit of water, the lighter the snow produced. Heavy snow makes a more stable base, lighter snow is better for actual contact with the skis. In no case, however, should it be assumed that artificial snow can approach real snow as a skiing medium. It is true that it makes a very good base, and of course is better than no snow at all when nature has not made a sufficient contribution. But articles in leading magazines have been overly optimistic in their claims that artificial snow is better than real snow.[1] For one thing, it is not like nature's snow. Real snow is formed by direct sublimation from water vapor, which is a gas, into the solid state. While it may seem like a fine line to draw, artificial snow is not gas sublimated to a solid, but tiny drops of liquid water frozen on contact with the cold air. The result will always be a relatively heavy snow compared to natural snow no matter how much air is added to the mixture.

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[1] "The Story of Man-Made Snow for Skiers," Reader's Digest, Volume 77 (December, 1960). Lydia Lawrence, "The Story of Man-Made Snow for Skiers," Today's Living (November 13, 1960). Andrew Pesky, Advertising Dynamics for the United States Ski Resort Industry, M. A. Thesis, School of Hotel, Restaurant and Institutional Management, Michigan State University (1961).

Another important consideration in using artificial snow making equipment is the availability of dependable personnel to operate the apparatus. Because slight changes in temperature and humidity may substantially alter the resulting snow, machines left unattended frequently ice up the slope or in some way ruin ski conditions rather than improve them. Snow machines can add revenue to an area by increasing the volume of business on days otherwise unsuited to skiing.

Skiing by artificial light

Night lighting of slopes can add hours to each day, taking advantage of good skiing conditions while they exist, and increase the use of expensive equipment otherwise left idle. Properly installed, artificial lighting leaves nothing to be desired in visual acuity. Shadows thus created make possible a detailed reading of the microrelief as the skier moves downslope. In most cases it is easier to read the slope with artificial lighting than during the daytime. This results in increased safety and an excellent opportunity to work on technique.

The decision of whether or not to install artificial lights at an area is more directly ascertained than the decision on snow machines. If the clientele is, or will be, drawn from urban areas approximately one hour's driving time or less from the area, installation of lights should be

given serious consideration. When skiers can drive to the area after work or classes during the week, night skiing can be big business. Ski areas outside of large cities are frequently booked up every evening with ski clubs organized at colleges, high schools, factories, shops and for just pure sociability. These people ski evenings because it is not possible for them to ski during the daylight hours.

At an area catering to skiers traveling longer distances and driving more hours than could be comfortably undertaken in one evening, night lighting may be unjustified. These are areas where weekday skiers are at the resort for a ski week. They ski all day long and would seldom pay extra to ski again at night. Probably they would not take advantage of the night skiing facilities even if they were part of the ski week plan at no increased cost. The installation of lights probably will prove unjustifiable where patrons have had the opportunity to ski all day long. When the sun goes down, skiers who have been on the slopes all day look forward to rest or relaxation of another sort.[1]

Laying Out Supplemental Winter Facilities

Where it is consistent with the natural setting and demand, recreation facilities to supplement skiing are to be

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[1]This supplemental activity will be described in the section immediately following, entitled Laying Out Supplemental Winter Facilities and in the section on Serving the Public, Chapter IV.

encouraged. Ice skating, tobogganing and swimming in a heated pool appear to be the most favored activities where skiing is also popular.

Tobogganing

Toboggan runs are not practical for most private resort operations. They must be completely isolated from the ski area to maintain safety. The uphill return must also be of a completely different nature from the ski lifts. The result is a sizeable increase in the acreage needed for development.[1]

The high speeds attainable on skis can also be reached on toboggans, but there is virtually no control over the path of a toboggan. Chutes must therefore be provided to give at least initial directive to the toboggan. There is a great chance of turnover and injury once the toboggan has left the chute, so only when a chute has been constructed for the entire length of the run does the sport approach maximum safety standards.

Since they require constant attention during use, personnel must be hired specifically for this purpose. These added costs plus a substantial injury rate give tobogganing a submarginal rating as far as return on investment is concerned.

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[1]To provide safe tobogganing, smaller ski areas would have to double the size of the original acreage allotment intended for skiing alone. A large area would require about a 30% to 50% increase in acreage.

Public agencies which operate parks cannot dismiss the sport quite so easily, however, because a monetary evaluation is not their sole basis of judgment. Here the object is to provide the public with the opportunity to participate in and enjoy outdoor recreation activities. Since tobogganing is a sport favored by many people, its provision at public parks should be seriously considered.[1]

Ice skating

Ice skating rinks are desirable at both public and private ski areas. The facilities needed for ice skating are simple and relatively inexpensive. Flat land with the ability to hold water is not even necessary today. If the land is not flat enough, a bulldozer or grader can accomplish the task. Soil too permeable to hold water is easily converted with one of the new synthetic coverings made especially for that purpose.[2] At private areas a ski lodge is usually nearby for changing, warming and snacks; at public areas a shelter should be provided to furnish these comforts for ice skaters and tobogganers.

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[1] California Public Outdoor Recreation Plan, Part I, California Public Outdoor Recreation Plan Committee, Sacramento (1960).

[2] See also: page 43, under Planning Use During Other Seasons.

Swimming pools

Heated outdoor swimming pools can be a definite added attraction at a winter resort, as well as valuable for use during other seasons. They provide a good opportunity for relaxation and social gathering after the day's skiing has been completed. During the day, less robust members of a family or group find the pool conveniently distracting.

The pool will unquestionably get much more use if it is glass enclosed. Building a pool without an enclosure should not be considered.[1] Resorts catering to ski weekers and hundreds of miles from the population centers will find a pool worthy of consideration, but so will resorts nearer the urban complex. Here the determinant is not so much the distance skiers travel but rather the total complex of facilities to be provided. If there will be skiers in the area at night, either because they are staying overnight in the area, or because they live close enough to travel to the area after working hours, then a pool will probably be a sound investment.

Other activities possible during the winter season include ski jumping, skijoring, sledding and saucering for the younger set, old fashioned sleigh rides and ice fishing.

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[1]"Under this Plastic Roof--Year Around Swimming," Sunset, Volume 122 (March, 1959).

These, with the exception of sledding and saucering, are extremely specialized supplementary activities requiring unusual demands and facilities in order to be justified. More sledding and saucering should be provided at public recreation sites, away from the skiing and tobogganing.[1] They do not belong at a private ski resort in most instances because of the substantial increase in costs to provide them safely, with no returns to offset this expenditure.

Planning Use During Other Seasons

Maximum return for investment

In many cases a ski area should be designed for use during all seasons of the year. For one thing, once initial investment and capital improvements have been made, use during the other seasons brings return on investment already made. Since many of the costs involved in a sound winter sports area development would not have to be repeated in developing the area for off season use, net revenue from the use of facilities already existing could be used to help pay for capital improvements and property otherwise left idle.

Chair lifts can be operated to give the tourist a ride to the higher points of elevation in the area, usually providing a panoramic view of what lies for miles around.

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[1] California Public Outdoor Recreation Plan, op. cit.

The investment in ski lifts is a substantial one, and the cost of running them comparatively small, so that operation during the off season is definitely a sound move.

It is sound not because any great profit will be reaped from those paying for its use, but because it has a tremendous attracting quality, adding substantially to the overall demand of the resort.

The swimming pool is usually in demand during all seasons. Once the pool has been built it will be another valuable item in the total list of desirable features for attracting winter and summer business. Here again initial investment is the largest expenditure, so allowing a pool to go unused could be poor management. The ratio of operating costs compared to charges is more favorable in this case than in that of the chair lifts, resulting in a real monetary profit along with the increased demand.

Tennis courts and an ice skating rink can be planned simultaneously. The most obvious need for skating is a flat area and water-retaining surface. Tennis also requires a flat, durable, water-shedding surface, which in all instances can serve as a base for an ice skating rink.

The most common materials used for tennis courts today are cement and asphalt. These provide an excellent surface, smooth and non-permeable, for flooding during the winter. One precaution must be taken, however, and that is related to the phenomena mentioned earlier about dark materials

absorbing heat much faster than light colored materials.

The dark tennis courts must be covered with something to make them light; otherwise the ice will be sloppy or non-existent on a sunny day, even though the temperature is well below freezing. Paint or cloth could be used, but these are expensive compared to the simple procedure of spreading lime on the courts. This is inexpensive and requires no repainting for the tennis season.[1]

The opportunity for combining the development of water resources for snow machine operation and sport fishing is also promising. Fishing as a form of recreation needs no endorsement. The need for a large and constant supply of water to make artificial snow was discussed in the section on Altering the Natural Endowment.

Most areas use one of two sources for their water supply. If there is a stream running through the property with sufficient flow to supply the needed water, it is tapped as such. Where this condition does not exist a pond is usually built to trap the water from a smaller stream, springs or run-off and ground water.

The stream or pond offer excellent resources for management and use as a fishing site. Help is planning this type of project can be obtained from the United States

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[1]David Fritz, "Melt Resistant Ice Rinks," American City, Volume 75 (April, 1960).

Department of Agriculture bulletins, Cooperative Extension agents, and the Michigan State Conservation Department. Fishing could easily be a major factor in creating demand for the area during the off season.

Many of the areas being developed for use as winter sports areas have potential for use as a hunting area also. Unless the area is larger than the average ski resort, hunting should not be allowed or encouraged during the ski season because crowding the two activities close together will naturally become dangerous. However, managing the same area for fall hunting and winter skiing is not out of the question.

The hilly terrain associated with skiing also makes a fine resource base for golfing. Many of the improvements made for maximum winter use can also be used for summer operation of a golf course. Water is needed in good supply for both operations. The slope should be groomed to as fine a cover as can be feasibly obtained, and there is no finer groomed area than that of a golf course.

The lodge would play an important role as the club house, and could be used as such for the swimming, tennis and fishing enthusiasts. Hunting and golf would probably not be developed at the same site for safety reasons, although it has been done at some of the larger areas with enough acres in the operation to carry on both activities without conflict.

The lodge and service accommodations are the most likely profitable aspects of the entire off-season operation, of course--the aforementioned activities being used mainly as attractors to the site. Accordingly the lodge deserves detailed study, which will be discussed in a later section,[1] since it is more associated with capital improvement than the natural resource base.

Other activities that may be added to the list of things visitors might be interested in while staying at the lodge include archery, horseback riding and hiking, none of which detract from the overall concept of the outdoor recreation setting.

Of a completely different nature, but worth mentioning, is the use of the area as a summer camp. This includes at least two distinct types. One type is that operated for children, with counselors and the planned group activities usually associated with a children's camp. The other is the type of camp operated on a daily or weekly fee basis, charging families or groups for particular camp sites and use of certain facilities, but with no overall program planned for them.

In all of the cases mentioned for consideration as having potential value in making maximum use of the area

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[1]Chapter IV, CAPITAL IMPROVEMENTS AND PROMOTION under the section on Layout and Choice of Equipment.

during the other seasons of the year, it is evident that the land and facilities developed for winter sports use are easily convertible for other uses. Basic economics will show full use and year around returns on capital expenditure a sound principle.

Personnel considerations

Another important consideration is the retention of key personnel. Finding and holding trustworthy, skilled labor is always a major problem in winter resort operation. Most of the operations during the winter do not need college graduates in order to remain operative, but most do require training. Operating the lifts, the snow machine, the slope grooming equipment, and the swimming pool, are examples of operations that need dependable personnel trained for the job. Training them costs the operator many dollars and creates many problems. Having untrained or undependable personnel in these positions will mean loss of business and perhaps injuries resulting in law suits.

Snow machines not operated properly can ice up a slope and ruin it. Snow grooming equipment used imprudently will create ruts and scars in the snow cover to the disappointment of the skier. Lifts run by inexperienced men are a nuisance to the user. All of these can be extremely dangerous operations as well as creating dangerous conditions for the skier.

It is not an easy job to train men for these positions. If the operation is during the winter season only, personnel recently trained may leave for more permanent positions. Or they may leave a few weeks prior to the end of the season to assure themselves of a summer job elsewhere. They may never return in either case.

Obviously many of these key personnel could be put to work in off season operation on the golf course, at the swimming pool or in camp. Managers of ski areas in Michigan and other leading ski states interviewed by the author, mention the labor problem as one of the most troublesome encountered. Personnel guaranteed the opportunity for year around employment will be more inclined to stay on the job instead of moving from place to place. Men holding year around positions with a permanent position in the area's total operation, will prove more reliable and trustworthy than others who have no interest in the success of the total operation.

CHAPTER III

THE MARKET AND DEMAND CONSIDERATIONS

Market and demand are considered in one chapter because the total population surrounding an area, while being the starting point and a major indicator, does not always give a true picture of the potential users or the true market from which an area may expect to draw. This is a result of the demand factor. Every skier is not attracted to the same type of ski area as his counterpart, and the sport of skiing in general appeals to certain groups of people more than others. Each winter sports area must be planned accordingly.

Potential Users of Winter Sports Areas

In determining the market from which an area may expect to attract its customers, three questions the investor must answer are: Where will the customers come from? Who is interested? and Why are they interested? That is: the total population within reach of the area; the age, education, and occupation of the people most inclined to become skiers; and what will bring them to the area.

The starting point and major indicator of the market is the total population within reach of the area. The total population within reach of an area is a variable resulting

from the interaction of the population and the distance from the market to the resort. The quality of skiing at an area will, of course, have much to do with the demand the resort creates and, therefore, the number and type of people interested in making the trip to that area.

Quality as used in this study is determined by the vertical feet of skiing offered; the horizontal run available; the number of chairlifts, T-bars, and rope tows; supplementary facilities such as a swimming pool, ice skating or tobogganing; the number of certified instructors; a safety rating; the overnight facilities available; the rental equipment available; whether or not night skiing is offered; the amount of snowfall; and whether or not a snow machine is owned.

The prediction of how many skiers will be using any particular area is obviously becoming an involved and difficult task. The independent variables as outlined thus far are the demand and the market. But demand in itself is a variable depending on the quality of the area and the individual ski type being catered to by the area. The market is dependent on the total population and its distance from the resort as well as the percentage of people from this population who are interested in skiing in general.

While it may sound involved, very definite advantages can be gained by a careful analysis of these variables.

The market

Where will the skiers come from and who will they be, are questions mentioned earlier that may lead us to a better understanding of the market as determined by the population, the distance from the resort, and what kind of people become skiers. The total population is, of course, the most convenient variable to find. Maps such as the one on page 55 and tables found in the appendices are reliable indicators of where the population centers are found. These centers are only part of the story, however, since the distance from them to the resort is not a straight line determination.

Distance can be defined in a number of ways, depending on the user's need and intentions. A term frequently used by those dealing with recreation travel is social distance. However, this is not what is important to a skier. Skiers usually think only in terms of how many driving hours it will take them to reach an area, being intent on getting from home to the ski hills as quickly as possible. Since there are no intervening attractions to mitigate the desire to arrive at a particular resort, the total driving time is the distance to be considered here.

The State of Michigan has one of the nation's finest highway systems. It has limited access highways capable of transporting the traveler across the state in less than three hours. Detroit to the Mackinac Bridge is a four and one-half hour drive and many recreation areas are found between those

two points. Chicago, Gary, Toledo, South Bend and Fort Wayne are cities approximately six hours drive from the bridge.

Presently there are some gaps in the system being completed which will shorten these times considerably. When Michigan's neighbors have completed and connected their super-highways with this state's system, there will be 12.5 million people added to the market that is within six hours driving time of the northern Michigan recreation area. See maps on pages 52 and 53.

This sytem of superhighways is kept quite free of snow during the winter months. No other state in the Mid-west has a reputation for efficient snow removal comparable to the State of Michigan. Thus, speaking on a total market access basis, there is no doubt that the potential customer has a better than usual transportation system available.

Since 85 per cent of the nation's travelers depend on highways to carry them to their destination,[1] and even the remaining 15 per cent must eventually resort to the roads to move them from point of debarkation, the most important transportation system for the potential investor-developer to consider is that of highways.

Airplanes, trains and boat travel will be discussed at the end of this section, because they are becoming

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[1] Statistical Abstract of the United States, (1957).

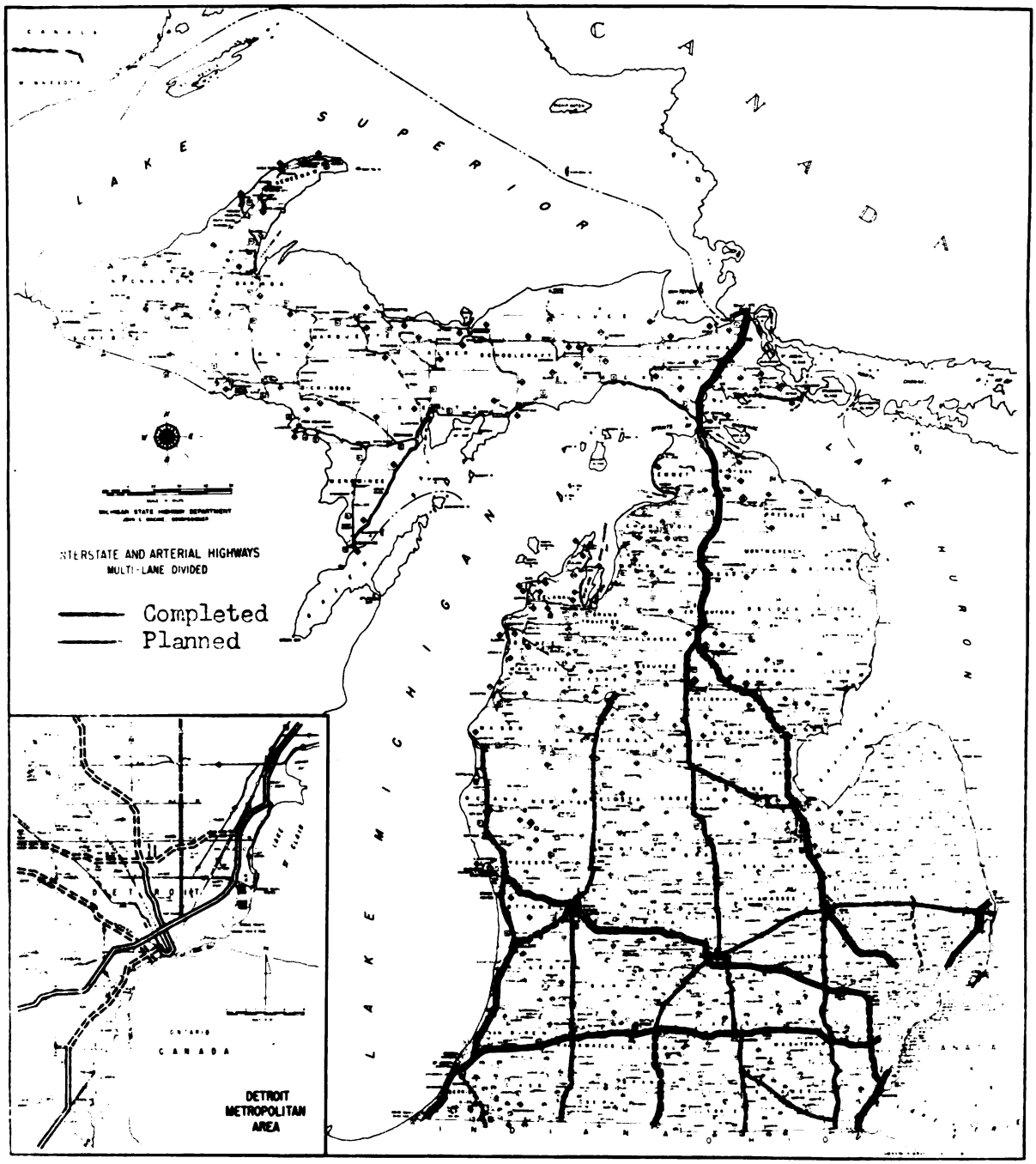
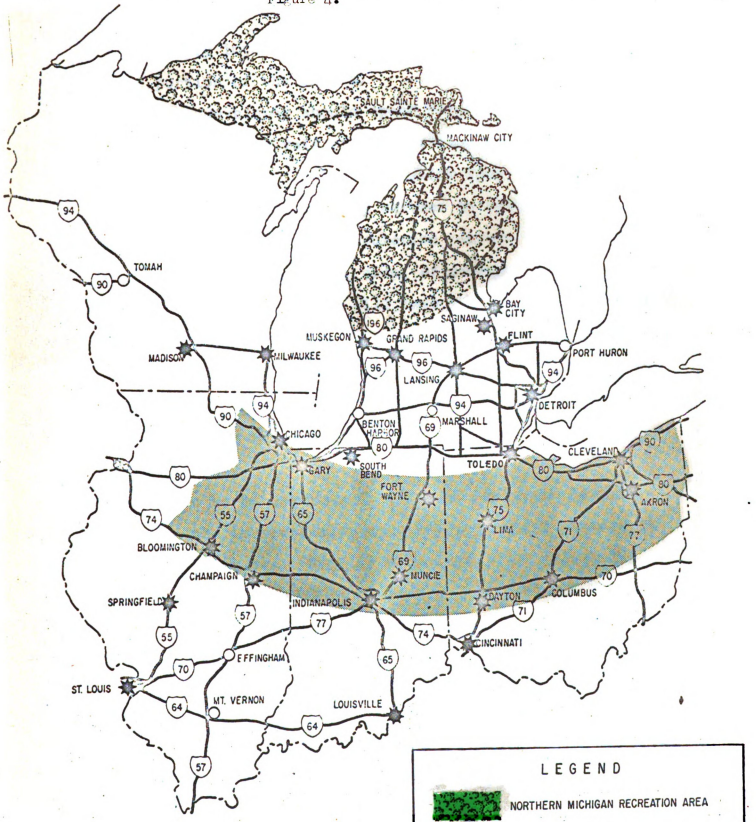


Figure 3. Planned and completed interstate and arterial highways.

MICHIGAN RECREATION AND MODERN HIGHWAYS[1]

Figure 4.



1 Coloring by G.C.Besch
PREPARED BY
Michigan State Highway Dept.
SYSTEM PLANNING
— OFFICE OF PLANNING —

increasingly important, although still carrying a relatively minor portion of the skiers.

The developer should spend considerable time in making a critical analysis of the existing roads and highways which will be used to carry the skier from his home to the winter sports area. Knowing whether or not adequate main arteries link the larger population centers with the ski area is the most important step, of course, but it is not enough. Many competitors will have the same good fortune, since Michigan does have an excellent super-highway system, kept efficiently free of snow. Using a map as the one on page fifty-three, in conjunction with the one depicting population centers on page fifty-five, the first step is not a difficult one.

Not to be overlooked, although not shown on this map, are the increasingly important population centers in neighboring states. Many of Michigan's more successful winter resorts receive up to twenty-five per cent of their trade from these out-of-state markets.[1] Ski Life magazine indicates the average Midwestern skier spends as much time on the road as he does skiing.[2] The developer who takes this into consideration and proceeds in his search for an

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[1]Results of interviews and questionnaires sent to Michigan ski resort managers.

[2]"By Skiing Obsessed," Ski Life, Volume 27 (January, 1963).

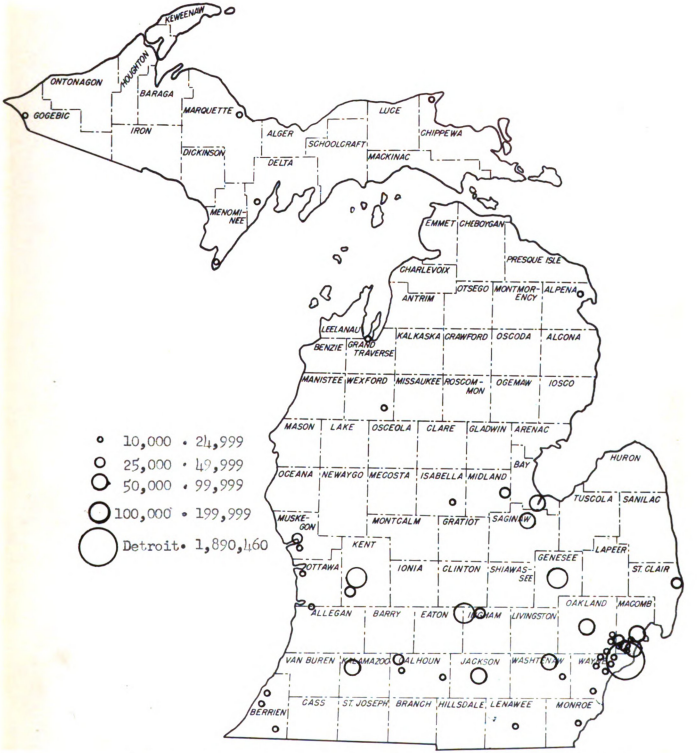

Figure 5. Distribution of urban places of 10,000 or more, 1962.

area with this in mind will be much better off than one who considers the natural resource base alone.

Another step, which may take a little more work but also may be a critical point in the success or failure of an area, is a check of the carrying capacity, road condition, snow removal and road signs from the point where the traveling skier must leave the main thoroughfare to get to the ski area. Many winter sports areas in the northern recreation area are served by the new super-highway traveling north and south through the middle of the state. But there is great differentiation when it comes to the highways connecting the area to the multi-lane highway.

The traveling skier very definitely considers these secondary highways in making his choice of ski area for the weekend. Besides checking the carrying capacity of existing roads between the main arteries and the intended ski resort, it would be wise to determine whether or not these roads are included in the plans for improvement by the highway departments. The local highway departments' consistency and efficiency in snow removal should also be ascertained.

Some managers of ski resorts associated with a particular town complain that there is no sign on the super-highway indicating the turnoff exit for the town. While something like this is, of course, not important enough to change the decision of whether or not development should take place, it

should be checked early so that a request can be made to alleviate the situation prior to the area's opening.

Other methods of transportation are becoming increasingly important to the ski industry as they carry more substantial numbers each year.[1] The ski resorts in the northwestern corner of the lower peninsula are in especially good position to attract skiers from the Chicago, Milwaukee and Green Bay areas via ferry boat across Lake Michigan. A sizeable number of skiers already take advantage of this mode of transportation to ski Michigan's fine slopes. There is opportunity to make better use of available water transportation through more development and promotion, for many winter sports areas near Lake Michigan's eastern shore. Travel to Michigan ski areas by rail is practically nonexistent for some reason, although both western and eastern United States ski areas, as well as those in Canada's Laurentians, use this means of travel quite extensively.

The trend to use small and medium size airplanes for private recreation travel is growing fast.[2] At least two northern ski resorts reported having landing strips and another is in the process of being completed. A number of other resorts offer free passenger service from the local airport to their area.

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[1]Pesky, op. cit.

[2]Statistical Abstract of the United States (1961).

No matter how appealing this mode of travel becomes to the skier, and airplane manufacturers are really aiming their sales effort at affluent skiers,[1] it will not take over as a major or even substantial carrier of skiers in the foreseeable future.

Ski tripping by bus, like the rail situation, doesn't seem to be popular in Michigan, but in other sections of the country it is a major carrier of skiers. This doesn't mean there is no possibility to develop and promote travel via chartered bus.

After making a critical study of the from where aspect in determining the real market, having looked closely at the total population and means of travel, the next step that must be completed is an analysis of the by whom aspect. Integrating the two will reveal the real market from which skiers can be drawn for the winter sports area, rather than only a picture of the market in general. Of course, intervening opportunities must be reckoned with, as discussed in the next section on Demand.

One thing the developer should be aware of in his microanalysis of the population is the dynamic nature of the numbers becoming interested in outdoor recreation. While it is impossible to predict just how long the trend towards

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[1] Time, Volume LXXXI (February 22, 1963), pp. 18, 19.

an increased percentage, as well as a total increase of the number, of people wanting outdoor recreation will continue, it is safe to say it will probably not level off for another twenty-five years.[1]

The effects of increased mobility, more leisure time, a higher disposable income, and growing population are multiplicative. That is, instead of just a simple increase in demand for outdoor recreation resources, it will be tripled by the year 2000.[2] There is not much need for further study by the investor of this surging demand for outdoor recreation in general. It is on the increase and will continue to grow substantially for some time to come.

Determining the type of individual or group within this tide of recreators that will be most interested in skiing is one of the most important studies to be completed. From this the investor-developer can plan the winter sports area to create maximum demand for its use by potential interested parties. Surveys conducted by Ski Life[3] and a graduate student[4] at Michigan State University place the

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[1] Outdoor Recreation for America, Outdoor Recreation Resources Review Commission, Washington 25, D. C., (1962).

[2] Ibid.

[3] Ski Life, Market Analysis Survey, Ski Publication, Inc., (1958).

[4] Pesky, op. cit.

average age of the skier somewhere between twenty-two and thirty-two years of age, respectively. The thirty-two years mean age indicated by Ski Life is notably higher because of the fact that magazine subscribers would naturally be a certain minimum age. Most teenagers can't afford to or don't subscribe in their own name.

More important than the mean age of skiers is the percentage to be found in each age class:[1]

Table 2.[a]-Age groups of skiers based on U. S. sample of Ski Life magazine subscribers

Age	Per Cent	Age	Per Cent
Under 15 years	1.8	35 to 44 years	22.8
15 to 18 years	9.1	45 to 54 years	8.7
19 to 24 years	16.1	55 to 64 years	1.7
25 to 29 years	16.8	65 or over	.8
30 to 34 years	22.2	Total	100.0

[a]Ski Life, Market Analysis Survey, Ski Publication, Inc., (1958).

This gives the developer a more definite basis on which to determine proportionment of investment. Other information gathered by Ski Life included the distribution of skiers

[1]Outdoor Recreation Resources Review Commission Book #2, Marginal Run Totals for Master Items General Group Descriptions, has found the age groupings to be essentially the same.

according to marital status. The survey indicated that 49.1% of the people were married and 48.0% were single. The remaining 2.9% was made up of widows, divorcees and widowers.

It is worth pointing out here that the figures shatter the somewhat stereotyped and obvious misconception that all skiers are bachelor playboys and party girls. The developer can make good use of this knowledge in the planning stages and in management later on.

Dividing skiers into occupational groups also can add valuable information to the list of bases on which development and management should be conducted:

Table 3.[a]-Occupational groups of skiers based on U. S. population sampling by questionnaire

Group	Per Cent	Group	Per Cent
Housewives	1.00	Chemists, Engineers	7.00
White Collar Workers	19.00	Doctors	3.00
Executives	29.00	Lawyers	0.75
Pilots	0.25	Students	33.00
Researchers	1.75	Stewardesses	1.00
Nurses	1.00	Secretaries	4.00
Ski Instructors	1.00	Teachers, Professors	6.00
Blue Collar Workers	6.00	Unemployed	0.25

[a] Andrew Pesky, Advertising Dynamics for the United States Ski Resort Industry, M. A. Thesis, School of Hotel, Restaurant and Institutional Management, Michigan State University (1961).

It is easy to see that a substantial majority of the skiers are students and the executive-white collar type.

Knowing the educational background of those who patronize ski resorts is also vital in planning the winter sports area and programming its operation. This is the educational breakdown of skiers:

Table 4.[a]--Educational groups of skiers based on U. S. sample of Ski Life magazine subscribers

Educational Level	Per Cent
No high school education	1.0
Some high school education	8.8
Graduated from high school	12.8
One to three years beyond high school	29.9
Graduated from college	25.3
Postgraduate	22.2
Total	100.0

[a]Ski Life, Market Analysis Survey, Ski Publication, Inc., (1958).

Obviously the majority of skiers have had some college education, and only 9.8% do not have a high school diploma.

From the results of these surveys it should not be difficult to proportion investment money, lodge space, facilities for skiers and non-skiing members of a family, and land use accordingly so that maximum use is assured,

thus keeping the recreator happy and giving a sound return for invested capital.

It must be pointed out, however, that the minority groups should be served, too, and not discounted simply because they are a minority. That is why the term apportionment is used. Public agencies especially have to keep in mind that everybody has a right to outdoor recreation.

Demand

This term was used in the preceding section to explain the general increase in total numbers and percentage of people demanding outdoor recreation facilities. It was a means of market description. Now it is important to more specifically consider the demand for skiing and the means by which it may be created at an area.

Nationwide it appears that skiing is growing in popularity at a rate to rival boating and camping, and Michigan is no exception to this surging demand for ski facilities.[1] Nationally the number of skiers has doubled twice since the 1951-52 season and it is expected to do so again by the 1963-64 season.[2] Based on the national average of growth in

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[1]Results of survey conducted by the author during the 1962-63 season indicate 68.8% more visitor-days of skiing than witnessed in the 1959-60 season.

[2]J. H. Auran, "Wanted: Room for Three Million More Skiers," Ski Life, Volume 27 (February, 1963).

number of skiers, Michigan will have to provide facilities for about 320,000 skiers by 1980. Skiing in Michigan is apparently growing even faster than in the nation as a whole.[1]

With the knowledge that skiing in Michigan is growing rapidly and the fact that some Michigan ski areas are tremendously overcrowded on a number of weekends, it might appear that any new winter sports area would become successful, regardless of what it offered the public. But since the 1959-60 season there have been eleven ski resorts forced to suspend operations,[2] and of the eighty-six that operated during the 1962-63 season, only seven were operating at a profit.[3] This is indication enough that precautions must be taken to make sure the potential customer will find the facilities demanded.

The failure to meet demand is not in the natural resource base in many cases. True, there are a few areas with very meager resources in the way of hills and snow that have failed. There are others, however, that made the necessary adjustments and planned wisely enough so that a

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[1]Messer, op. cit. and Ski Life, Volume 27 (January, 1963), op. cit.

[2]Tabulated from Pain, op. cit. and the Michigan Tourist Council's Ski Directory for 1962-63.

[3]Fred Bocks, President, North Central United States Ski Resort Operators Association.

successful operation resulted.[1] Of course, the natural resource base is important and is the first consideration in site selection. But it is only the first step in satisfying the skier in order to operate a successful winter sports area.

To satisfy the skier's demand the winter resort must now supply the skier with much more than just hills, snow and tows.[2] Skiers still want good ski conditions and a more than just adequate lift to the top, of course, but now they also demand the convenience of good food and lodging, the opportunity for an active apres' ski life,[3] and the finest in rental equipment and ski instruction. It has become painfully obvious to some resort managers that their own complex does not draw the same numbers as consistently as a rival with no better a resource base than he controls.[4] The smaller volume of business may be attributed to the lack of development and provision of services at the marginal area. When the potential customer is given a choice between

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[1] Detroit Free Press, January 29, 1963, "Ski Trails," by Terry Edwards.

[2] The subject of ski lift considerations is covered in Chapter IV.

[3] "Those Carefree After Ski Hours in Vermont," Ski Life, Volume 2 (March, 1960).

[4] Comparable vertical and horizontal runs; snow conditions as a result of snowfall and slope development with regard to wind and sun.

two ski areas with equal physical resources for skiing, he will probably choose the one that offers the most comfortable ride to the top, a spacious lodge with an atmosphere, and a variety of entertainment for the evening.

Intervening opportunities

The problem of competition is always present where goods and services are valuable commodities capable of returning a profit on investment. Skiing, and all that goes with it, falls into this category. There is some justification in analyzing the intervening opportunities between the major market areas and the proposed winter sports area. The question is: which areas between the market and the proposed ski resort are actually intervening opportunities? Since the question is one of competition, the basic problem becomes one of evaluating the quality of an area and determining the type of business sought.

Not all ski areas on the route from market area to the one in question will be intervening opportunities because not all of them will be offering the same facilities or competing for the same clientele. By assigning points for definite factors of quality[1] a rough idea of the areas that are actually intervening opportunities offering serious

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[1]The factors as listed on page 119. An arbitrary assignment of points for these factors is found in the appendix.

competition can be ascertained. This is not meant to be a hard and fast rule on which the investor-developer bases all decisions. But it could offer tremendous insight to the total ski industry picture, used in conjunction with all the information on who skis, as outlined in the previous section. Any resort between the market and the area being studied with an equal or greater amount of quality points will probably offer serious competition. Those with considerably fewer points will be drawing a different type of skier, and probably not be in such direct competition.

The demand for skiing apparently is inelastic with respect to the charges made at an area.[1] The number of skiers patronizing an area did not appear to be affected by the price. A low charge did not seem to increase the number of skiers and a high charge did not seem to cause it to diminish.

The quality of the area did seem to affect demand, and there was a direct relationship between the quality, the charges made by the area, and the number of skiers. In other words, ski resorts have set their prices according to the quality of the area, and people are willing to pay accordingly.

A low charge at a sub-standard area will not bring large numbers of customers trying to save money. Capital

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[1]Result of regression analysis completed by the author during the 1962-63 season.

improvements and a higher initial investment to secure the best in a natural resource base apparently can be justified because a proportionally higher charge can be made without losing customers. After the capital expenditures have been paid, the higher charge and more people is suggestive of a better profit margin.

The last point to be made in this section is concerned with the case where a number of similar areas are very close to each other. They do not necessarily harm each other. In fact it appears that the opposite is true. New England and the States of Colorado and New York have good examples of ski areas working together to promote their particular section as a total complex.[1] They offer lift tickets good at all the resorts in the group, as well as the standard types, even though each is under separate ownership.

Aspen, Colorado; Lake Placid, New York; and Stowe, Vermont are thought of as particular and individual ski resorts when in reality there is a triumvirate of resorts in each case that has done such a good job of promoting the area as a whole to the skiing public that most people think the town is the name of a resort. They are in competition with each other it is true, but the owners have been far-sighted enough to realize that getting the skier to their

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[1]Hal Burton, "Placid's Playgrounds," Ski Life, Volume 3 (February, 1961) and Mike Beatrice, "Vermont's Triple Entente," Ski Life, Volume 27 (February, 1963).

region is the basic step. Then they have only to compete with each other, not the whole state, and when equal quality resorts are only a few miles apart, there is a good chance that all will be visited and money spent at each in one way or another.

CHAPTER IV

CAPITAL IMPROVEMENTS AND PROMOTION

Layout and Choice of Facilities

Once the physical resources have been purchased and the necessary adjustments completed to insure their giving maximum safety and enjoyment to the skier, the remaining improvements are in the form of layout and type of uphill equipment, lodge and parking lot construction, and overnight accommodations, if they are to be included in the overall development of the resort. The purpose of public recreation facilities and private recreation facilities are not exactly the same, and the result is a different outlook on some of the considerations to be discussed here. Others must be considered in the same vein no matter who is operating the resort, and they are discussed in a separate section.

Maximum efficiency for public use

An area being planned for operation as a public winter sports area must approach the problem of its development in a different light from one operating for profit only. Of course the public agency must try to meet costs as reasonably as possible, but instead of profit being the prime objective, giving the public maximum enjoyment for their time and

dollar is the first consideration.[1]

Therefore, little justification for a publicly operated chairlift on Michigan's short slopes can be found. They cost more to install and a little more to operate, but do not move as many skiers per hour as a T-bar lift.[2] The T-bar will be able to move more skiers uphill at less cost, enabling the public to get in more skiing at less cost to them.

The poma lift or platter pull is slightly less expensive to install than the T-bar, but operational costs are similar and the carrying capacity only one-half as great as that of the T-bar. In most cases where either can be used, the T-bar is a better investment for the public resort.

The simplest and cheapest form of uphill transportation is, of course, the rope tow. These are suited only for the shortest of slopes because the burdensome task of hanging onto the heavy rope makes it unreasonable for longer hills.

The lodge and overnight accommodations would also be slightly different at a public recreation area. Public agencies do not ordinarily consider it part of their responsibility to provide the facilities associated with a gala

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[1]Besides the points of differentation being discussed here, the reader is reminded of those under Laying Out Supplemental Winter Facilities, Chapter II.

[2]Gunn, op. cit.

night life. Dormitory type overnight accommodations at one of these areas would probably be the most reasonable use of the public dollar. The initial investment is less than for unit motel type facilities, and more people can be accommodated at less charge per individual.

Services that can be provided just as efficiently by local businesses and people should be left to them in the case of a publicly operated winter sports area.

Maximum return for investment

To get a higher return on capital investment, private ski areas in Michigan have found it advantageous to install chairlifts where T-bars would serve the public better. At an area where two T-bars would have cost $35,000 to purchase and install,[1] the owner chose to pay $75,00 to have two chairlifts installed instead.[2] This gave the area more appeal to those who would rather sit than stand on the way uphill. But that was not the main reason they were chosen over the more efficient T-bar. The owner could have charged the customers $4.00 for a lift ticket to use the T-bars. With chairlifts the charge is $5.00. In one year the chairlifts will return $125,000 more than the T-bars would

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[1]Lift purchase and installation is usually a package deal.

[2]The example presented here was a user-oriented area near Detroit. A similar case is known to the author in the Upper Peninsula. The names of the particular areas have not been disclosed in order to protect the source of information.

have returned.[1] This pays for the difference in installation and shows a profit above that. In the years to come it will be all profit, with the exception of slightly higher operational costs.

The lodge and overnight accommodations at an area being operated primarily for profit would understandably differ from those for most efficient public use. The entrepreneur wants as much money spent at the resort as possible and, therefore, should seriously consider providing most of the services around the area. Providing opportunity for an active apres' ski life increases the demand of the resort and is profitable in itself.[2] Although initial investment is higher, building unit motel type overnight facilities will prove a better investment in the long run because the private resort is catering to a slightly different clientele, willing and able to pay the extra cost of private accommodations. It can also be used as a motel during the off season, while there is no demand for dormitory type lodging[3] once skiing is over for the year.

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[1] Ibid.

[2] "Hard Sport on the Roaring Fork," Ski Life, Volume 27 (February, 1963).

[3] The exception to this could be when a children's camp is planned for summer use.

Converging considerations

Rental equipment must be provided the skier in both publicly and privately operated winter sports areas. A cafeteria and ample space to change from shoes to ski-boots, relax, or just watch the skiers, must be included in every case. These services and the charges made for them should be nearly the same at both the public ski resort and the private one.

Careful attention should be paid to the layout and construction of a parking area in both cases. Adequate drainage must be provided to prevent icy conditions following a thaw and refreeze.[1] But the main provision that both types of area must consider is the layout and operation of equipment for the maximum safety of the skier.

The section on slope layout explained the need for flat land near the bottom of the slope where the lift lines form. This cannot be over emphasized. Very few Michigan ski centers have heeded the recommendations made for safety, such as outlined in Appendix A.

Rope tows are especially dangerous because they jerk the skier off his feet at the start, are fatiguing, and may entangle the skier. Safety devices to reduce the power at the unloading station are absolutely necessary here and at

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[1] Gunn, op. cit.

the unloading station are absolutely necessary here and at the T-bar lift. Simple tricks to tremendously increase their safe operation, such as grading down toward the hill at the beginning so the skier is not jerked from a standstill,[1] have gone needlessly unused.

While there may be some phases of development where public and private winter sports areas diverge because of their basic purpose for operating, one point stands out for both to consider: ski safety must improve. It must be planned for from the initial search for and choice of property and acreage to daily operation.

The State of Michigan has made it clear that it will no longer tolerate indifference to ski safety. The 71st legislature passed a bill making provision for increased ski safety. This act is reproduced in Appendix B and should be read carefully by all ski area managers. In addition to this type of control, it is not unlikely that paid professional ski patrolmen will be required in the future to insure the safe handling of those who do get injured. Figure 6 illustrates how sound planning and purchase of equipment can greatly improve the standards of safety at an area and reduce insurance rates.

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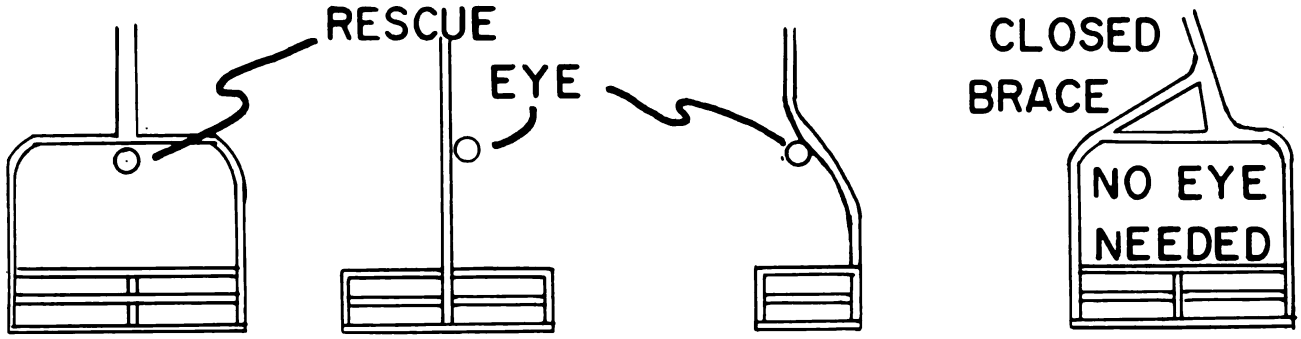
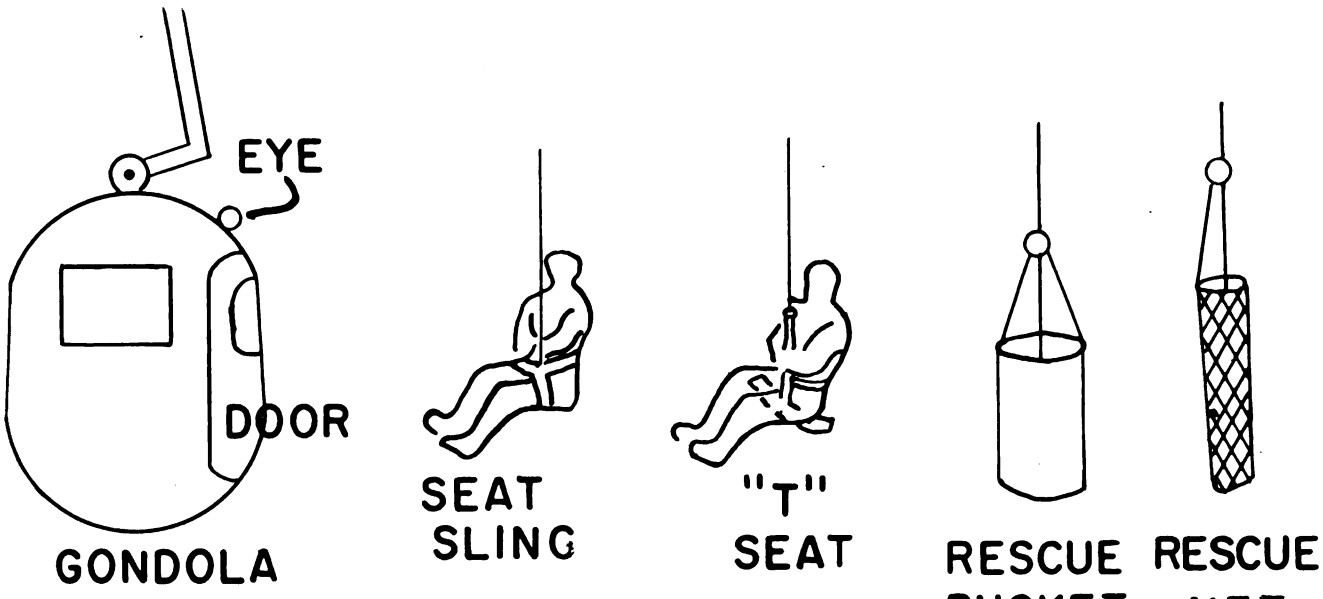
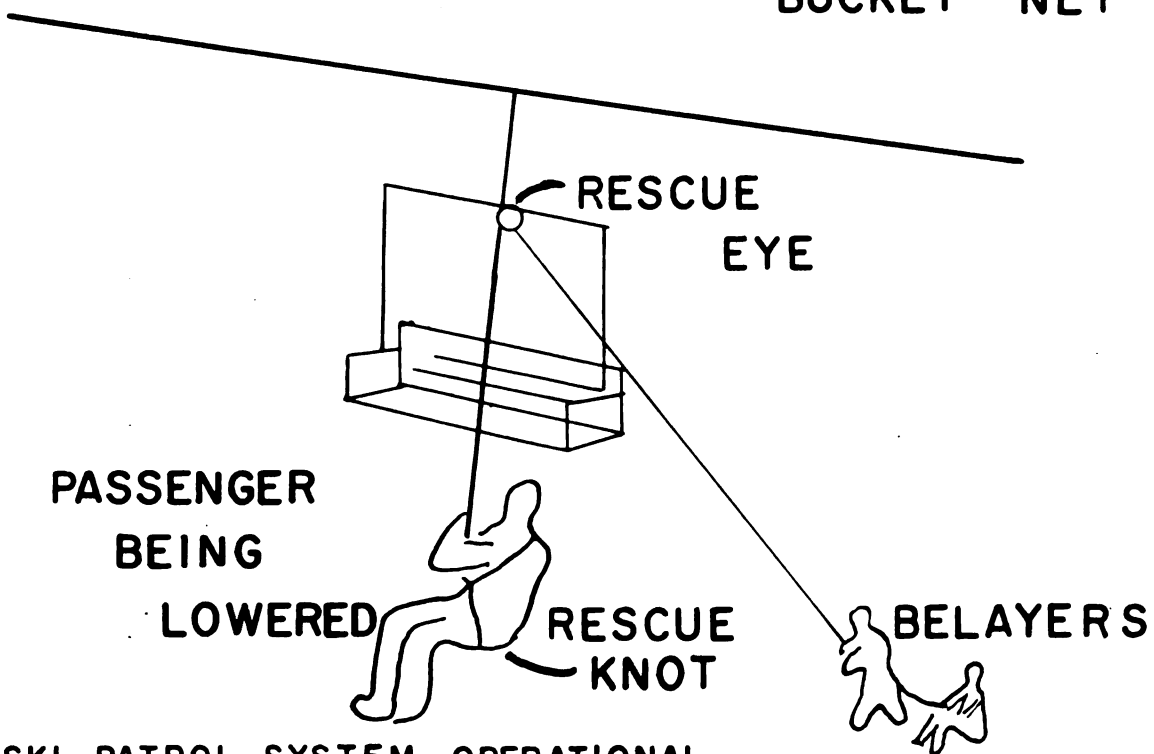
[1] Gunn, op. cit.

LIFT EVACUATION DIAGRAMS[1]







[1] NATIONAL SKI PATROL SYSTEM OPERATIONAL MANUAL, 828 - 17th STREET, DENVER 2, COLORADO

FIGURE 6

Capital needed for development

With the wide variance in property values, cost of equipment, and size of the total complex to be developed, a definite figure on capital needed to start a winter sports area cannot be given. However, it is safe to say no less than $100,000 will be needed. This section will, therefore, deal with the means of financing development through various commercial and government sources.

Commercial backing for outdoor recreation ventures is extremely limited. Local financing may be obtained in large enough amounts to satisfy the requirements that must be met in order to obtain a government loan, but are seldom large enough in themselves to back a development of this nature. The investment houses large enough to finance an operation of this nature seldom focus their attention more than seventy-five miles north of the Detroit-Grand Rapids line. Their investors will not touch resort properties because they are considered speculative.[1]

Thus, the task of raising venture capital falls on the initiative of the individual. The contacts he can make, the local backing he can receive and his ability to convince a governmental agency of the need and feasibility for a loan

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[1] A Program Plan for the Overall Economic Development of Emmet County, Michigan, Emmet County Redevelopment Committee (June, 1962).

are the factors determining whether or not sufficient funds can be raised for development.

Both initial development and additional improvements or expansion may be financed in part by obtaining loans from government agencies. The loans obtained and used by developers of recreation sites are most often granted by the Area Redevelopment Administration, the Rural Areas Development program, or the Small Business Administration. These agencies do not compete with each other, do not promote conflicting programs. One agency may be able to assist in the development of an area where another cannot do so legally. In short, they work together as supplemental agencies in an overall effort to provide the local people with the means necessary to stimulate the local economy.

The ability to stimulate the local economy is the main justification for securing a governmental loan under the A.R.A. program. Besides this, local participation must be indicated by at least a 10% investment on their part. The remaining funds will be: at least 5% from the individual or group applying for the loan; up to 15% from other commercial sources; and up to 65% from the A.R.A.

Not all areas being considered for development will be in counties designated as eligible for A.R.A. aid. Each county that has been declared eligible[1] for assistance from

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[1]A listing of these counties may be obtained from the Michigan Economic Development Department, 110 Stevens T. Mason Building, Lansing 26, Michigan.

the A.R.A. must submit an Overall Economic Development Program to the Michigan Economic Development Department in Lansing. If it is approved by that department, it is forwarded to Washington for review and approval. The project intended for development must fit into this overall program before it can be considered for a loan or any other type of assistance from Washington.

The Rural Areas Development and the Small Business Administrations do not have as many restrictions regarding the need for local participation and effect on the local economy as the first agency, but the interest rate may be higher.

There is no doubt that a ski resort can help bolster the economy of an area.[1] Nationally, estimates indicate that from 335 to 1000 million dollars per year are spent on ski equipment, tows, lodging, transportation and food by skiers, and with skiing specifically the purpose in mind.[2] Skiers spend at least twenty million dollars at Michigan ski resorts and an additional three million dollars for equipment at various shops in and around Michigan with Chicago getting a good share of the latter.[3]

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[1]Agnes Mueller, "The Skiing Boom That Saved a Town," Ski Life, Volume 2 (December, 1959). The Overall Economic Development Plans for Emmet and Cheboygan Counties, Michigan (1962).

[2]America's Lush Leisure Markets, reprinted from Sales Management (1961).

[3]Michigan Tourist Council, Stevens T. Mason Building, Lansing 26, Michigan.

This obviously has an impact on the economy of the state as a whole, because much of the money comes in from out-of-state sources. Area resort operators indicate that up to twenty-five per cent of their patrons are out-of-staters. All of these aren't just the "one fling" vacation skier. Season passes are held by patrons from such distant points as St. Louis, Missouri; Louisville, Kentucky; Cleveland, Ohio; and Cincinnati, Ohio. Although Chicago is by far the greatest out-of-state market, occasionally visitors do come from much farther away.

More important is the impact on the locale around a major ski area. To put it in non-academic but self-explanatory terms, the "big money" being earned in the industrial metropolitan areas is being dispersed. Areas that may have some summer revenue due to tourism or farming, have the winter months "off season" eliminated. Stability is extremely important for both the owner-operator and the employed help. The owners of the area itself, the gas stations, food stores, motels, taverns and sporting goods shops, not only can look forward to a better winter income themselves, but can offer a steady job instead of periodic employment. This means he gets better trained and more reliable help, and it means the help are guaranteed a more secure position. A good example of what this can mean to a community was illustrated by an interview and tour granted the author at Shanty Creek in Bellaire Township, Antrim County. Here is a project

completed with the aid of the Area Redevelopment Administration, via an $890,000 loan and job training program. The opening of Shanty Creek will create employment for about ninety personnel the first year and one hundred and twenty-five by the second year. These people are all to be hired locally. Of course, payment for the services that must be supplied the resort by local people add to the region's revenue as well as giving work to the unemployed and underemployed. It is part of the Area Redevelopment Administration conditions that local people must be trained for the Shanty Creek jobs, and not brought in from other areas. These jobs won't last for only one season but will extend throughout the entire year.

Specific examples of the increased volume of business being received by local concerns around ski resorts is evidenced by the letters from small businesses in and around Boyne Mountain, Michigan, expressing the change witnessed by them when a ski resort developed nearby.[1] Restaurants, laundries, cleaners, gas stations, drug stores and dairies saw their businesses improve in volume. One dairy had its sales grow from $300 per month to $3,000 per month.[2] Service

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[1]Prospectus submitted to A.R.A. by Everett Kircher, of Boyne Mountain Corporation, for proposed Harbor Highland development (February, 1963).

[2]Ibid.

stations reported a 30% increase in business during the winter months.[1] The economy of the area was obviously improved by the development of a winter sports resort in the locale.

Assistance in the development of an idea into an acceptable project proposal may be obtained from the U. S. Department of Commerce; the U. S. Small Business Administration; the U. S. Department of Agriculture; the U. S. Department of Interior; the Michigan State Economic Development Department, and the Cooperative Extension Service of Michigan State University.

Promoting the Winter Sports Area

Various means of promotion are available to interest the skiing public in coming to a particular resort. Magazines, billboards, television, radio, mail, telephone, snow condition reports, road reports and newspapers can be used to advertise an area and entice the skier. However, the most effective promotion is that carried on by word of mouth from satisfied skiers.[2] The reason is obvious to those familiar with and experienced at skiing.

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[1] Ibid.

[2] Statistics obtained from Pesky, op. cit., although his conclusion is in opposition to the author's. His conclusion is that advertising does not reach the people and they are forced to seek information from friends.

New skiers become interested in the sport because their friends are always talking about it and have succeeded in talking them into trying it. They either go skiing with these friends or go where their friends recommend they ski.

There is a general feeling among skiers that information about winter sports areas is unreliable when the source is the ski resort itself. Until the ski resorts supply reliable information about their area through the various media of advertising, a skier will continue to be influenced more by the word of another skier than by any other means of promotion.

Established skiers have learned not to trust or rely on what they read or hear anywhere but from other skiers. Satisfied skiers will do a better job of promoting an acceptable winter sports area, and dissatisfied onces demoting a less acceptable one, than any of the aforementioned means of advertisement.

Paid advertisements in magazines have some value in acquainting the public with a new ski area. But by far the best means of promoting through magazines is having an article written and published concerning the new development. It is not a difficult task to accomplish.

Billboards are useful only as directives near the area, more as a courtesy to the patron than as an advertisement. Television and radio, the mails, telephone and newspapers all offer an opportunity to encourage skiing through

accurate snow condition and road reports. However, to date there has been almost nationwide misuse of these media to entice the skier to an area. The result is that again the skier turns to friends for the information sought.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary and Conclusions

Snow skiing is among the faster growing leisure time activities, and it is growing faster in the Midwest than anywhere else in the country. Michigan stands out as the Midwest's leader in providing the facilities to meet this tremendous demand because of its abundance of snowfall, ideal topographic relief, excellent road system and central location within this regional market of 50 million inhabitants. Although there are over 700 ski areas in the United States now, the 335 to 1000 million dollars being spent for skiing (and expenditures related to the appeal of skiing) is allocated in and around a disproportionate number of areas. The same situation exists in the state of Michigan, which lists eighty-six resorts, although not all of them deserve the title. Evidence to support this statement is on hand: In the two-year span from 1960-62, eleven winter sports areas in the state were apparently forced to suspend operations because of insufficient funds; and it is estimated that only seven of the eighty-six resorts operating showed a net profit.

To keep pace with the surging demand for winter sports areas, new ones must be developed, established ones improved and expanded, and submarginal ones eliminated. The task of selecting and developing a new site, or improving an old one, is never a one-step procedure. It always involves a critical analysis of several factors that will effect its success. intro

The winter sports area should be planned with this thought in mind: Each recreator should have the opportunity to enjoy his leisure time in a safe and satisfying manner. It is a rule that other recreation planners must follow, and developers of snow skiing areas have an obligation to adhere to it as well. All the other aspects of sound development follow this major premise, including profitable return on investment.

In Michigan, some areas have soundly planned an adequate natural resource base along with wise collateral development. These resorts witness overcrowded conditions on most winter weekends. Other areas, with adequate natural resource bases but without the judicious development of the former are relatively deserted. Since the average skier goes skiing only three weekends per year, the resorts in Michigan had to compete for about 60,000 skiers per weekend in the 1962-63 season, not the 200,000 total. Thus, on any given weekend, if there are three resorts with 5,000 skiers, five resorts with 3,000 each, and twelve resorts with 1,000

each, it is obvious that only 18,000 skiers remain to be distributed among sixty-six resorts.

Since there is obviously competition for the skiing clientele, the winter sports area offering the most attractive facilities will be most likely to succeed in the future. This means offering the public the opportunity to enjoy safe recreation on the slopes and an active apres' ski life, i.e., slopes from beginner's to expert's; safe lift equipment and well-patrolled slopes; comfortable conditions, free from wind and on adequate snow; a lodge and overnight accommodations with planned evening activities and an opportunity for spontaneous relaxation around a pool; the cocktail lounge and dance floor.

The objective of this study was to examine the kinds of information necessary for making sound plans in developing a winter sports area. The ski industry is dynamic and changes can be expected to influence the motif and concept of what the ski resort must offer the public. Making sound plans in the development or expansion of a winter sports area will give reasonable assuredness of reaching the profit producing operational category.

Each of the aspects needing analysis and study before action is initiated presents a question of extent. There is a point at which further research would be unnecessary and less research unrealistic.

Major categories of information and the extent of

study needed for successful development are as follows:

A. The natural resource base

1. Topographic maps are used first because they have a large scale and extensive areas can be studied quickly and inexpensively.

2. A general idea of the climate in the area can be obtained from U. S. Weather maps.

3. Combining general topographic and climatic information will narrow the number of possible areas that should be studied in more detail.

4. The more detailed analysis should be guided by a knowledge of appropriate slope development requirements: north and east facing slopes, ground cover, safety and variety. Complementary development must also be considered in this micro-study.

5. The detailed study can be carried out with aerial photographs, land use maps, soil maps, personal inventory and advice from local and state Cooperative Extension personnel and private industry field representatives.

B. Market analysis

1. The population centers offer a gross indication of the "customer" potential. The transportation system linking these centers with the area proposed for development gives a better picture of the true zones from which the "customers" can be expected.

2. The "customer" is equally important. Skiers are most often from the better educated and/or higher income groups. Single and married people come in about equal numbers. People in the age group from twenty to thirty-five are the largest single type found at an area. They demand about the same things and therefore should be given primary consideration in planning, but not to the exclusion of the teenager, the tot and the grandfather.

C. Sources of capital

1. The winter sports industry is big business. Each year the total investment needed to develop the area complex from the natural setting becomes larger. The amount required for initial development is usually in excess of that at the disposal of one individual.

2. Banks and investment houses are frequently reluctant to lend capital to "speculative" recreation ventures. Thus, at present the Federal government offers the best source of obtaining help, both in the form of venture capital and planning assistance.

3. Commercial lending institutions may become less reluctant to lend money as public awareness and successful resorts indicate the potential value of these areas. This may result in the reduction of Federal aid to these ventures.

It may have appeared that this thesis was intended to give all the information needed for the future in developing

Michigan's winter sports areas. That is not the case. The ultimate plan for development has not been designed yet, and probably never will be, because the industry is a dynamic one, dependent on the demand of the public.

A major factor in the success or failure of any business venture is the management. It is certainly no less true of the ski industry. However, this study did not attempt any analysis of business management techniques even though they play a major role in the success of a ski resort.

Although this work presents no ultimate plan for designing a winter sports area and does not enter the realm of business management, it does present basic facts that will be useful no matter what the demands of the public; when the area is planned; or who handles the business management.

Recommendations

Land and land use

Serious consideration should be given to initial acquisition of sufficient land to permit designing the area for maximum safety as well as the development of an optimum complementary facility complex.

The reasons for this recommendation are:

1. The cost of undeveloped land is likely to be one of the smallest costs relative to the total capital investment.

2. Sufficient land permits flexibility in design. This is particularly important because the most appropriate total design has not yet been established in the industry. Multiple-use development is still in the exploratory stage.

3. A winter sports area in which the initial land use is not focused on maximum safety considerations in active particpation areas may find itself forced to suspend operations until adjustments have been made. Land to serve as buffer zones should be allocated to separate activities which may be dangerous when carried on in close proximity to each other.

4. A high accident rate at the junction of the ski lift and the slope indicates that more land should be provided for both loading and unloading skiers. The accidents here are usually the result of overcrowding at these points of embarkation and debarkation where people are forced to congregate.

5. Safety problems are not necessarily solved on the drawing board prior to development and sometimes do not appear until use has actually begun.

6. Whenever possible the most extensive complex of complementary facilities should be planned. It is usually much easier to reduce the scale of development as the development process occurs than to add to the scale after certain critical decisions have been made. This may mean land for a swimming pool, ice skating rink, overnight

accommodations, cocktail lounge and dance facilities, toboggan chutes, hills for sleds and saucers, and for collateral development to operate the four seasons instead of just one.

7. In any case, the planner's concept of land use at a winter sports area must adjust to the changes in demand at these areas and in light of the high accident rates found at poorly planned ski centers. The total acreage involved in a development should therefore be greater for both initial design and development as well as those changes brought about by a dynamic industry and naive initial planning.

Capital sources and use

An exhaustive study of all sources for obtaining venture capital should be made with an awareness that some regulations and rates are better suited to the developer's needs than others.

The reasons for making this recommendation are:

1. While investment houses and banks have been reluctant to back recreation ventures because (according to them) these developments are "speculative" in nature, the dynamic changes in the outdoor recreation business and public awareness of these changes may open new doors for securing capital.

2. The Federal government offers a variety of opportunities to secure both technical assistance and investment capital for initial development and expansion.

3. Venture capital for initial development must be available in quantities sufficient to transofrm a purely

natural and undeveloped setting into a winter sports area with all of the qualities mentioned earlier plus the major expense of slope equipment. Therefore, it may be feasible to consider investing in one of the partially developed areas included in the eighty-six resorts already in operation. Since some of these have a sound natural resource base but are as yet relatively underdeveloped, they may offer better opportunity for development than a totally undeveloped setting.

4. In any case it must be realized that a net profit will probably not be realized for a number of years while capital improvements and adjustments are made to improve on initial design and secure a prominent position in the field.

Other recommendations

1. T-bar lifts should be seriously considered where rope tows are now the standard. Rope tows are less expensive to install, but their discouraging effect on the beginner, fatiguing effect on all skiers, and the large number of injuries directly attributable to them, make the "benefit-cost" ratio unfavorable and indicate T-bar installation would be a more judicious move in the long-run.

2. To increase safety on the slopes, colored lift tickets designating the bearer's skiing ability should be sold and worn, with each slope marked accordingly to discourage

uninformed skiers from attempting slopes too advanced for their skill. To enforce slope and activity area differentiation, paid ski patrollmen, professionally trained for this work, should be employed.

3. Snow machines and earth moving equipment change the natural resource base. These innovations to the ski industry offer many possibilities to supplement nature, but in many cases their usefulness is overestimated rather than overlooked. Their limitations as well as their capabilities must be considered before development is based on their use.

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APPENDIX A-1

SKI AREA INSPECTION[a]

Summer Inspections

A. Check for any new construction or installations.

   1. Swimming pool

   2. Chalets, ski shops, cafeteria, etc.
      a. Area figures required.

   3. Number of rope tows, T-bars, J-bars, chair-lifts, platter pulls, etc.

B. Survey all slopes or runs, tow-lines for existing stumps, boulders, etc. which protrude above the grade level, narrow gullies, and electric power lines particularly where guy wires are used.

   1. Order removal of obstructions. In case of guy wire when within the slope, order that it be boxed in to height of (10 feet) and be stripe pained.

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[a] Courtesy of Daniel R. Duggan, Representative for Citizen's Mutual Insurance Company, 645 West Grand River, Howell, Michigan.

APPENDIX A-2

SKI AREA INSPECTION[a]

Winter Inspections

A. Rope Tows

1. Enclosed motor assembly, combustion enginer, transfer sheaves with snow fences, etc. to prevent contact with moving parts.

2. Safety gates should be designed so that they cannot be avoided by skiers who fail to disengage from the rope at the unloading point.
   a. Safety gates can be of rope (nylon preferred) or aluminum bar. No heavy metal or wood barriers should be used.

3. Drift test on tow. On this test, place piece of cloth on up-hill rope. As cloth reaches safety, disengage the gate switch and the forward motion of tow must stop before the cloth reaches the sheave. The safety should be at least (30 feet) from the return sheave.

4. All tows should be checked and the safety thrown before the start of days activities.

5. Starting switches should be enclosed and under lock and key, so that only authorized personnel can restart tow operations.

6. Rope speed for beginners should not exceed (600 feet) per minute, while tows being used by experienced skiers should not exceed (1500) feet per minute or 15 MPH.

7. Skiers should be cautioned against wearing loose scarfs or clothing which might become wrapped around the twisting rope.

8. Return rope sheaves should be mounted high enough so that the rope is held at a minimum of (8 feet) above the maximum snow conditions.

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[a]Duggan, op. cit.

9. Unloading space must be provided to unload skiers on terrain which will have a slight downgrade away from the tow and be free of obstructions.

B. Chair Lifts

1. All chair lifts must be manned at top and bottom terminal and at intermediate loading stations.

2. Stopping device should be installed so that operator can stop lift at either terminal.

3. Communications: An adequate telephone system must be provided so that operators at each terminal will be in touch with each other before lift is restarted.

4. Safety gates or device activated by an occupied chair should be on all lifts to prevent occupant from going around either upper or lower bull wheel.

5. All chair lifts must have, in addition to a manually operated brake and an electrical brake, a non-backing type of rachet on the bull wheel.

6. Downgrade take-off slope necessary at unloading terminal.

C. Pomalift--Robeling or Doplemyer type of: J-Bars, T-Bars or Platter Pulls

1. An unavoidable safety gate should be located a sufficient distance from the take-off area to bring the cable to a stop before passenger reaches the bull wheel.

2. Testing of robeling and Pomalift Platter Pull. Grasp carrier rod in hand, pull spring taut, let go and spring should retract to original position. This spring test simulates same conditons as when passenger starts slope ascent and when he releases grip.

3. Cable control. Sheaves should be supplied with flange or other device to prevent cable from jumping out of or being disengaged from sheave grooves.

4. Loading. Watch for too close spacing of platter pulls. Suggest at least (40 feet) between carriers.

D. Signs Needed

1. Hold poles in right or left hand.
2. Prepare to unload.
3. Are ski tips up?
4. Safety gate.
5. Prepare to unload.
6. Caution. Loose clothing and hair can become entangled in tow and cause serious injury to skier.
7. Do not board tow until skier ahead has cleared marking flag.

E. Ski Patrol

1. Check authority of patrol.
2. Check first-aid training of members. Should have at least basic American Red Cross certificate.
3. Check first-aid facilities--method of conveying injured to first-aid room, and to hospital, if necessary.

F. Sweeping Area

1. Determine if area is swept (checked by ski patrol) at end of day's activities.

G. Liquor Control on Slopes

1. Are wineskins allowed on premises?
2. Are intoxicated individuals refused admission to ski area?
3. Are unruly skiers ejected from the area?

H. Use of Colored Tickets on Area

1. Experience of skier and access to suitable slope designated by colored tickets which individual should display on person.

2. Ski Patrol should police the use of the proper slope by the skier in accordance with the colored ticket displayed on his person.

APPENDIX B

AN ACT TO PROVIDE FOR THE INSPECTION, LICENSING AND REGULATION OF SKI AREAS AND SKI LIFTS: TO PROVIDE FOR THE SAFETY OF SKIERS, SPECTATORS AND THE PUBLIC USING SKI AREAS: TO CREATE A SKI AREA SAFETY BOARD IN THE OFFICE OF THE COMMISSIONER OF LABOR: TO PROVIDE FOR THE DISPOSITION OF REVENUES: TO MAKE AN APPROPRIATION: AND TO PROVIDE PENALTIES FOR VIOLATIONS.[a]

The People of the State of Michigan enact:

Sec. 1. This action shall be known and may be cited as the "ski area safety act of 1962."

Sec. 2. As used in this act:
(a) "Ski area" means an area used for skiing and served by 1 or more ski lifts.
(b) "Ski lift" means a device for transporting persons uphill on skis, or in cars or tracks, or suspended in the air by the use of cables, chains, belts or ropes, and usually supported by trestles or towers with 1 or more spans. It includes a rope tow.
(c) "Operator" means a person who owns or controls the operation of a ski lift. An operator includes this state or any subdivision thereof.
(d) "Area manager" means a person actively engaged in the management of a ski area.
(e) "Department" means the state department of labor.
(f) "Commissioner" means the state commissioner of labor.
(g) "Board" means the ski area safety board.

Sec. 3. A ski area safety board consisting of 7 members is created within the office of the commissioner. The board consists of 3 ski area managers, 1 from the Upper Peninsula and 2 from the Lower Peninsula; 1 engineer with skiing experience; 1 member of the central United States ski association,

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[a]Act No. 199, Public Act os 1962, Approved by Governor June 7, 1962, State of Michigan, 71st Legislature, Regular Session of 1962.

a nonprofit corporation; 1 person with skiing experience from the Upper Peninsula; and 1 with skiing experience from the Lower Peninsula. The Commissioner and an officer of the Michigan tourist council are ex-officio members of the board without vote.

Sec. 4. Members of the board shall be appointed by the governor with the advice and consent of the senate for terms of 4 years and until their successors are appointed and qualified, except in the first instance 1 member shall be appointed for a term of 1 year, 2 for 2 years, 2 for 3 years and 2 for 4 years. Vacancies in the board shall be filled for the unexpired term.

Sec. 5. The board shall elect a chairman and such other officers as it deems necessary to perform its duties between meetings. A majority of the 7 members shall constitute a quorum. The board shall meet at least once yearly on the call of the chairman or by written request of at least 3 members. Members shall receive no compensation but shall receive their actual and necessary expenses within the legislative appropriation.

Sec. 6. The board shall formulate definitions, rules and regulations for the safe construction, installation, repair, use, operation, maintenance and inspection of all ski areas and ski lifts as the board finds necesssary for protection of the general public while using ski areas and ski lifts. The definitions, rules and regulations shall be reasonable and based upon generally accepted engineering standards, formulas and practices.

Sec. 7. The rules and regulations shall be promulgated in accordance with the provisions of Act No. 88 of the Public Acts of 1943, as amended, being sections 24.71 to 24.82 of the Compiled Laws of 1948, and subject to Act No. 197 of the Public Acts of 1952, as amended, being sections 24.101 to 24.110 of the Compiled Laws of 1948.

Sec. 8. The commissioner, subject to the limitations herein contained and the rules and regulations of the board shall administer and enforce the provisions of this act.

Sec. 9. No person shall operate a ski lift without a permit issued by the commissioner. On or before October 1 of each year an operator shall apply for a permit to the commissioner on a form furnished by the commissioner and containing such information as the board may require. All ski lifts shall be inspected before they are originally put into operation for the public's use and thereafter at least once every 12 months, unless permitted to operate on a temporary permit.

Sec. 10. The commissioner may issue a temporary permit for 30 calendar days to an operator, who has previously been operating in this state on a regular or annual basis, to continue operation. An inspection of his ski lifts shall be made within 30 days from the issuance of the permit. A ski lift inspected and covered by a permit in the preceding year may operate on a temporary basis until further inspected.

Sec. 11. If upon inspection a ski lift is found to comply with the rules and regulations of the board, the commissioner shall issue a permit to operate. A permit shall expire on September 30 of the following year.

Sec. 12. Before a new ski lift is erected, or before a presently existing ski lift is moved to a different location, or whenever any additions or alterations are made which change the structure, mechanism, classification or capacity of any ski lift, the operator shall file with the department detailed, duplicate plans and specifications of such work. The plans and specifications shall be prepared by a qualified tramway firm or by an engineer, licensed in this state as a professional engineer, in accordance with Act No. 240 of the Public Acts of 1937, as amended, being sections 338.551 to 338.576 of the Compiled Laws of 1948. Upon approval of plans and specifications, the department shall issue a permit for such work. All rope tows shall be excluded from this section.

Sec. 13. The commissioner or board may order in writing, a temporary cessation of operation of a ski lift if it has been determined after inspection to be hazardous or unsafe. Operation shall not resume until such conditions are corrected to the satisfaction of the commissioner or board.

Sec. 14. This act shall not be construed to prevent the use of any existing installation, upon inspection found to be in a safe condition and to conform with the rules and regulations of the board.

Sec. 15. If there are practical difficulties or unnecessary hardships for an operator to comply with the rules and regulations under this act, the commissioner, with the approval of the board, may modify the application of such rules or regulations to such a situation, if the spirit of the provisions shall be observed and the public safety is secured. Any operator may make a written request to the board stating his grounds and applying for such modification. Any authorization by the commissioner and the board shall be in writing and shall describe the conditions under which the modification is permitted. A record of all modifications shall be kept in the department and open to the public.

Sec. 16. (a) An application for a permit shall be accompanied by fees of:

$25.00 for an annual permit; or
2.00 for each rope tow,
5.00 for each T-bar, J-bar or platter pull,
15.00 for each chair lift or skimobile, and
30.00 for each aerial tramway,

if greater than the $25.00 annual permit fee.

(b) Inspection fees shall be as follows:

$ 8.00 for each rope tow,
20.00 for each T-bar, J-bar or platter pull,
60.00 for each chair lift or skimobile,
120.00 for each aerial tramway, and
50.00 for reinspections or special inspections at an operator's request.

Any operator may employ any person, partnership or corporation, approved by the commissioner and board, to make the inspections. Inspections made by any person, partnership, or corporation, that may be employed by an operator, shall be on forms furnished or approved by the department and shall accompany the annual permit application. Inspection fees shall be waived when the annual permit application is accompanied by such an inspection report.

(c) Fees for review and approval of plans prior to construction shall be:

$200.00 for a chair lift, T-bar, J-bar, platter pull or tramway.

(d) Fees shall be paid to the department, which shall give receipts therefor.

Sec. 17. The department, with the advice and consent of the board, shall employ or retain a person qualified in engineering and training who shall be designated chief inspector. The chief inspector and such additional inspectors and other employees as may be necessary to properly administer this act may be hired on a temporary basis or borrowed from other state departments, or the department may contract with persons, partnerships or corporations for such inspection services on an independent basis.

Sec. 18. All fees for permits or inspections, or any other income received under this act, shall be paid into the general fund. All salaries and other moneys expended under this act shall be paid by the state treasurer from a fund appropriated by the legislature.

Sec. 19. Notice of any public hearing held under this act shall be published at least once, not less than 10 days prior thereto, in such newspapers of general circulation as the commissioner prescribes.

Sec. 20. Any person who violates any provision of this act, or rule, regulation or order issued thereunder, or who interferes with, impedes or obstructs in any manner the commissioner or his authorized representative or a board member in the performance of his duties, is guilty of a misdemeanor. Each day such violation or other act continues shall be deemed a separate offense.

Sec. 21. There is hereby appropriated the sume of $6,000.00 for the purpose of administering this act for the fiscal year ending June 30, 1963.

This act is ordered to take immediate effect.

APPENDIX C

CLIMATE IN MICHIGAN COUNTIES[1]

County	Temperature (°F) January Average	July Average	Average Annual Precipitation (inches)	Average Annual Snowfall, unmelted (inches)
Alcona	23.2	67.6	27.94	53.6
Alger	19.0	65.1	33.84	128.0
Allegan	27.0	72.9	34.33	48.7
Alpena	21.1	67.2	30.60	66.2
Antrim	18.0	67.7	39.45	141.8
Arenac	22.3	70.0	29.04	42.8
Baraga	13.6	66.3	30.00	94.4
Barry	26.2	73.3	33.22	37.8
Bay	25.5	68.6	27.00	32.3
Benzie	24.5	68.1	28.70	60.5
Berrien	29.4	74.4	34.06	44.1
Branch	26.5	73.1	34.23	32.6
Calhoun	25.4	75.0	33.96	39.0
Cass	28.8	75.7	33.89	32.0
Charlevoix	21.7	68.2	31.36	75.8
Cheboygan	20.8	68.5	27.32	69.5
Chippewa	19.5	60.3	30.84	97.0
Clare	19.8	69.1	32.64	68.0
Clinton	23.3	71.4	31.97	37.8
Crawford	19.4	67.9	32.57	82.5
Delta	20.3	66.1	32.07	85.1
Dickinson	15.7	68.0	29.87	65.3
Eaton	25.5	72.4	32.01	30.1
Emmet	23.4	69.1	30.89	64.1
Genesee	25.2	73.0	30.71	33.4

[1]U. S. Weather Bureau, as reported by the Michigan Economic Development Department in Economic Data Sheets (1962).

County	Temperature (°F) January Average	July Average	Average Annual Precipitation (inches)	Average Annual Snowfall, unmelted (inches)
Gladwin	21.5	69.3	29.84	41.9
Gogebic	14.5	68.6	36.20	135.3
Grand Traverse	23.6	70.3	29.11	71.9
Gratiot	24.5	72.4	28.30	36.1
Hillsdale	25.9	72.6	32.58	43.7
Houghton	15.9	65.7	36.51	168.5
Huron	23.8	69.4	28.48	44.7
Ingham	22.9	71.1	30.50	33.9
Ionia	26.9	72.6	31.35	36.6
Iosco	22.9	68.5	28.36	42.0
Iron	14.7	66.7	28.46	66.2
Isabella	23.4	71.8	28.80	31.7
Jackson	25.9	72.8	31.82	35.0
Kalamazoo	25.9	73.4	35.45	51.5
Kalkaska	17.6	67.8	32.02	105.5
Kent	24.7	73.0	31.93	43.0
Keweenaw	16.8	61.7	29.11	72.3
Lake	24.2	69.8	31.55	44.8
Lapeer	24.6	72.1	29.86	34.3
Leelanau	24.4	67.9	32.51	71.0
Lenawee	26.9	74.5	32.04	27.0
Livingston	21.8	71.4	31.24	37.4
Luce	17.9	66.1	30.92	100.4
Mackinac	21.1	67.2	26.58	58.1
Macomb	26.0	72.8	28.02	33.0
Manistee	25.3	70.2	30.54	68.7
Marquette	15.5	66.3	31.58	92.3
Mason	25.5	69.3	29.43	59.7
Mecosta	23.6	70.1	31.56	53.5
Menominee	17.2	68.8	29.98	54.4
Midland	25.3	72.7	29.78	34.4
Missaukee	19.4	69.7	28.49	62.6
Monroe	27.7	74.1	31.01	28.0
Montcalm	24.8	72.5	30.50	43.2
Montmorency	19.7	67.5	28.60	62.0

County	Temperature (°F) January Average	Temperature (°F) July Average	Average Annual Precipitation (inches)	Average Annual Snowfall, unmelted (inches)
Muskegon	24.8	69.5	29.08	54.6
Newaygo	22.2	70.7	31.99	50.9
Oakland	25.0	72.4	31.65	34.8
Oceana	24.9	70.8	31.48	71.9
Ogemaw	19.4	67.3	29.40	49.6
Ontonagon	11.0	65.6	34.78	113.2
Osceola	21.0	69.0	29.60	44.2
Oscoda	19.5	67.0	25.65	54.0
Otsego	16.3	66.2	33.70	123.1
Ottawa	26.8	71.0	33.65	60.4
Presque Isle	20.6	68.6	27.89	59.5
Roscommon	21.1	68.1	27.96	51.5
Saginaw	24.1	71.9	28.05	40.2
St. Clair	23.6	70.1	32.07	35.3
St. Joseph	26.9	73.7	36.10	33.1
Sanilac	23.3	70.3	31.00	42.4
Schoolcraft	19.8	71.2	28.41	68.7
Shiawassee	25.7	72.6	29.76	37.9
Tuscola	23.3	70.3	31.00	42.4
Van Buren	28.1	71.6	32.48	40.4
Washtenaw	26.4	73.3	29.90	31.8
Wayne	27.3	73.7	31.37	28.2
Wexford	19.9	67.8	31.58	67.2


SNOWFALL CONTOUR MAP
WINTER OF 1956-57
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APPENDIX D

Table 1[a].--Actual and estimated population, gross national product, disposal income, and paid vacation, 1960, 1976, and 2000 United States of America

Year	Population (millions)	Gross National Product (billions)	Disposable Income (billions)	Per Capita Disposable Income	Paid Vaction (weeks)
1960	179	503	354	1970	2.0
1976	230	1018	706	2900	2.8
2000	350	2007	1437	4100	3.9

[a]Projections in the Years 1976 and 2000, ORRRC Study Report 23: "Population Projections of the United States for 1976 and 2000," Commission staff. "Economic Projects for the Years 1976 and 2000," National Planning Association. "Estimates of the Decrease in Hours Worked, 1960-2000," Bureau of Labor Statistics, U. S. Department of Labor.

Table 2[a]--Average standard workweek for nonagricultural workers by industry, 1960, 1976, and 2000, United States of America

Industry	Work week (hours)		
	1960[b]	1976	2000
Total, all industry	39.0	36.0	32.0
Mining	37.0	34.0	30.3
Contract construction	39.0	35.4	31.6
Manufacturing	39.0	36.0	32.6
Transportation and public utilities	39.0	35.8	32.0
Wholesale and retail trade	40.0	36.2	32.3
Finance, insurance, and real estate	37.0	33.5	29.9
Service and miscellaneous	39.0	35.7	32.0
Government	39.0	35.2	31.5

[a]Projections to the Years 1976 and 2000, ORRRC Study Report 23 "Estimates of the Decrease in Hours Worked, 1960-2000," Bureau of Labor Statistics, U. S. Department of Labor.

[b]Computed by the ORRRC Commission staff.

Table 3[a].--Estimated miles of domestic intercity travel in the United States, 1960, 1976, and 2000 by means of transportation

Means of Transportation	1960	1976		2000	
		High	Low	High	Low
	(Passenger miles (billions)				
Total	738	1592	1512	3189	3031
Auto	670	1400	1400	2800	2800
Air	30	150	80	325	200
Rail and Bus	38	42	32	64	31
	(Miles per Capita)				
Total	4170	6950	6600	11000	11000

[a]Projections to the Years 1976 and 2000, ORRRC Study Report 23, "The Future of Travel in the United States," by A. J. Goldenthal.

Table 4[a].--Estimated acreage and capacity of facilities planned for development within five years, forty-eighty contiguous states, 1960

Type of Facility	Acres 1000's	Capacity People--1000's
Picnic grounds	48	1140
Swimming beaches or pools	4	535
Winter sports sites	30	105
Campgrounds	57	547
Total	139	2327

[a]Outdoor Recreation for America. Outdoor Recreation Resources Review Commission. (Washington, 1962).

Table 5[a].--Estimated acreage and capacity potential or long range developments on existing public designated recreation areas, forty-eight contiguous states 1960

Type of Facility	Potential long-range development Acres 1000's	Capacity People-1000's
Picnic grounds	662	7918
Swimming beaches or pools	31	2914
Winter sports sites	199	2148
Campgrounds	1098	8716
Total	1981	21696

[a]Outdoor Recreation for America. Outdoor Recreation Resources Review Commission. (Washington, 1962).

Table 6.[a]--Present and potential development of winter sports facilities, acreage and capacity, by census region, forty-eight contiguous states 1960[b]

Census Region	1960 Development	Planned in five Years	Potential Development Long Term A[1]	Long Term B[2]	Development Regional[3]
Northeast:					
Acreage (1000's)	14	4	10	6	20
Capacity (100's)	96	33	183	47	263
Per cent increase		34	191	49	274
North Central:					
Acreage (1000's)	14	(4)	16	3	19
Capacity (1000's)	53	12	132	47	191
Per cent increase		23	249	89	361
South:					
Acreage (1000's)	9	10	1	1	12
Capacity (1000's)	15	2	92	9	103
Per cent increase		13	613	60	686
West:					
Acreage (1000's)	31	16	152	10	178
Capacity (1000's)	128	58	1477	161	1696
Per cent increase		45	1154	126	1325
All regions:					
Acreage (1000's)	68	30	179	20	229
Capacity (1000's)	292	105	1884	264	2253
Per cent increase		36	645	90	771

[a]In estimating long term potential under A and B, recreation managers in each area were asked to think in terms of the maximum recreation development possible under their agencies existing policies, on the existing land and water acreage on the area.

[b]Outdoor Recreation for America. Outdoor Recreation Resources Review Commission. (Washington, 1962).

[1]Sites which could be developed now (access exists or could be provided).

[2]Sites whose development hinges on some future in conditions or solution of acute land and water management problems (e.g. water developments, representation, pollution, erosion control, termination of other use rights, etc.).

[3]Regional totals are for planned and potential acreage and capacity only.

[4]Less than 1000 acres.

APPENDIX E-1

FORMULA SHOWING HOW THE DANGEROUS VELOCITIES ATTAINED BY FREE RUNNING SKIERS, TOBOGGANS, SLEDS, OR RUNAWAY SKIS, ARE REACHED. THIS EMPHASIZES THE NEED FOR A PROTECTED LIFT LINE AND FOR THE RULE REQUIRING SAFETY RUNAWAY STRAPS.[1]

A basic law of nature, as learned in the physics lab, is that the force of an object is equal to its mass times its acceleration.

$$F = m\ a$$

Applied to the winter sports situation it means the destructive power of the object coming down slope is directly related to its weight and speed. A steep slope is not necessary to reach very dangerous speeds in excess of seventy miles per hour, as proved by the following:

$$V = K\left(\frac{W(\sin\theta - Ks\cos\theta)}{A \cdot Kw}\right) 1/2$$

Where V = maximum velocity
W = weight of skier in pounds
θ = slope angle in degrees
K = 0.682 (a constant)
Ks = coefficient of friction (0.02 between snow and running surface)
A = frontal area of skier
Kw = coefficient of wind resistance (0.0009)

While the reference above is to a skier, the principle applies to sleds, toboggans, saucers, and runaway skis as well. Speeds up to 150 miles per hour have been attained on slopes no more than 40^{o}.

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[1]Compiled from Ski Life, Volume 27 (December, 1962), and the author's application and interpretation.

APPENDIX E-2

ARBITRARY ASSIGNMENT OF POINTS TO FACTORS INFLUENCING THE QUALITY AT AN AREA

Quality Factors	Points
Vertical drop	1 point for each 20 feet
Horizontal run	1 point for each 100 feet
Chairlift	5 points for each
T-bar or Poma	3 points for each
Rope tow	1 point for each
Safety[1]	0 to 5 points
Complementary facilities such as pool or lounge	2 points for each
Supplementary facilities[2]	1 point for each
Rental equipment	2 points if available
Night skiing	5 points if available
Overnight accommodations	2 points if available
Snow making equipment	5 points
Snowfall (natural)	1 point for each 10 inches

[1]Safety rating was determined by allowing one point for a volunteer ski patrol, three points for a professional ski patrol, two points for a first aid room or having a doctor on call.

[2]Tobogganing, ice skating, sledding, scaucering, snow shoeing, sleigh rides, skijoring.