Mission Statement – Increase participation in Nordic skiing in the Boise area.

Goal – Use snowmaking technology to establish and operate three to five kilometers of Nordic ski trails at the base of the foothills in or near Boise, Idaho.

Executive Summary

Boise is a prime location to employ snowmaking to establish a small cross country ski trail system. It has an active outdoors-driven community, and a strong core of dedicated Nordic skiers. It has a growing population of both children and active older residents for whom cross country skiing likely would be attractive, particularly if they could be introduced to it at a location only a few minutes from home. Lack of consistent snow in the valley, and the drive to Bogus Basin hamper the potential of Boise's skiing community.

Providing a valley-floor Nordic skiing venue—even one of modest length—would bring more Treasure Valley residents to this activity. This inevitably will increase the numbers of cross country skiers who then also would use Bogus Basin's excellent trail facilities on weekends or other times when they have the free time to commit to the trip up the mountain.

Snowmaking will be necessary to operate such a facility in Boise. Snowmaking typically has a high initial investment, but with the given data we expect this investment to pay off quickly (see *financial plan*). Between the numbers of already committed skiers, and the potential for the growth of the sport within the 600,000 people who live in the greater Boise metropolitan area (see *customer base*) – there is a vast pool of possible trail users.

Moreover, we expect the new trail system to pay off as an investment in the health and well-being of the Boise community. First, cross country skiing is one of the best sports that one can do for their health – it is "low-impact" and it provides both a cardiovascular and strength benefit. Moreover, cross country skiing is one of the only cardiovascular outdoor workouts that one can do safely when there is ice and snow on the ground.

Both a clear need for more Nordic opportunity and a large growth potential for youth and disadvantaged services exists in this valley. Currently, the Bogus Basin Nordic Team has just under 90 kids aged 6-18 as members. Yet programs in other regions – most with very small population bases (Bozeman, MT, Bend, OR, Ketchum, ID, and many New England communities)– have teams with hundreds of participant children. Similarly, the Bogus Basin Nordic Team's "Refuski" program currently provides free skiing and coaching to 8 Boise refugee youth and an additional 24 refugee youth in a one-time "outreach day." The primary limitation of this program is transportation. With ski trails in town, the Refuski program could grow in size exponentially.

The Boise City Park and Recreation Department's Five Year comprehensive plan (2011 with 2015 update) states that "The challenges faced by modern households include

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finding programs that do not require excessive travel and that fill specific blocks of available time." Currently a round trip visit to Bogus Basin with an hour and a half of skiing is a three-hour event – something that only the most committed skiers can do during the week. One goal in Boise Parks' comprehensive plan is to *"Contribute to the health and well-being of City residents – particularly youth – by increasing access to and participation in recreational and educational opportunities, and addressing increased demand for community centers, swimming pools, skate parks, ice sports, and golf facilities."* Finally, the results of the 2009 Household Survey indicate that adult/child or family activities ranked second at 51% followed by lifetime sports at 47% as the programs residents are most interested in. Nordic skiing is both a lifetime and family activity. The proposed ski trails would assist the City in the process of achieving so many of these goals; and it would do so with far less infrastructure and capital expense than those incurred by amenities such as swimming pools and neighborhood or regional parks.

Product/Service

A new ski trail system based in the valley reaches an untapped market in Boise and the greater Treasure Valley. While Bogus Basin offers an excellent cross-country skiing experience, it is out of reach for much of the Treasure Valley on a weekday basis. There are three major obstacles that prevent full use of the Bogus Basin Nordic trails, each of which would be remedied with a manmade snow loop in the valley. These obstacles are cost and transportation, snow reliability, and lack of a stadium learning area

Cost and transportation - To access Bogus Basin, one must have an adequate vehicle, 4WD, chains, and or snow-tires. Moreover, the time commitment is a major cost – on dry roads the drive takes 35 minutes and can take much longer when the roads are particularly snowy. Combined with the time it takes to park and walk to the lodge, an hour-long ski can quickly turn into a three-hour affair. As the head coach and program director of the local XC ski team (the Bogus Basin Nordic Team) our other coaches and I drive 15-passenger vans up the road 5-6 times per week. This obviously limits the number of children who can participate, and adds an additional expense to participants

Snow Reliability - Over the past handful of years, quality XC skiing at Bogus Basin has become less common. While there was plenty of snow through the winter of 2016-17, 2017-18 had barely enough snow. Late openings, early closings, and midseason closures are all possible in a ski area that depends completely on natural snow. As demonstrated by the Gateway Snow Park in Eagle (see *Market Analysis*) blowing a significant amount of manmade snow is realistic in the Treasure Valley. Once a manmade snow base is established during the typical cold spells of November/December, it can be well maintained through the months of January through early March.

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Image 1 Soldier Hollow During NCAA Championships - March 2014

Image 2: James Crimp from Bowdoin College races at Soldier Hollow on entirely manmade snow.

Lack of a stadium - Bogus Basin Nordic has excellent beginner terrain, but it lacks a true "stadium" that critically assists beginning skiers, both adult and children. Most successful Nordic areas around the country feature a large flat area that allows for the construction of challenge/obstacle courses for elementary-aged skiers, to supervise a large group from one strategic location, the ability to host fun low-key races, and teach adult beginners in a wide open and controlled environment where many can learn at the same time without interfering with one another.

Image 3: Large open areas allow for beginners to learn and provide space to start races

Manmade ski trails based in the Boise foothills offer other advantages as well.

Racing - If planned correctly a new ski trail could provide a superior racing experience for both local skiers and for racers invited from around the region. Currently, Boise athletes who want to be regionally and nationally competitive are forced to do nearly all of their racing away from Boise. The addition of a stadium – and the ability to plan loops that make sense for different distances and disciplines give these new trails the ability to host races that would attract racers from outside of the Treasure Valley.
Similarly, many ski areas around the country are able to host fun after-work race series that attract between 20-100 skiers. These are locally competitive, but are more about community and camaraderie. The proximity to town would allow this sort of community event to develop.

Quality Grooming - For cross country skiing the snow surface is paramount to providing a positive experience. Cross country skiing is a lifetime sport, but many people are reluctant to try it for the first time later in life. Learning to ski at a later age is absolutely possible, but trail conditions must be managed. A small manmade loop can be perfectly manicured so that the surface is neither too firm nor too soft; is free of chunks of ice, rocks, and other debris; and has an even-smooth surface. Under these conditions, and with appropriate beginner terrain anyone can learn to cross country ski.

At our new ski track, we hope to provide an excellent beginner experience and a high-quality training venue for advanced skiers when they cannot find time to drive to Bogus Basin. To provide the best beginner experience, we could offer both rental gear and lessons. Alternatively, the rental gear could also be obtained from the three local shops that rent cross country equipment. Given the control that we have over our terrain and

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snowpack, the risk to gear is much lower than at a ski area that depends on natural snow. We are unlikely to have rocks, sticks, roots and other unanticipated hazards on our trails that may damage the equipment. When our snow depth is insufficient we simply won't be open. Offering lessons would give beginners confidence to try out the sport.

Tourism – We don't expect tourists to travel great distances to ski at the new trail system, but given its central location, it is not unreasonable to assume that with sufficient marketing, residents from as far as Mountain Home, Caldwell, or Ontario (Oregon) may make the easy hour (or less) drive to Boise to give skiing a try. Drawing these trail users to Boise would provide a small economic boost to nearby shopping centers, restaurants, bars, and outdoor retailers. And again, we see this valley ski facility as a feeder for greater use of the Bogus Basin Nordic trails as skiers become more proficient and want to experience longer or more varied trails.

Market Analysis

Comparable Businesses

Weston Ski Track (Leo J. Martin Ski Track) – Weston, Massachusetts (greater Boston Metropolitan Area)
(http://www.skiboston.com/skitrack/skitrack.php)
According to general manager Marc Jacobson – The Weston Ski track has ~42,000 unique user-days each year – or nearly 1% of the greater Boston metropolitan area (4.63 million). They make snow on about 2.5 kilometers of trail and open up to 10 kilometers when there is sufficient natural snow. Beyond the thousands of visitors, the Weston Ski Track also hosts state and regional level races that attract hundreds of skiers to the area. This comparable is one of the best for Boiseans to consider, as it has many parallels – a large urban population nearby, use of a golf course, and smart solutions for obtaining water for snow making.
Moreover, Boston and Boise have remarkably similar average temperatures (see Figure 6, 7) Both the high and low temperature in Boise are lower than Boston in November and December, when the high and low temperature are slightly higher in Boise during January and February.

Soldier Hollow – Heber, Utah (2002 Winter Olympics Site)
(http://soldierhollow.com/)
Soldier Hollow has piping set up to make snow across its entire 30 kilometers of trails, but normally focus their snowmaking efforts on 3-5 kilometers of trails. Every year since 2003, they have hosted a significant junior race that has recently attracted over 750 racers coming from California, Oregon, Washington, Colorado, Wyoming, Montana, Idaho, and Utah. They organize this notwithstanding variable winter conditions. Soldier Hollow also provides daily Nordic skiing to moderate income Heber Valley citizens who normally could not envision driving 35 miles (and the expense) of driving to the Park City area cross country trails. Despite being 45 minutes from Salt Lake City, Soldier Hollow remains profitable due to the consistency of the ski experience and the reliability of its combined natural and manmade snow.

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Quarry Road – Waterville, Maine
(http://quarryroad.org/)
Just a few minutes outside of Waterville Maine, Quarry Road is a City- owned trail center with 3 kilometers of snowmaking trails and an additional 10 kilometers when conditions allow. Quarry Road is a vibrant center for training youth in Waterville, who formerly had to travel fairly long distances to access cross-country groomed trails. There really was no organized youth cross country skiing in Waterville until this site was re-designed and revived, starting in 2006. Over the past few years this site also has served as the backup location for college and regional races. Maine is enthusiastic about skiing, and for the past handful of years central and coastal Maine have had little snow in the winter. With its newly built trails and snowmaking, Quarry Road has been a significant boon to adult and youth skiers, many of whom are of limited financial means. Interestingly, Quarry Road twice had alpine skiing in past decades but was shut down principally for economic reasons. It was revived with the passionate drive and non-profit fundraising by locally-organized citizens, much like the volunteer and outdoor-oriented people of Boise.

Theodore Wirth Park – Minneapolis, Minnesota
Located in downtown Minneapolis, Theodore Wirth Park is an excellent analog to what we are trying to do in Boise. The trails are located on a park and golf course with just over 3 kilometers of skiing. Given its downtown location Wirth Park is easily accessible to hundreds of thousands of people. Theodore Wirth is bursting at the seams – high school teams schedule practice far in advance, and races are scheduled for nearly every weekend. On an average winter – with 60 days of operation Wirth Park typically sees around 55,000 user-days which equates to around 1.5% of the Minneapolis-Saint Paul Metropolitan area's population (3.6 million).
While once operated by the city, Theodore Wirth is transitioning to independent management through the Loppet Foundation.
Like our plan, Theodore Wirth is driven by snowmaking – while Minneapolis receives more natural snow than Boise the demand for ski facilities is so high that they need the ability to guarantee snow.

Sun Valley Nordic Ski and Snowshoe Trails – Sun Valley, Idaho
Cross Country Ski trails have been groomed on the Trail Creek Golf Course for decades. According to Alex Bliss, Trail Creek Golf Course Superintendent, damage to the golf course is minimal. In years where they have planned poorly and had little snow some sprinkler heads were broken. The primary "damage" is simply that it takes the grass just a bit longer to green-up. Alex's primary concern is the golf course – not the skiing – and he describes the brown as frustrating, but that it is an aesthetic issue rather than affecting the quality of play.

Gateway Snow Parks – Boise, Idaho
Gateway operates a small freestyle terrain park on Eagle Island. With two "Fan" type guns they are able to produce a significant amount of snow – enough to build jumps and other terrain features that can withstand the rain and warm temperatures that often visit during a Boise winter.

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Customer Base

According to the Boise Valley Economic Partnership (http://www.bvep.org/facts/demographics.aspx) the Boise Metropolitan area had a total population of nearly 640,000 people in 2013. Boise's population is highly active – and recreationally motivated. It is estimated that more than 400,000 people use the ridge to rivers trails (https://www.ridgetorivers.org/news/2015/11/citizen-input-sought-at-ridge-to-rivers-public-workshops/) each year and about 30% of Boise's residents are trail users. Whether they are hikers, walkers, runners, or mountain bikers – XC skiing is an excellent complement to their current preferred activity.

Bogus Basin Nordic Team

Currently the Bogus Basin Nordic Team has about 90 kids age 7-18 participating in its programs – and that is with the high barriers to entry. Nearly all of their parents participate, at least recreationally, in XC skiing as well. We believe that with a lower time commitment, easier access, alleviated fears about the drive to Bogus, and consistent skiing this program can grow substantially.

Idaho Nordic

Idaho Nordic represents a community of around 60 committed XC skiers. This group represents Boise residents in their late 20s – mid 60s. They meet often throughout the year to train and they travel to regional and national races like the Boulder Mountain Tour in Sun Valley and the American Birkebeiner in Wisconsin. Nearly 100 skiers from Boise travel each year to the Boulder Mountain Tour – these skiers would have the opportunity to get in a quick ski before or after work on a weekday and travel to Bogus on the weekends for their longer distance training sessions.

Ada County Schools

Across New England, the Midwest and Colorado cross country skiing is offered as a middle and high school sport. Current access to skiing makes that unrealistic for Boise, but with the proposed ski area travel time would be removed as an obstacle. Similarly, Treasure Valley schools could utilize the area for winter-sports days.

Consider a few comparable ski programs

Tahoe XC "Strider Gliders" - North Lake Tahoe has a year-round population of only ~10,000 residents and draws nearly 200 kids to participate in their youth program (Age 4 – 11). The Tahoe Cross Country Ski area also offers free skiing to all Tahoe schools. The teachers and students visit the ski area for a day of skiing introducing hundreds of kids to a new way to have fun and stay active during the winter. (https://www.tahoexc.org/tccsea/free_skiing_for_schools).

The Utah Nordic Alliance based in Salt Lake City draws 150 kids to its programs from a metropolitan area of nearly 1 million – though their participants must drive 20+ minutes from the city to their training site at the Mountain Dell Golf Course.

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Bridger Ski Foundation Bozeman, Montana similarly has a substantially smaller population than Boise – the United States Census Estimated Bozeman's population as 41,660 in July of 2014. Yet, their junior programs boast nearly 300 total participants. Like Boise, Bozeman skiers have a high quality venue 30 minutes from town (Bohart Ranch), but skiing at Lindley Gardens – just outside of downtown Bozeman – allows a much greater number of children to participate.

Between the Bogus Basin Nordic Team, Idaho Nordic, and other local skiers, there is clearly already an established market for XC skiing in the Treasure Valley. With the superior access this ski area would provide, the potential for this healthy lifelong sport to grow is enormous.

Site Analysis

Choosing the site for a new ski area is possibly the most important part of the project. The primary considerations are: access to water, access to power, adequate topography, parking, traffic concerns, and aspect and elevation.
Access to Water and Power is crucial for snowmaking. Water can be drawn from the municipal system, but would ideally be drawn from a non-treated source as the snow is not meant to be ingested. Access to power determines the ability to make snow across different parts of the course rather than in just one central location.
Adequate Topography XC ski areas must have varied terrain. Too flat results in boring skiing and is an insufficient challenge for advanced skiers. Too much climbing/ descending and it becomes too challenging for beginners. Additionally, having a stadium or teaching area is preferred for all abilities.
Parking and Traffic Concerns are paramount for current residents. Inadequate parking leads to conflicts with trail users and local residents. Access to trails should also avoid passing though residential neighborhoods and creating a large increase in traffic.
Aspect and Elevation determine how much natural snow the area would receive and how well the area would hold snow. Ideally much of the terrain would be on north and north-east facing slopes as these areas receive less direct sun, stay cooler, and hold snow better. A higher elevation typically means more snow, but with this ski area we are planning for zero natural snow (any natural snow is just a bonus), and as a result elevation is less of a concern.

Climate Analysis

Temperatures must be sufficiently cold for effective snowmaking. The primary factor in determining the quality of man-made snow is the "wet-bulb temperature." Wet-bulb accounts for both the relative humidity and the ambient air temperature. Wet-bulb is a better measure of the freezing potential of the water. 27 degrees Fahrenheit (ambient air temperature) is the "magic number" for snowmaking as snow can be made up to 100% humidity. In the following data, I used 27 degrees as the break-off point for a day when at least some snow could be made (See *Figure 1*).

During the past 3 winters between one third and one half of all days between November 1 and March 1 are "Snowmaking days." When the inversion sets up there is often a period

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of time when several days in a row allow for snowmaking 24 hours per day. For a month-by-month list of number of snowmaking days for the past 4 winters (See *Figure 3*).

According to estimates completed by HKD snowmakers on behalf of this project, with 6 "lance-style" guns or 2 "fan" guns in 6 of the last 7 years we would have been able to open a full 3 kilometer loop (at 18 inches of depth) by December 15. Over the same time period the average date for hitting the same 18 inches of depth would have been November 30th (See *Figure 2*).

Noise

Neighbors may worry about noise associated with these new ski trails, but using the best available technology and strategically choosing location and timing, these concerns are unnecessary. Different types of snow guns produce differing amounts of noise. The loudest are the "Fan Gun" while the quietest are the "Air-Water" guns. For this, and other reasons we will use air-water guns. At 5 meters (16 feet) the Snowlogic air-water gun has been measured at 66 decibels, and at 20 meters (65 Feet) the same gun has been measured at 57 dBA. According to the Occupational Safety and Health Administration 50 dBA is comparable to an urban residence, 60 dBA is equivalent to a conversation at 3 feet, and 70 dBA is equivalent to classroom chatter *(See Figure 9).* For comparisons sake, snowmaking is significantly quieter than the neighbors weed whacker and power tools which come in between 75 and 85 dBA at similar distances.

Moreover, Snowmaking will be concentrated to a handful of days early in the season. The plan for snowmaking involves making a lot of snow early in the season and only supplementing that snow when necessary later in the season.

Image 4 Snowlogic's Duel Vector Technology is much quieter than traditional fan guns and is appropriate for use even in residential areas (Deer Valley, Utah)

Strategy and Implementation

The most important piece of establishing a ski area in Boise is the selection of location. Our strategy is to build a coalition of already passionate skiers, and reach out to potential

partners – (Boise Independent School District, City of Boise Dept. of Parks and Recreation, Adaptive Skiing, Refugee Services, Boise State University).
Our preferred site is the northeast corner of the lot shared with Hillside Junior High– it has access to water, an established electrical system, a north facing aspect, excellent ski terrain, plenty of parking, is easily accessible from underserved segments of the Boise population and is removed from major residential neighborhoods. For a map of the potential site see *Figure 8*.

Supporters

Bogus Basin Nordic Team – A team of nearly 70 junior and youth athletes, and additional network of 125 parents, and many hundreds of program alumni.
Idaho Nordic - ~60 of Boise's most committed Nordic skiers. Many of whom are well connected and well positioned in the Boise community.
Bogus Basin Recreational Association – The Bogus Basin Ski Area recognizes that skiing has high barriers to entry and that an easily accessible ski trail in town will go a long way to revitalizing and building a winter sports culture in Boise.
Local Businesses – Owners of both Idaho Mountain Touring and World Cyle (two of the leading outdoor retailers in Boise) are strong supporters of the project.

Timeline

The first priority is receiving permission to use the golf course as a site for the new XC ski trail. We need this guarantee before we can seriously solicit donations as without the land there is no ski area.
The second priority is raising the money to cover initial expenses (see *financial plan*)
Perform any studies required by the city – water, noise, traffic, etc.

The following occurs in the year snowmaking is to begin
July 1– order snowcat, and order snowmaking equipment. Season Passes go on Sale
August – Order rental gear, create signage
September – minor marketing push, purchase insurance, hire winter employees
Early October – perform any necessary trail work
~October 25 – Install snowmaking, begin major marketing push
~Nov 20 – Begin Blowing Snow
~Dec 1 – Trails open
March 1 – Clear trails of remaining snow

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Financial Plan

To make this ski area a reality will take a substantial amount of fundraising. This is a community project, not an expansion/ investment of a large business, and as a result there is no one able to take on the risk of such a large capital investment.
The goal of the first fundraising push will be to raise $315,000
This covers snowmaking (machines, piping, pumps, hoses), purchases two grooming machines, and pays for any studies required by the city (water, traffic, noise)

After this portion of the fundraising has been accomplished we will sell season passes for the first season. At a rate of $100 for under 18 passes and $175 for over 18 passes we anticipate approximately $42,500 of season pass income the first year (75 junior passes, 200 adult passes)
Season pass income pays for an initial investment in rental gear, signage and supplies and the down payment on a snowmobile.

Estimated Startup Cost - $387,150
Estimated ongoing (yearly) costs - $166,000

Estimated Season Pass Income - $42,500
Estimated Day Pass Income - $105,000
Estimated Rentals and Lessons - $85,000
Estimated Concession Income - $2000
Estimated total income $234,500

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Appendix.

Snowmaking

SNOWMAKING WET BULB

RELATIVE HUMIDITY	TEMPERATURE °C															
R.H.	3	2	1	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
90%	2.4	1.5	0.5	-0.6	-1.5	-2.5	-3.6	-4.5	-5.4	-6.3	-7.3	-8.4	-9.4	-10.3	-11.3	-12.3
80%	1.8	0.9	-0.1	-1.1	-2.1	-3.1	-4.0	-4.9	-5.8	-6.8	-7.7	-8.6	-9.6	-10.6	-11.6	-12.6
70%	1.1	0.1	-0.7	-1.7	-2.6	-3.7	-4.6	-5.5	-6.3	-7.2	-8.1	-9.1	-10.0	-11.0	-11.9	-12.9
60%	0.3	-0.7	-1.5	-2.3	-3.2	-4.1	-5.0	-5.9	-6.7	-7.6	-8.5	-9.3	-10.4	-11.2	-12.2	-13.1
50%	-0.5	-1.3	-2.2	-3.0	-3.8	-4.7	-5.6	-6.4	-7.2	-8.1	-9.0	-9.9	-10.7	-11.7	-12.6	-13.4
40%	-1.3	-2.1	-2.9	-3.7	-4.4	-5.2	-6.1	-6.9	-7.7	-8.5	-9.4	-10.3	-11.1	-12.0	-12.8	-13.7
30%	-2.0	-2.8	-3.5	-4.3	-5.0	-5.8	-6.7	-7.4	-8.1	-9.0	-9.8	-10.6	-11.4	-12.3	-13.1	-14.0
20%	-2.9	-3.5	-4.3	-5.0	-5.7	-6.5	-7.2	-7.9	-8.7	-9.4	-10.2	-11.0	-11.8	-12.7	-13.5	-14.3
10%	-3.5	-4.3	-5.0	-5.6	-6.3	-7.1	-7.8	-8.5	-9.2	-9.9	-10.6	-11.4	-12.3	-13.1	-13.8	-14.6

www.snowmakers.com

SNOWMAKING WET BULB

RELATIVE HUMIDITY	TEMPERATURE °F															
R.H.	37	36	34	32	30	28	27	25	23	21	19	18	16	14	12	10
90%	36.3	34.7	32.9	30.9	29.3	27.5	25.5	23.9	22.3	20.7	18.9	16.9	15.1	13.5	11.7	9.9
80%	35.2	33.6	31.8	30.0	28.2	26.4	24.8	23.2	21.6	19.8	18.1	16.5	14.7	12.9	11.1	9.3
70%	34.0	32.2	30.7	28.9	27.3	25.3	23.7	22.1	20.7	19.0	17.4	15.6	14.0	12.2	10.6	8.8
60%	32.5	30.7	29.3	27.9	26.2	24.6	23.0	21.4	19.9	18.3	16.7	15.3	13.3	11.8	10.0	8.4
50%	31.1	29.7	28.0	26.6	25.2	23.5	21.9	20.5	19.0	17.4	15.8	14.2	12.7	10.9	9.3	7.9
40%	29.7	28.2	26.8	25.3	24.1	22.6	21.0	19.6	18.1	16.7	15.1	13.5	12.0	10.4	9.0	7.3
30%	28.4	27.0	25.7	24.3	23.0	21.6	19.9	18.7	17.4	15.8	14.4	12.9	11.5	9.9	8.4	6.8
20%	26.8	25.7	24.3	23.0	21.7	20.3	19.0	17.8	16.3	15.1	13.6	12.2	10.8	9.1	7.7	6.3
10%	25.7	24.3	23.0	21.9	20.7	19.2	18.0	16.7	15.4	14.2	12.9	11.5	9.9	8.4	7.2	5.7

www.snowmakers.com

Figure 1 These charts show the relationship between temperature, relative humidity, and wet bulb temperature. The blue shaded zone describes weather conditions where snowmaking is impossible.

3. Hours to Open Terrain

Gallons to Cover 3 kilometers 14ft wide	= 953,003	18" deep
Gallons to Cover 3 kilometers 14ft wide	= 1,270,670	24" deep

- Equipment Option 1 + 2

Six HKD Phaser Sled guns, 275 GPM Max, <27° F wet bulb 2h.

	Average 2009-2016		
	% Open	Flow	Hours
Oct 30th	1%	9,330	2
Nov 30th	100%	956,133	121
Dec 15th	218%	2,074,417	248
Jan 1st	372%	3,549,358	433

*** 7yrs of Seasonal Hourly data from NOAA Station KBOI 24131 Elev: 2814***

- Equipment Option 3

2 HKD Halo Fan Guns, 275 GPM Max, <27° F wet bulb 2h.

	Average 2009-2016		
	% Open	Flow	Hours
Oct 30th	0%	3,794	2
Nov 30th	62%	590,163	121
Dec 15th	139%	1,326,667	248
Jan 1st	238%	2,271,189	433

*** 7yrs of Seasonal Hourly data from NOAA Station KBOI 24131 Elev: 2814***

4. Full Engineering and System Planning

This document was designed to help you with a basic overview and budget for your snowmaking system. The system will require site visits, and full engineering of the water source, pump station, piping, primary power, electrical distribution, and snow gun installation.

www.HKDsnowmakers.com 15 Mercer Road, Natick, Ma 01760 508-655-3232

Figure 2 Operational Hours and Required Flow for Snowmaking

Climate Data

Number of Days with low temperature below 27 degrees Fahrenheit				
	2012-13	2013-14	2014-15	2015-16
November	4	8	12	9
December	11	28	10	15
January	26	23	14	14
February	16	5	4	7

Figure 3 *(Note: 2014-15 was considered to be one of the worst years for winter sports (and snowpack) in Southern Idaho's history – yet nearly 1/3rd of all days had snowmaking potential.)*

Climate Data	Average High	Average Low	Average Humidity
November	48	32	69
December	38	24	75
January	38	25	75
February	45	28	75
March	55	34	60

Figure 4 Simple average high, average low, and average humidity from the Boise airport. At 75% humidity snow can be made at 29-30 degrees Fahrenheit.

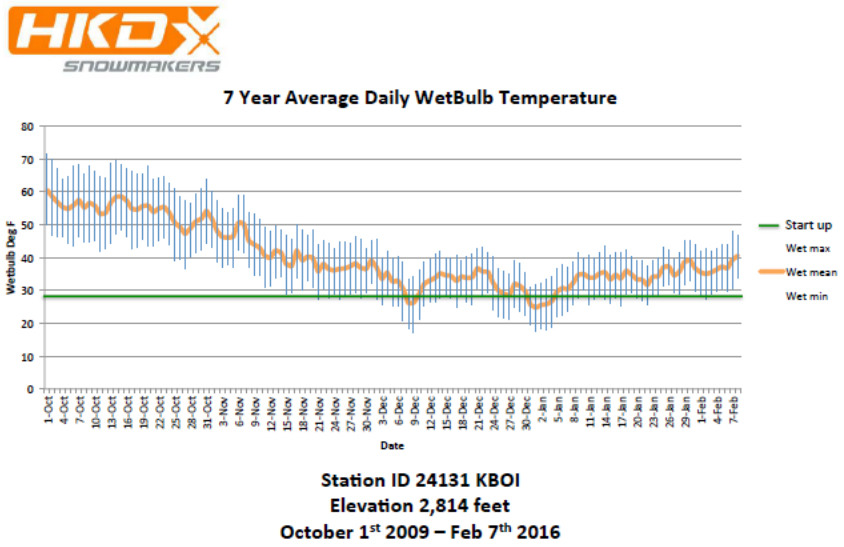

Figure 5 Seven-Year Average Boise Wetbulb Temperatures (Boise Airport Weather Station)

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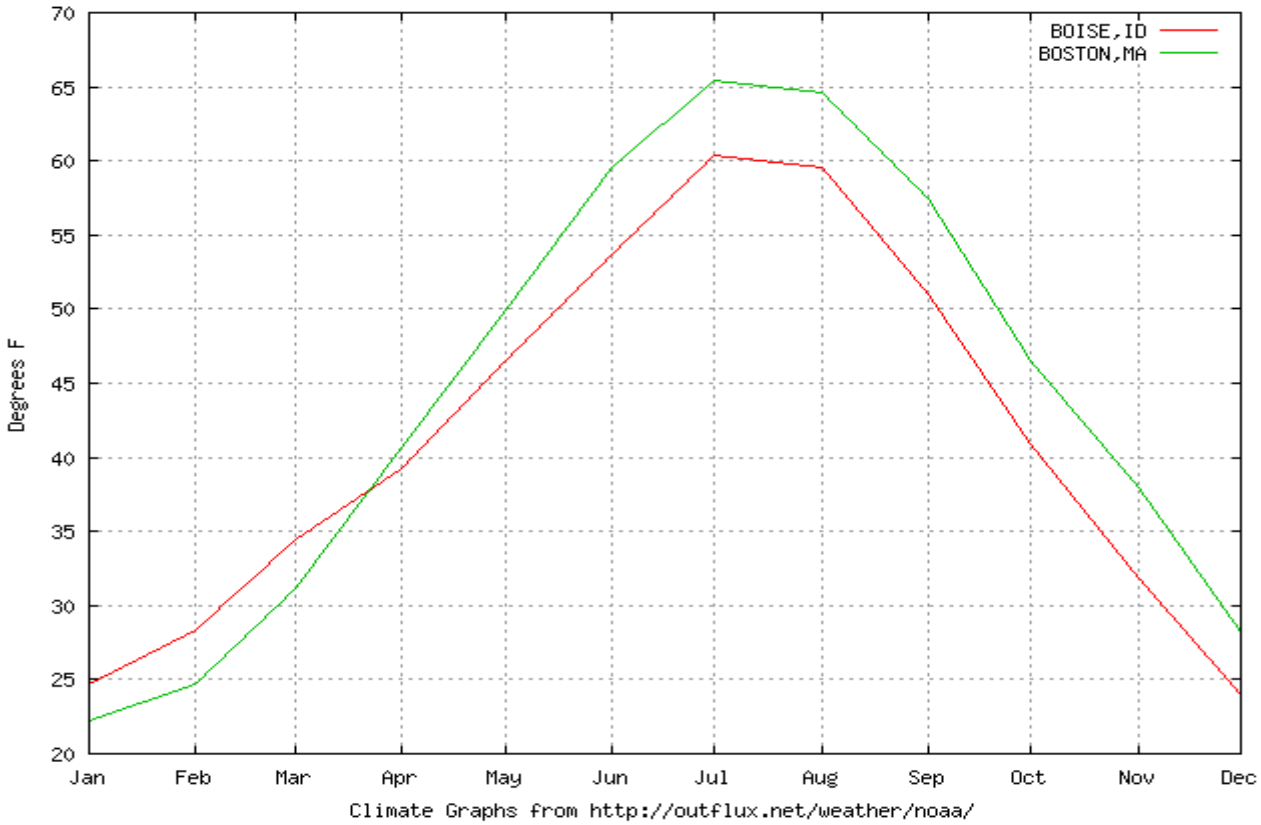

Figure 6 Average Low Temperature

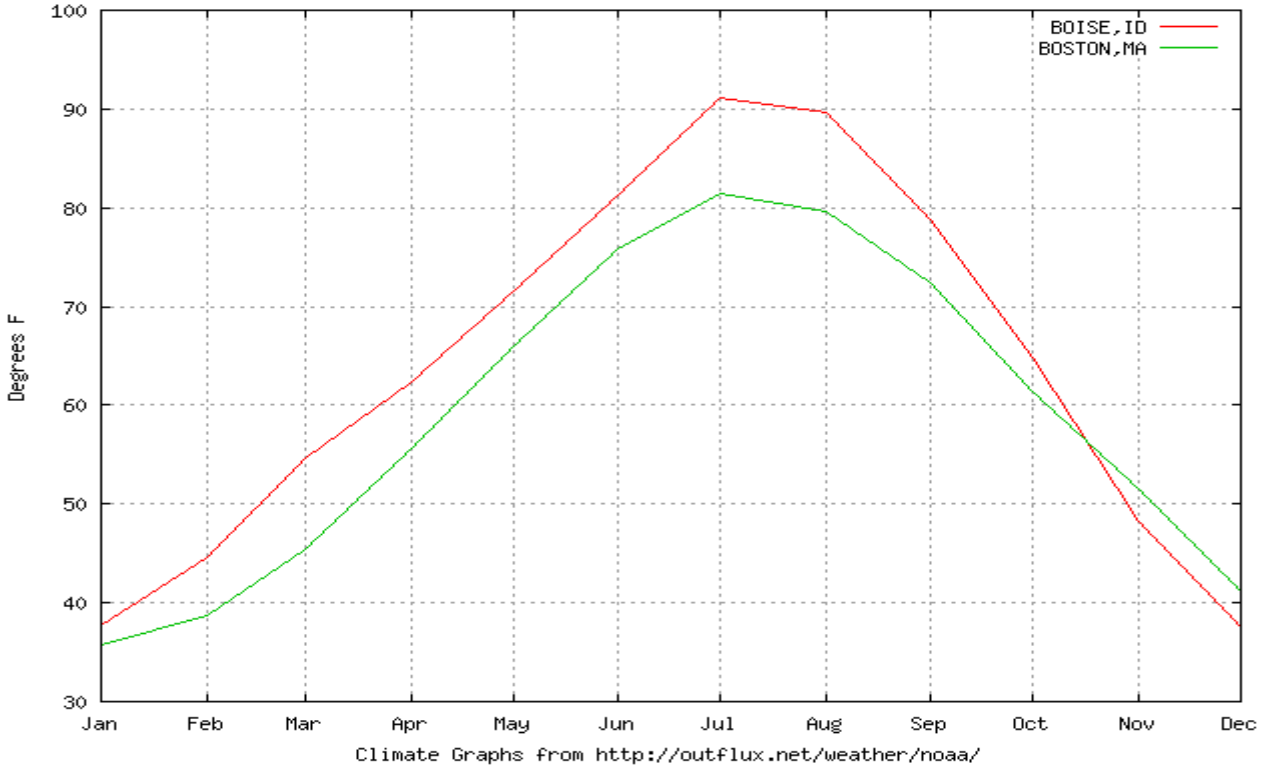

Figure 7 Average High Temperature

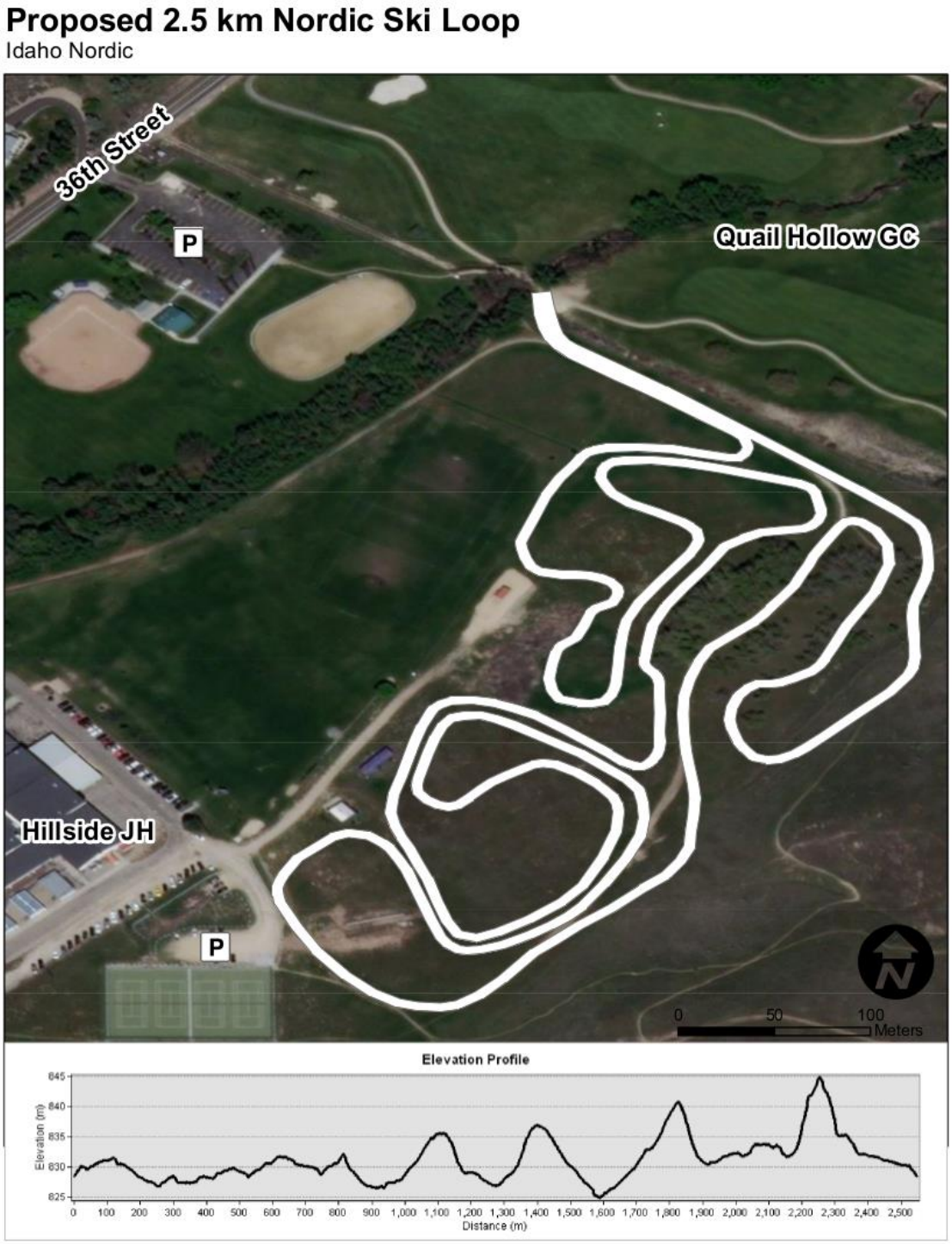

Figure 8 Potential Course Outline

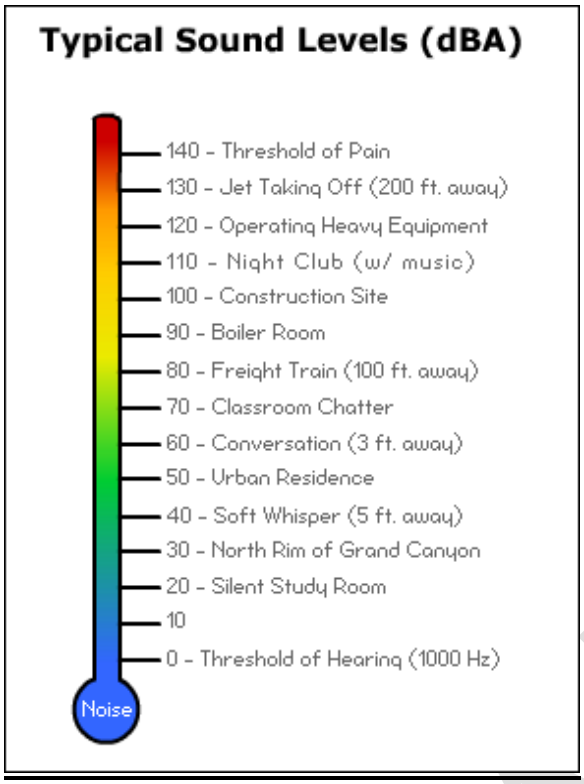

Figure 9 OSHA Typical Sound Levels (www.osha.gov)

Other Sources

https://parks.cityofboise.org/media/227501/2011-plan-with-2015-update.pdf

http://parks.cityofboise.org/media/4076/ExecutiveSummary.pdf

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