

ALPINE CANADA ALPIN
LONG TERM SKIER DEVELOPMENT
FOR ALPINE SKI RACING



ALPINE INTEGRATION MODEL - AIM 2 WIN / PARA-AIM 2 WIN

Acknowledgments

Acknowledgments

LTSD Steering Committee

Dr. Stephen Norris, LTAD Expert, Canadian Sport Centre, University of Calgary
Mark Sharp, ACA National Development Director
David Ellis, ACA Sport Science Director
Benoît Lalonde, ACA National Development Director

Contributors

Ken Read, CEO of Alpine Canada Alpin
Max Gartner, ACA Program Director
Peter Goodman, General Manager Canadian Ski Coaches Federation
Pierre Ruel, Technical Director Canadian Ski Coaches Federation
Dusan Grasic, Men's Head Technical Coach
Dr Joan Vickers - The Quiet Eye - Perception, Cognition and Decision Training. Human Kinetics Publisher 2007
Laurence Lemieux, Ski Coach
Richard Lepage, Athletic Director Ski Quebec Alpin
Jim Davis, Technical Program Director Alberta Alpin
Martha Marpole, Alberta Alpine Entry Level Coordinator
Joanna McGee, British Columbia Alpine Entry Level Program Director
Dr. Kimberley Amirault, PHD Sport Physiology
Keith Robinson, CSCF
Heather Metzger, Children Development Director Ontario Alpine
Sarah Applegarth, Active Life Conditioning Inc. Strength & Conditioning Coach

Graphic design team

Aurélie Botbol
Kyle Marr
Alain Verdier
Josée Rochon - French translation

Photographs credits

Peak Photography
Pentaphoto
Martin Olson Photo (sequence photos)
Panorama Photo
Mark Sharp
John Everly
Robert Kwong
Jesse Porter - Timestamp Multi Media
Jessica Tidswell
Malcolm Carmichael





"One thing that you really need is that fire in your belly when you are ski racing because you have to be willing to take chances, to take risks. You need that to be competitive and to be the best,"

-- Two-time World Cup winner Thomas Grandi

Contents

Table of Contents

ACKNOWLEDGEMENTS.....	3
FOREWORD.....	6
GLOSSARY OF TERMS.....	8
INTRODUCTION.....	10
LTSD FOR ALPINE SKIING.....	12
KEY FACTORS FOR LTSD.....	14
SPECIFICS OF THE LTSD STAGES.....	49
GLIDING START.....	50
SKIER ESSENTIALS.....	52
LEARN TO TRAIN.....	55
LEARN TO RACE.....	59
TRAIN TO RACE.....	63
TRAIN TO WIN.....	66
SKIING FOR LIFE.....	68
CANADIAN TECHNICAL VISION.....	70
BASIC SLALOM SKIING GOALS.....	71
BASIC GS SKIING GOALS.....	72
CANADIAN SKI COACHING VISION.....	73
APPENDIX.....	74
A1. ACA STANDARD TESTING PROTOCOLS.....	75
A2. ACA STANDARD PHYSICAL TESTING PROTOCOLS.....	80
A3. ACA TESTING PROTOCOL TARGETS LEVELS.....	81
B. ADDITIONAL TESTS FOR PROVINCIAL ATHLETES AND CAST ATHELETES.....	83
C. COACHING EDUCATION.....	86
D. COGNITIVE DEVELOPMENT - DECISION TRAINING FOR SKIERS.....	90
E. COURSE SETTING.....	95
F. BENCHMARKING THE SKILL OF YOUR SKIERS.....	100
REFERENCES.....	101
LTSD FOR PARA-ALPINE SKIING TEAM.....	103
CLOSING REMARKS - Ken Read.....	182

Foreword

Foreword

"BEST IN THE WORLD ... AT EVERY LEVEL"

Every nation strives to be the best in the world. In doing so, comparisons are often made amongst nations. The Austrian ski racing system has been talked about greatly as they have dominated the World Cup scene. They are blessed with government financial support for the sport school system and have an abundance of both skiers and experienced coaches at every level. Competition within their system is fierce and only exceptional athletes reach the podium.

What does competition within a system mean? The Canadian hockey system is a great example. There are large numbers of athletes playing the game (500,000+) thus producing inner system competition. There is a hockey rink in most towns and countless experienced passionate coaches (often ex-hockey players) at the grass roots stages. Media images and articles are aimed at us daily. Youngsters are accustomed to seeing Canadian hockey players win. This environment creates a system that produces a great deal of young talented individuals.

From the 20,000 ski racing members across Canada, approximately 340 athletes compete at a level from which the Canadian Alpine Ski Team selects its athletes. Although this is a small pool to draw from, if all 340 athletes were exceptional, Canada's World Cup scene would be even better.

As we continue to research training systems at the developmental levels of ski racing, I find myself asking what it takes to make a ski champion. How do they become what they are? What did they do when they were young? What kind of life led them to the top of this sport? What kind of system were they in, and was it the system that produced them or did they get there in spite of the system?

I have talked to several elite-level World Cup racers during the development of this document. The following are some questions I asked and a cross section of answers I received.

How much did you ski when you were young?

"I skied a lot. We got out of school at lunch time and I skied almost every day." "I skied about five days a week. I never stopped going up and down."

How much training and racing did you do?

"I loved racing. Up until I was 14, I trained four to five days a week. I lived close to the hill and we had great night skiing."

What kind of training did you do?

"I loved training on courses; you had to pull me off the hill. It's all I knew. I hated losing races. I always had someone to chase. Skiing was like walking to me. The skis were part of my body. I never stopped needing to win. I had the confidence to attack from when I was very young. That's how I always skied."

Why did you become one of the best?

"I always had a good coach and did many interesting things in training. My mom and dad were always very involved." "I loved sports. I always skied fast and loved free skiing in the trees when I was really young." "I worked a lot on my skiing from about eight years old. Winning was always the reward that pushed me. I loved skiing; it was my life and all I remember. I did a lot of other sports at school. I was always good in sports, but I couldn't wait to get back on the hill."



Foreword

On a recent trip I spoke with famous coaches, Ante Kostelic, father and coach of the legend Janica and her brother Ivica Kostelic, and Anders Pearson, father and coach of Anja Pearson. I asked them similar questions and not surprisingly, Kostelic and Pearson had similar answers.

Their kids skied most days but also participated in gymnastics, athletics, soccer and swimming. Opportunity, exposure and high volume combined with all-around sports was the way of life for these families. There were many interesting activities on skis in the younger years and many long non-stop runs with different goals in mind. However a break in the summer away from snow was also very important.

Both coaches conceived and implemented a plan from the early stages. There was a long term vision to be committed and training plans were devised in four three-year blocks in preparation of the Olympic Winter Games in Salt Lake City. The plan worked as their kids made history. It was relatively simple, be an all-around athlete, ski, ski, ski and stay happy.

I was shocked to learn the number of gates Janica skied between the ages of 9 - 12. Willow branches with a point shaved on the end and stuck in the snow on an angle so they wouldn't hit them, were used as gates. Ante said he gave very little coaching intervention, but continually changed the course. They skied up to one thousand turns around branches every day! That's five or six thousand turns a week for three years! This type of training (i.e. constant adaptability) fits exactly into the windows of trainability at ages 9 to 12 where reaction and adaptability must be trained.

It is interesting that there is an obvious trend in the answers to my questions. Being great is not all genetic. It is about family commitment, strong coaching knowledge and providing the environment to flourish. It is about physical literacy (Good all-around sport exposure at an early age) and instilling the love of the sport in creative ways. It is about developing the passion to 'win' by exposure to the correct environments at the right times. It is very clear that the early foundation years were instrumental in building these ski champions.

Much can be learned by looking at these top skiers. It is evident our children must ski a lot when they are young. Committed, well planned programs that instill all the ingredients correctly at the right time must be followed and a fun competitive spirit must flourish at every level.

Our concept of striving to be "BEST IN THE WORLD... AT EVERY LEVEL" implies the need for a professional approach from the grassroots level to the top, from all facets of the ski racing community including: clubs, parents, volunteers, organizers, sponsors, coaches, athletes etc. Our knowledge and expertise in managing every element of Long Term Skier Development must be utilized. We must strategize our calendar planning, run excellent ski club programs, produce knowledgeable coaches, run high quality fulfilling races, provide high quality exposure opportunities and athlete tracking, manage school and costs, with the common goal of enhancing the experience and gaining positive outcomes for our sport.

We must build an underlying philosophy of winning and be confident that we are always doing the best job possible to make ski racing fun. We will produce good members of society and respectful human beings through the vehicle of ski racing but we should never forget the Canadian population feels a great sense of national pride when our medal count at the Olympics is greater than all other nations.

Mark Sharp
Alpine Canada Alpine
National Development Director

Foreword



Glossary

Glossary of Terms

ACA	Alpine Canada Alpin
ADAPTATION	refers to changes in the body as a result of a stimulus that induces functional and/or morphological changes in the organism. The degree of adaptation is dependent on the genetic endowment of an individual. However, the general trends or patterns of adaptation are identified by physiological research, and guidelines are clearly delineated of the various adaptation processes, such as: adaptation to muscular endurance or maximum strength.
AIM	Alpine Integration Model
AUTOMATION	refers to a state of performance being fully automatic.
CSCF	Canadian Ski Coaches Federation
CHRONOLOGICAL AGE	refers to "the number of years and days elapsed since birth." Growth, development, and maturation operate in a time framework; that is, the child's chronological age. Children of the same chronological age can differ by several years in their level of biological maturation. The integrated nature of growth and maturation is achieved by the interaction of genes, hormones, nutrients, and the physical and psychosocial environments in which the individual lives. This complex interaction regulates the child's growth, neuromuscular maturation, sexual maturation, and general physical metamorphosis during the first two decades of life.
DEVELOPMENT AGE	refers to "the interrelationship between growth and maturation in relation to the passage of time. The concept of development also includes the social, emotional, intellectual, and motor realms of the child." Growth and maturation are two terms that are often used together and sometimes synonymously. However, each refers to specific biological activities. Growth refers to "observable, step-by-step, measurable changes in body size such as height, weight, and percentage body fat." Maturation refers to "qualitative system changes, both structural and functional in nature, in the organism's progress toward maturity; for example, the change of cartilage to bone in the skeleton."
EARLY SPECIALIZATION SPORT	includes artistic and acrobatic sports such as gymnastics, diving and figure skating. These differ from late specialization sport in that very complex skills are learned before maturation since they cannot be fully mastered if taught after maturation.
ELITE STREAM	refers to the flow of athletes who show promise in achieving high levels of performance at each level.
GROWTH	refers to observable step-by-step changes in objective measures such as: height, weight and body composition (fat to muscle distribution).



LTAD	Long Term Athlete Development resource paper. This generic framework was produced in 2006. Visit www.ltad.ca for the complete document.
LTSD	Long Term Skier Development Guide. This sport specific guide has been produced by Alpine Canada Alpin to guide coaches, administrators, program directors and parents on the scientific and artistic approach to long term athlete development in alpine ski racing.
MATURATION	refers to qualitative system changes, both structural and functional in the body's progress toward maturity such as the change of cartilage to bone in the skeleton.
PEAK HEIGHT VELOCITY	(PHV) is the maximum rate of growth in stature during the growth spurt. The age of maximum velocity of growth is called the age at PHV.
PHYSICAL LITERACY	refers to the mastering of fundamental motor skills and fundamental sport skills.
SKELETAL AGE	refers to the maturity of the skeleton determined by the degree of ossification of the bone structure. It is a measure of age that takes into consideration how far given bones have progressed toward maturity, not in size but with respect to shape and position to one another.
STAGES OF DEVELOPMENT	refers to the various stages in the LTSD guide that an athlete progresses from entry level ski racing to success on the World Cup international scene. The stages in the LTSD guide are Gliding Start, Skier Essentials, Learn to Train, Learn to Race, Train to Race, Train to Win, and Skiing for Life.
WINDOWS OF TRAINABILITY	refers to the period in an athlete's development where the five basic S's (speed, stamina, strength, skill and suppleness) of training and performance are best trained.
SPECIFIC SKI TRAINING AGE	refers to the actual number of years a child has been exposed to a ski training environment. Although a child can begin a ski program at any age, it is common and advantageous to begin the Skier Essentials stage around six years of age.
TRAINABILITY	refers to the faster adaptation to stimuli and the genetic endowment of athletes as they respond individually to specific stimuli and adapt to it accordingly. Trainability has been defined as the responsiveness of the developing individuals to the training stimulus at different stages of growth and maturation.



Introduction



In 1999 Alpine Canada Alpin produced a document titled "Alpine Integration Model," known as "AIM". Under the leadership of Istvan Balyi, Dee Dee Haight and in conjunction with the High Performance Advisory Committee (HPAC) and the Canadian Ski Coaches Federation, AIM was created on principles of the Long Term Athlete Development Guide (LTAD).

As AIM is a well known term in the ski racing community, this latest Long Term Skier Development guide (LTSD) for alpine ski racing will be addressed as AIM 2 WIN.

The AIM 2 WIN document is intended as a resource for coaches, managers, administrators, parents, teachers and volunteers who play a role in the development of young ski racers. AIM 2 WIN is a progression from the original AIM document by providing greater detail in the specifics of each development phase.

For many years, high quality coaches have been working with high level athletes, but one of the core messages from AIM 2 WIN is the importance of having high quality coaches working with children and young people during the early stages of their involvement in skiing.

AIM 2 WIN identifies skier development and performance pathways from the ski club level to the Canadian Alpine Ski Team national level. The document provides a framework of what to do and ensures that those involved with a skier's development have guidance. This document should not be seen as a rigid set of rules but as a guiding set of principles that can inform decision making.

Clubs and regions will continue to have flexibility in implementing the LTSD guide. Implementation will be influenced by such factors as club size, age range of club members, number of clubs in the region, and philosophy of the club. Other factors include length of the winter season, relationship with local ski resorts and ski schools, volunteer base, and availability of quality coaches.

The goal of Alpine Canada Alpin is to ensure that any child entering the alpine ski racing system is provided every opportunity to experience the necessary building blocks in order to reach the desired highest levels of the sport. Although the primary objective of AIM 2 WIN is to produce greater numbers of ski racers capable of achieving at the highest level, it also provides a platform for clubs and coaches to encourage and support participants at every level to fulfill their potential and maintain a lifelong involvement in the sport of alpine skiing.



"I have been an athlete for many years. Through adversity and success I have tried to maintain the same passion, dedication and love for the sport."

Emily Brydon



LTSD for Alpine Skiing

LTSD for Alpine Skiing

Every individual progresses through the same developmental stages from childhood to adulthood, although timing and intensity of physical, mental and emotional changes vary individually.

Identifying an individual's particular stage of growth and development forms the basis for effective and fulfilling programs for both skiers and coaches.

Skiing is categorized as a late specialization sport, which means in the early stages the most fundamental movement skills should be developed together with basic technical and tactical awareness involving various activities and sports. Opportunities to achieve and succeed in skiing at any level are improved through a long-term approach to preparation and performance. It is important to understand there is no shortcut to an athlete achieving full potential. If any aspect of a skier's development is not given adequate time or support to grow, the potential for shortcomings in vital skills or attributes is high.

It is now known that classifying young skiers based on chronological age is not a particularly effective approach for safe, fair and motivating competition, or as the basis for planning and implementing development programs.



14-year-old Canadian skier

Children of the same age demonstrate a wide variety of physical and movement skill development, psychological, social and emotional development. Ideally, the competitive categorization of young skiers would be based on physical development and maturation rather than chronological age. However, at this point there is no viable and reliable classifying system in operation.

Although the stages are on a sliding scale, the LTSD guide illustrates the latter years of Skier Essentials, Learn to Train and Learn to Race stages are indeed the most critical to long-term individual development. It is claimed these are the stages that make or break a performer.

Coaching at these early stages demands knowledgeable, experienced individuals able to relate well to young athletes and respond sensitively to their needs. Failure to capitalize on potential at the relevant stages cannot be fully compensated for later.

It is worth stressing that if young skiers are subjected to ineffective coaching during these early stages, it may be impossible to correct the problems created during the later Train to Race and Train to Win stages. There is a widespread understanding within many sports, that a 'day of learning in the first ten years of life is worth at least five days of compensatory training in later development stages.'



Long term skier development for alpine skiing

Seven stages of LTSD



Long term skier development for alpine skiing



Key Factors

Key Factors for LTSD



01. THE TEN YEAR RULE
02. FUNDAMENTALS OF ATHLETICISM
03. DEVELOPMENTAL AGE VS CHRONOLOGICAL AGE
04. SPECIALIZATION
05. WINDOWS OF OPTIMAL TRAINABILITY
06. PHYSICAL, MENTAL, COGNITIVE AND EMOTIONAL DEVELOPMENT
07. PERIODIZATION
08. PLANNING FOR TRAINING
09. PLANNING FOR COMPETITION – CALENDARING
10. NEW INITIATIVES
11. SCHOOL, COSTS AND SUMMER CAMPS
12. DESIGNING AN APPROPRIATE LTSD PROGRAM
13. CANADIAN SKI RACING SYSTEM



Long term skier development for alpine skiing

1. The Ten Year Rule

Scientific research has concluded that across most sports it takes a minimum of ten years or 10,000 hours of training for an athlete to reach elite levels. This translates into an average of three hours of physical activity every day for ten years.

This factor is supported by The Path to Excellence, which provides a comprehensive view of the development of US Olympians who competed between 1984 and 1996. The statistics reveal that:

- U.S. Olympians begin their sport-specific participation at the average age of 12.0 for males and 11.5 for females.
- Olympic medalists were younger (by 1.3 to 3.6 years) during their first five stages of development in comparison to non-medalists. This suggests that medalists were receiving motor skill development at an earlier age. However, caution must be taken not to fall into the trap of early specialization in late specialization sports.

The Canadian ski racer development pathway begins at approximately six years old. The years of development from 6 to 12 are considered the years where the essential foundational skills must be acquired. From 11 to 12 years and onwards, skiers will participate in more sport-specific programs and begin the journey in which the ten-year rule applies, although in speed disciplines the start of this journey may begin later.

TECHNICAL EVENTS

- Correct technical abilities must be acquired by ages 11 to 13 (end of Learn to Train stage), reaching the international elite level around 21+ years.
- The end of the Learning to Train stage may be later by a year for later developers.

SPEED EVENTS

- Specific training begins at ages 14-15 (Train to Race stage) reaching international elite level at approximately 24+ years.



The Canadian ski racer development pathway begins at approximately six years old.

Long term skier development for alpine skiing



2. FUNDamentals of Athleticism

Fundamental movements and skills should be introduced through fun and games. Fundamental sports skills should follow and include basic overall sports skills.

Fundamental movement skills + Fundamental sports skills = PHYSICAL LITERACY
 PHYSICAL LITERACY refers to competency in movement and sports skills
 PHYSICAL LITERACY should be developed before the onset of the adolescent growth spurt.

The lists below outline the wide variety of FUNDamental movements and skills that underpin physical literacy. They include four different environments: earth, water, air and ice.



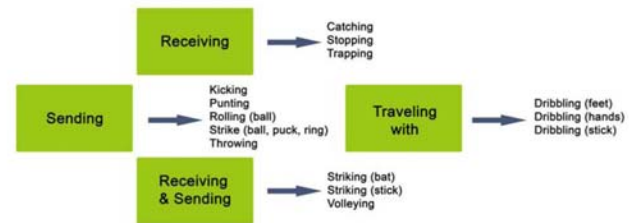
The base for all sports can be found within:

Athletics: run wheel jump or throw
 Gymnastics: ABC's of athleticism - agility, balance, coordination and speed
 Swimming: for water safety reasons, for balance in a buoyant environment

Without basic movement skills a child will have difficulty participating in any sport.

The world's top skiers are proven to be some of the most well-rounded athletes of any sport. A continuously changing playing field coupled with force, speed, physical and cognitive demands, requires the skier to have superior athletic skills as well as adaptability and spontaneity skills. Ski racers must first and foremost be good athletes as skiing is an incredibly demanding sport. The foundation for these abilities must be laid during the first four stages of development, Gliding Start, Skier Essentials, Learn to Train and Learn to Race.

Boosting | Climbing | Eggbeater | Galloping | Gliding | Hopping | Ice Picking | Jumping | Leaping
 Poling | Running | Sculling | Skating | Skipping | Sliding | Swimming | Swinging | Wheeling



Balancing/Centering | Body rolling | Dodging | Eggbeater | Floating | Landing | Ready position
 Sinking/Falling | Spinning | Stopping | Stretching/Curling | Swinging | Twisting/Turning



3. Developmental age vs chronological age

LATE DEVELOPERS

As competition programs are based on chronological age structures, late developers can be at a severe disadvantage when compared to peers up to four years older biologically. Late developers theoretically spend more time in the optimal skill learning window; therefore often have greater potential to become top athletes provided they experience quality coaching throughout that period and stay involved in the sport.

PEAK HEIGHT VELOCITY (PHV) AND LONG TERM SKIER DEVELOPMENT

PHV is the maximum rate of growth in height, which occurs during the adolescent growth spurt. To determine PHV the standing height of an athlete should be measured every three months (four times per calendar year). The period that is identified as the greatest growth rate is then identified as PHV – the importance of identifying this period lies within the structure of training that precedes and follows this period.

To correctly measure height have the athlete stand against a wall WITHOUT shoes on. Be sure that heels, buttocks, shoulders and back of the head are all in contact with the wall. Place a set square at a right angle with the wall and in contact with the apex (highest point) of the head. The athlete should then take a big breath in and then step away from the wall while height is recorded. (Height is measured in centimeters to nearest 0.5 cm e.g. 165.5cm)

PHV AND MATURITY EVENTS IN GIRLS (12 + 2 YEARS OF AGE)

PHV in girls occurs at around 12 years of age. Usually the first physical sign is breast budding, which occurs slightly after the onset of the growth spurt. Shortly thereafter pubic hair begins to grow. Menarche or the onset of menstruation comes rather late in the growth spurt, occurring after PHV is achieved. The sequence of developmental events may normally occur two or more years earlier or later than average.

PHV AND MATURITY EVENTS IN BOYS (14 + 2 YEARS OF AGE)

PHV in boys is more intense than in girls, and occurs on average about two years later than the female counterpart. Growth of the testes, pubic hair and penis are related to the maturation process. Peak Strength Velocity (PSV) comes a year or so after PHV when there is a spike in testosterone levels. Thus there is pronounced late gain in strength characteristics of the male athlete. As with girls the developmental sequence may occur two or more years earlier or later than average. It must be reinforced that late developers will catch up once they experience their growth spurt.



"It is critical that programs keep an eye on determined youngsters who maybe athletic in other ways but may be behind the typical curve of physical and motor skill development."

ACA National Development Director - Mark Sharp

It is important to remember that not all athletes develop physically at the same pace. For example, the three individuals pictured are all 14-years-old.



Long term skier development for alpine skiing

4. Specialization

Sports are classified as either early or late specialization, although many sports are late specialization sports. Early specialization sports include artistic and acrobatic sports such as gymnastics, diving and figure skating. These differ from late specialization sports in that very complex skills must be learned before maturation as they cannot be fully mastered if taught after maturation.

Specializing before the age of ten in late specialization sports contributes to:

One-sided, sport specific preparation
Lack of ABC's, the basic movement and sports skills
Overuse injuries
Early burnout
Early retirement from training and competition

Although the average age of success at the World Cup level of ski racing is rising and skiers are competing at higher ages, the early stages of development are not being skipped. These skiers have been correctly trained during their formative years.

5. Windows of Optimal Trainability

A critical period of development refers to the point in development of a specific capacity when training has an optimal effect. It can also be defined as a developmental "readiness" where stimulus must be timed to achieve optimum adaptation with regard to motor skills, muscular, and/or aerobic power.

AIM 2 helps coaches by identifying the critical periods of maturation and trainability. While a training effect may be achieved at any time throughout the development stages, optimal windows of trainability exist where accelerated adaptation to training stimuli occurs.

These optimal windows of trainability relate to physical and motor skill development. Although these critical periods have implications to the physical conditioning of a skier, coaches cannot lose sight of the skier's social and psychological maturation.

It must be understood that ski club programs coincide with the majority of the optimal windows of trainability as the young skier grows. It is therefore the club's responsibility to ensure training programs both on and off-hill, suit the individual needs of the athletes developing through their system.

Long term skier development for alpine skiing





There are five key components of athletic performance relating to alpine ski racing with respect to the physical and motor development of an athlete: Stamina (Endurance), Strength, Speed, Skill and Suppleness (Flexibility).

STAMINA (Endurance)

The optimal window of trainability occurs at the onset of PHV. Although alpine ski racing is considered an anaerobic sport, aerobic capacity of an athlete is paramount to the volume of training a skier can tolerate at later performance levels. Aerobic capacity training is recommended before athletes reach PHV. This performance factor is generally well targeted through continuous aerobic sports such as soccer, ultimate, running, cycling, inline skating, and mountain biking. Aerobic power should be introduced progressively after growth rate decelerates. As the athletes progress through PHV, activities should become more intense in nature and include activities such as: hockey, uphill running, and structured interval training (two to three minutes in duration.)

STRENGTH

The optimal window of strength trainability for girls is immediately after PHV or at the onset of the menarche, while for boys it is twelve to eighteen months after PHV when there is a spike in testosterone levels. Strength training should be initiated from general strength type exercises around PHV (body weight sit ups, push ups, step ups) to light resistance exercises using implements (tubing, medicine balls) before and during PHV. Structured training with free weights (dumbbells/barbells) can be initiated immediately following PHV in girls, whereas boys should wait until twelve to eighteen months post PHV.

SPEED

For girls, the first speed training window (speed 1) occurs between the ages of 6 to 8 years and the second window (speed 2) occurs between the ages of 11 to 13 years. For boys, the first speed training window (speed 1) occurs between the ages of 7 to 9 years and the second window (speed 2) occurs between the ages of 13 - 16.

Speed # 1

The first window of speed training relates to development of the central nervous system. In this window the goal is to increase reaction time, agility and quickness. Training this aspect is best approached through simple or complex tasks that require speed, reaction, coordination, and directional changes lasting less than five seconds.

Speed # 2

The second window of training relates to the development of the anaerobic lactic power/capacity. Duration of interval training should be kept between five and twenty seconds during this phase. The ability to be fast for a longer period of time enhances performance potential.



There are three forms of speed that influence a ski racer's athletic ability. They can be summarized as:

Linear and lateral speed - Sprinting and changing direction
 Multi direction - Patterned drills in three dimensions
 Segmental speed - Leg and arm speed. The speed at which individual body parts can do different things at the same time to effect balance and performance

These abilities can be directly related to the skier's speed abilities on snow in terms of.

Lateral explosiveness - Ability to move mass sideways. Long radius turns to the smallest of lateral movements in a flush
 Rotational quickness - Core speed of upper and lower body separation. How fast the feet can steer back to fall line.
 Speed of steering
 Linear quickness - Start speed to the first gate
 Vertical explosiveness - Ability to affect pressure against the skis. How fast a skier can push off of the skis.

SKILL

The window of optimal skill training takes place between the ages of 8 to 11 for girls, and 9 to 12 for boys.

Skiing can be defined as "movements while in motion." Skills and abilities learned in dryland sports can be directly transferred to skiing. Due to the challenge of attaining specific time on snow, as compared to the time available for off snow sports, any movement and coordination skills learned during the optimal window of trainability for skills will directly transfer to on snow skills in a young skier.

The critical period for accelerated adaptation to movement skills and the development of coordination is called the peak motor coordination velocity.

It is important to note that if fundamental movement skills and basic sport-specific skills are not developed sufficiently by approximately 11 or 12 years of age (the end of the Learning to Train phase) young skiers may not reach their optimal potential.

Every child by the end of the Learning to Train phase must have the successful acquisition and development of,

- ABC's of sport performance - Agility, balance, coordination and speed
- ABC's of athletics - Running, throwing and jumping
- KGB's - Kinesthetic sense, gliding, buoyancy and striking with an implement
- CPK's - Catching, passing, kicking and striking with a body part

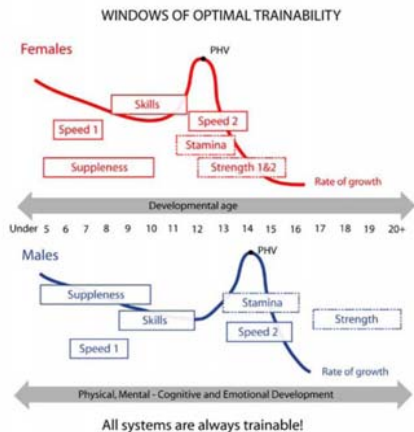


Key sports such as gymnastics, athletics, hockey, soccer, lacrosse, swimming, baseball/softball, ice skating, basketball, skateboarding, mountain biking, and trampoline will help young skiers acquire basic skills. Although skills can be trained at any age there is a gradual decline in skill trainability after 11 or 12. As these windows will close, it is strongly encouraged that the essential basic skiing skills and movement skills on skis are learned as close as possible to this skill window.

SUPPLENESS (flexibility)

Very simply, flexibility training should be undertaken at the earliest stages in training. Special attention should be paid to flexibility during PHV as aggressive stretching poses the potential for injury at growth plates and the musculo-tendon junction of the muscles.

Static stretching and dynamic mobility training is the focus before the growth spurt and PNF (proprioceptive neuromuscular facilitation or partner stretching) during and after the growth spurt.



5.1 Characteristics of great alpine ski racers

ALL AROUND ATHLETICISM

It is evident that most top skiers are good at many sports. Due to the nature of ski racing, it is imperative that a child is exposed to a cross section of other sports throughout the year. Physical abilities and superior fitness are the king pins of confidence.

AGILITY AND EXPLOSIVENESS

Ski racing is a very explosive sport. Conditions, courses, and terrain are constantly changing. Skiers are required to be explosive and agile.

FAST DECISION MAKERS

Because of the ever-changing playing field, the ability to make lightning fast decisions is paramount. This ability is very apparent in the champions of alpine ski racing.

EARLY INITIATION OF THE "SPIRIT AND FUN OF COMPETITION"

The love of going fast is an innate quality a ski racer must have and playing the game of ski racing is a great way to initiate the spirit of wanting to go fast. It is imperative to experience ski racing in fun, suitable environments to spark the spirit of this sport early.

HIGH VOLUME OF SKI MILEAGE IN THE EARLY YEARS

Although it is sometimes an arduous task in winter conditions, more hours of exposure to snow between the ages of three and five will result in more natural and relaxed skiing in later years. A few hours a day on skis between the ages of three and five can be worth three or four days of catch up when they are 12. Although this is not based on science and is not a rule of thumb, when researching the background of many top skiers, evidence shows there was regular exposure to time on snow at the ages of three and five.

TECHNICALLY CORRECT BEFORE ONSET OF PHV (GROWTH SPURT)

By the end of the Learn to Train stage, skiers must have learned the basic essential skills of skiing and be technically very sound. As children enter their growth spurt it is possible that one or two seasons may be spent "getting through" the course. After this point it may be very difficult to catch up with basic technical requirements and to correct fundamental skills under a more demanding competitive environment.

THE WINNING MIND

To excel in any sport there must be an innate desire to succeed. Winning may come in many forms to each individual. However, each formal sport or game is designed to have a winner and the desire to win or succeed must come from within.



5.2. Strength and technology - enhancing the engine to utilize the technology

Over the last decade – ski structure has changed radically from the classic long, straight ski to the shorter aggressive side cut ski. Inevitably, this has changed the demands on the skier. Skiers are now also faced with changes in snow technology where the racing surface has become more aggressive and grippy than ever before. Injuries have been on the rise and in an effort to minimize this trend it is imperative that young skiers possess the strength and stability to cope with the increase of external forces built up in the turn.

The following picture illustrates the capabilities of a 10 year old Canadian ski racer it also shows the interaction of technology (boots/bindings/skis/snow), and the engine (psychology, technical skills and physical capabilities).



Long term skier development for alpine skiing

Early in the development of the racer (Skier Essentials and Learn to Train) a larger emphasis must be placed on general physical development in an effort to improve leg axial stability as well as total body stability.



Skier demonstrating poor leg axial stability



Skier demonstrating poor trunk stability



Because of the new equipment, good technical skiing is now largely dependant on a strong physical platform. This fact then leads to the importance of the quality of training. Good technique alone cannot compensate for poor physical capabilities and vice versa, good technique can only be developed with a good physical foundation. Beginning as early as 8 years old one can initiate the development of trunk stability and leg axial stability, as this will serve to protect the spine, knees and in later years allow the skier to efficiently transfer forces back to the ski.



Long term skier development for alpine skiing



6. Physical, Mental, Cognitive and Emotional Development

Training, competitive and recovery programs should consider the mental, cognitive, and emotional development of each athlete. Refer to the Sport Canada LTAD resource paper – Appendix 2. www.ltad.ca
Beyond physical, technical, and tactical development, decision-making skills, mental, cognitive, and emotional development should be enhanced. Refer to the cognitive development section in the Coaching Education Appendix in this document. Mental skills are an inseparable part of athletic performance. Learning the following mental skills throughout the various stages, skiers can improve control of their own mental state and deal effectively with stress and distraction:

A practical example of how to package the necessary mental skills for alpine ski racing can be viewed in work of Dr. Dana A. Sinclair's 'Better Skiing: Discover the Power of Performance Psychology'. This tool will effectively improve your mental skills and performance on race day. www.humanperformance.ca

MENTAL SKILLS	Skier essentials	Learn to Train	Learn to Race	Train to Race	Train to Win
Look for good things	X				
Positive thinking	X	X	X	X	X
Relaxation	X	X	X	X	X
Imagery	X	X	X	X	X
Focusing	X	X	X	X	X
Goal setting	X daily	X	X	X	X
Activation control		X	X	X	X
Attention control		X	X	X	X
Thought control		X	X	X	X
Pre-race preparation		X	X	X	X
Course focus		X	X	X	X
Evaluation			X	X	X
Training program design			X	X	X
Monitoring				X	X

LEARNING PROCESS : HOW SKIERS LEARN

	Skier essentials	Learn to Train	Learn to Race	Train to Race	Train to Win
1. Set a goal	X	X	X	X	X
2. Identify relevant cues	X	X	X	X	X
3. Visualize the motor pattern	X	X	X	X	X
4. Execute (do it)	X	X	X	X	X
5. Coach evaluation/Self feedback		X	X	X	X
6. Revise the motor pattern		X	X	X	X
7. Re-execute (do it again)		X	X	X	X

7. Periodization

Simply put, periodization is time management. As a planning technique, it provides the framework for arranging the complex array of training processes into a logical and scientifically-based schedule to bring about optimal improvements in performance.

The following diagram illustrates the various phases of training (general prep, specific prep etc.) and the key focuses during each phase for various skiers. Note the season generally revolves around a twelve month calendar year beginning in April.

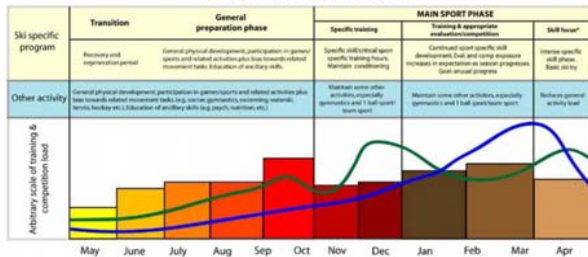


	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	
K1	Comp/Transition Minimum on snow base	General Preparation Phase						Specific Preparation	Pre competition	Competition phase			
		Focus: complementary sports, school, aerobic conditioning, general strength, athletic abilities						On snow training off-piste conditions	Racing training - off-piste maintenance				
K2	Comp/Transition Whistler Cup Peak	General Preparation Phase						Specific Preparation	Pre competition	Competition phase			
		Focus: complementary sports, school, aerobic conditioning, general strength, athletic abilities						On snow training off-piste conditions	Single Peak - K2 National/Whistler Cup				
J1	Comp/Transition Spring Selection	General Preparation Phase						Specific Preparation	Pre competition	Competition phase			
		Focus: technical, physical preparation - summer technical camps						Refine race skills	Single Peak - J1 National/J1 International				
J2	Comp/Transition Spring Selection	General Preparation Phase						Specific Preparation	Pre competition	Competition phase			
		Focus: technical, physical preparation - summer technical camps						Refine race skills	Multi Peaks - National - FIS/Cup - Nationals - World Juniors				
PSO/ CAST	Comp/Transition Spring Selection	General Preparation Phase						Specific Preparation	Pre competition	Competition phase			
		Focus: technical, physical preparation - camp summer technical camps						Refine race skills	Multi Peaks - National - FIS/Cup - FIS/Cup - National - World Juniors				
BIC/UP	Transition No selection	General Preparation Phase						Specific Preparation	Pre competition	Competition phase			
		Focus: Olympic, off-piste preparation - camp summer technical camps						Refine race skills	Multi Peaks World Cup Calendar - World Championships - Olympics				



Jean-Philippe Roy

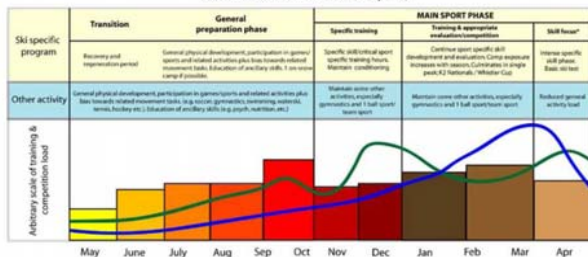
POSSIBLE YEARLY STRUCTURE DURING THE 'K1' PERIOD
(Blocks denotes overall volume/intensity load)



*Note "Skill focus" and "Basic ski try" immediately post comp phase
*Possible based on (time and geography etc)
Terminology based upon Bompa, 1999

Volume of training/competition guide
Intensity of training/competition guide

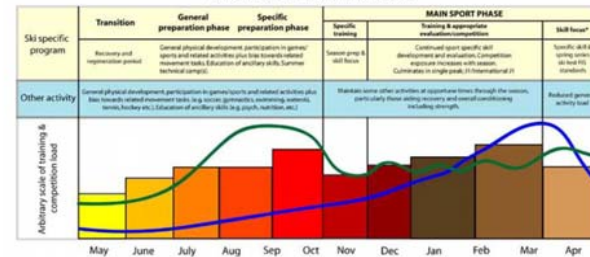
POSSIBLE YEARLY STRUCTURE DURING THE 'K2' PERIOD
(Blocks denotes overall volume/intensity load)



*Note "Skill focus" and "Basic ski test" immediately post comp phase
*Possible based on (time and geography etc)
Terminology based upon Bompa, 1999

Volume of training/competition guide
Intensity of training/competition guide

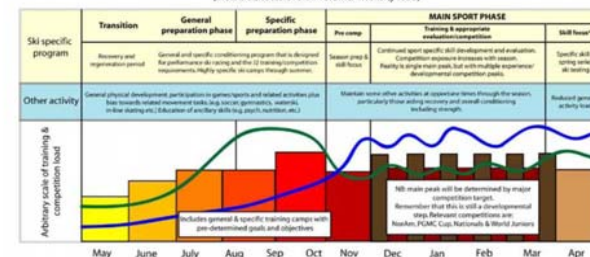
POSSIBLE YEARLY STRUCTURE DURING THE 'J1' PERIOD
(Blocks denotes overall volume/intensity load)



*Note "Skill focus" and "Basic ski test" immediately post comp phase
*Possible based on (time and geography etc)
Terminology based upon Bompa, 1999

Volume of training/competition guide
Intensity of training/competition guide

POSSIBLE YEARLY STRUCTURE DURING THE 'J2' PERIOD
(Blocks denotes overall volume/intensity load)

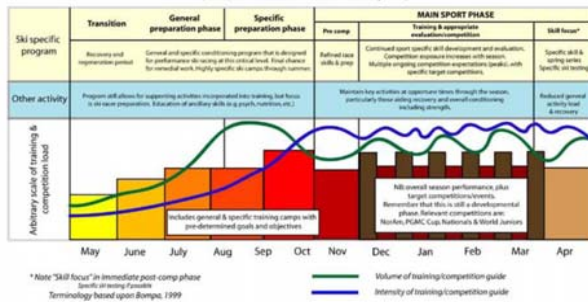


*Note "Skill focus" and "Basic ski test" immediately post comp phase
*Possible based on (time and geography etc)
Terminology based upon Bompa, 1999

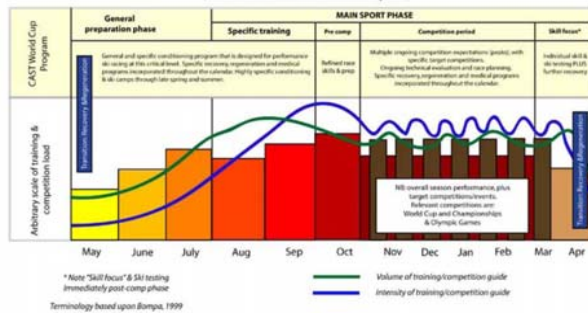
Volume of training/competition guide
Intensity of training/competition guide



POSSIBLE YEARLY STRUCTURE: PSO/CAST DEVELOPMENT
(Blocks denotes overall volume/intensity load)



POSSIBLE YEARLY STRUCTURE: WORLD CUP TEAM
(Blocks denotes overall volume/intensity load)



Long term skier development for alpine skiing



PERIODIZATION AND PLANNING FOR THE SKIER ESSENTIAL STAGE

As organized programs at this level run only in the winter months, periodization takes a different form. Program designers must break the season into 'Blocks of Exposure and Learning', making sure that the skiers experience the correct stimuli several times throughout the season.

The following is one example of how a program may look.

Dividing the season into four blocks of several weeks

- Block 1 Dec 7 – Jan 14
- Block 2 Jan 14 – Feb 25
- Block 3 Feb 25 – Mar 30
- Block 4 Mar 30 – Apr 15

Dividing each block into sub-blocks of athletic development

- Sub Block A Reaction Skills, Speed, Agility, Multi-directional Explosive
- Sub Block B Kinesthetic Awareness, Carving, Gliding, Rhythm
- Sub Block C Body Awareness, and Technical Skills

Example of a season: showing blocks moving through athletic development.

- Block 1A Dec 7, 8, 14, 15
- Block 1B Dec 20, 21, 26, 27, 28, 29, 30
- Block 1C Jan 2, 3, 4, 13, 14
- Block 2A Jan 18, 19, 25, 26,
- Block 2B Feb 1, 2, 8, 9
- Block 2C Feb 15, 16, 22, 23
- Block 3A Mar 1, 2, 8, 9
- Block 3B Mar 15, 16, 22, 23
- Block 3C Mar 29, 30
- Block 4A Apr 1, 2, 3
- Block 4B Apr 6, 7, 8
- Block 4C Apr 13, 14



Long term skier development for alpine skiing



Example drills or stations to cover sub-blocks of athletic development

Sub Block A: (teaching quickness and agility)

- Impossible flush brushes 2m vertical distance
- Three short turns 1 long in moguls
- 180 pops and backwards skiing
- Dual stopping on coaches demand
- Downhill lateral hops over poles, 12-14 inches apart
- Crazy Kombi

Sub Block B: (finding the soft touch for the snow)

- Square turns - glide and arc
- Highest carve competition
- No push glide races
- Skiing with ipod for rhythm
- Synchro
- Carving in shallow bumps
- Skiing on eggshells

Sub Block C: (molding basic technique and exploring movement)

- Short turns in bumps stabbing top of each bump
- Brush course in shallow bumps resting poles on wrists
- Trampoline effect by pressuring over feet
- Tucking in 'C' turns
- Symmetrical edge angles
- Dragging inside hand turns
- Turn 360, Turn 360



A training day can be structured into stations where a quantity of work is done for that station and then the group moves to the next environment or drill.

Following this approach through a season will provide adequate exposure to the work necessary to aid development in the skill areas mentioned.

During the season there should also be spot assessments for Husky Snow Stars evaluation.

An emphasis must also be given to the development of the "Fun Competitive Spirit" by using "Skill Duals" (see Husky Snowstars) which is a form of training that combines both Skill Learning and "Scrimmage" of our sport.

Mark Sharp -
ACA National Development Director

8. Planning for Training

Most ski racing families are in for weekend driving or some form of camp out at the nearest ski resort to experience time on snow. Many community sports consist of one hour of non-stop action at the local rink or soccer field two or three times a week. It is much more difficult to achieve a full hour of task learning on the ski hill. Lift rides, skiing to the training site, waiting for the skier in front to go, lunch in the lodge, going in to warm up, etc. are all factors that must be considered. A task focused run may last a minute. Very rarely will a child ski 60 runs in a day and 20 runs would be considered a big day. Therefore, in very general terms, it takes a full day to clock about 20 minutes of focused skiing. Many entry level programs are one day a week or approximately 16-18 days a season. This translates to around four or five hours of task orientated skiing in a winter. When compared to hockey, this duration of task specific training is achieved within two weeks of ice time.

Hence, it is critical that time on snow is very well utilized. Although there must be time allowed for free skiing and self expression on and off piste, accumulated ski time with a goal of improvement is critical.

Technical free skiing, course training, drill skiing, etc. must all be part of a race day, and the hours spent sitting in the lodge must be minimized. This culture has to be learned early in the child's ski racing education. Being too tired to use available time to ski on race days is no longer acceptable.

Peaking for career making results from ages 6-15 is not the goal; rather learning about the process and from the outcomes of a race day must be the focus. There are many extra minutes on a race day apart from the two or three that involve the actual race.

It is necessary to build programs around more local days or sessions on snow, particularly in the earlier stages of development. This again requires parental commitment. The twelve to sixteen day programs are adequate to introduce youngsters to skiing but when one looks at the windows of trainability, more time must be given to children to learn the correct skills at the right time.

The number of suggested days or sessions on snow in the specific guidelines has been dramatically increased to stress the importance of time on snow in the early years. Again there will be differences in all regions due to length of season, but it is important that clubs understand the responsibility of the critical foundational years of sport and motor skill acquisition.

Training work loads

Below is a chart providing a guideline to a high volume day for each level. The number of gates skid is a common tool for manipulating the workload and intensity of a training day. Use this table as a baseline for planning the periodization of the training loads for the particular levels.

Specific Downhill training is usually limited to race events as a training set up is next to impossible at the lower levels. However elements of DH can be trained.

Time on snow -
A precious commodity during winter months

SUGGESTED NUMBER OF GATES, STUBBIES OR BRUSHES DURING A HIGH VOLUME GATE TRAINING DAY					
EVENTS	GS	SL	SG	DH	GLIDING
E1	80-100	200			
E2	100	300			
K1	100-150	300-400	100	ELEMENTS	5-10 KM/YR
K2	150-200	400	150	ELEMENTS	10-20 KM/YR
J1	250-300	400-500	250	ELEMENTS	30 KM/YR
J2	250-300	500-600	250	COMP	50 KM/YR
SENIOR	350-400	700-800	350	SPECIFIC	100 KM/YR

Examples of achieving training volume and intensity within a given training session:

Station training

Set up stations in a circuit fashion all over mountain. These may also be free ski stations eg. counting the number of turns or time. Ex. Station #1 may be a mogul section, Station #2 a section of brushes and station #3 a section of tight stubbies on a pitch etc.

Section training

Using several short sections in one run to equal full length course. Ex. Three or four sections of 15-20 turns SL or three sections of 15 gates of GS etc.

Full-length courses

Regulation number of gates.

Over-length courses

Over compensation by dramatically adding to regulation gate numbers. Ex. 90-100 slalom gates.

Volume vs. Intensity

Raising the intensity of training can be achieved by reducing the number of runs or gates and increasing the quality of focus for each run. Timing full length courses and simulating competition will also increase intensity.

Free ski mileage

At any level ski mileage accumulated during free skiing in all environments can be used to manipulate work load volume.



9. Planning for Competition - Calendaring

Optimal competition calendar planning at all stages is critical to athlete development. At certain stages, developing the physical capacities takes precedence over competition. At later stages, the ability to compete well becomes the focus. This table below outlines general recommendations for the ratio of training to competition and competition-specific training. Consider how the quantity and quality of the training and competition programs changes as long-term plans progress. The appropriate level of competition is critical to the technical, tactical, and mental development at all stages.

STAGES	RECOMMENDED RATIO* RACE DAYS:TRAINING DAYS (ON SNOW)	DRYLAND OR DAYS WITH PHYSICAL ACTIVITY
Gliding start	No specific ratios	365
Skier essentials	1:12 - 1:9 (at end of phase)*	310 - 320
Learn to train	1:7 - 1:6 (at end of phase)*	290
Learn to race	1:6 - 1:5 (at end of phase)*	205 - 220 (rest important during PHV)
Train to race	1:4 - 1:3*	150 - 185 (periodized/structured)
Train to win	1:4*	160 (periodized)
Skating for life	Based on individual desire	Daily active lifestyle

* Note: Race to train ratios may vary depending on the time of year. For example, in the Learning to Train phase there may be a range from 1:12 in early winter and a 1:6 mid season but overall ratio works out as above.

Alpine Ski Racing disciplines. (FIS)

- Slalom (technical)
- Giant Slalom (technical)
- Super Giant Slalom (speed)
- Downhill (speed)
- Traditional Combined (DH and Slalom over several days)
- Super Combined (DH or SG plus one run Slalom in same day)
- Parallel Slalom (Knockout event in dual format)

Alpine Canada Alpin also promotes three other events:

- Kinder Kombi
- Dual format racing
- Stubby slalom

ACA promotes the use of multi-run races in the first three stages of development, when ever possible.



PLANNING GUIDELINES FOR TRAINING AND COMPETITION

Please note that this a guideline that provides Volumes and Quantities associated with performance programs. Programs of course must plan according to their individual demographics.

AGE RANGE LEVEL	5,6,7 E1	8,9,10 E2	11,12 K1	13,14 K2	15 J1	16 J1	17 J2	18,19 J2	20+ Senior
LTSD STAGE RANGE	Skier Essentials	Skier Essentials	Learn to Train	Learn to Race	Learn to Race Train to Race	Train to Race	Train to Race	Train to Race Train to Win	Train to Win
VOLUMES 1 day = approx. 40 mins ski time									
Target total ski days	47+	55+	75+	100+	115+	115+	127+	147+	130-185+
Non program weekend ski days	16								
Program weekend ski days	16	32	32	32	32	32	32	32	
Program weekend ski days		8	15	35	40	40	40	40-50	
Holidays	15	15	15	15	15	15	15	15	
Off season ski days*			10-15	13-18	23-28	23-28	30-40	45-55	40-50
Off hill activity days	320	310	290	220***	205***	205***	205***	150-185****	160****
TRAINING SPECIFICS 1 day = 3 hours 1 hour = 20%									
Free skiing	40%	40%	25%	20%	20%	15%	15%	10%	
Gate drills all terrain	25%	25%	25%	25%	20%	20%	15%	10%	
Technical free ski drills all terrain	15%	15%	25%	25%	20%	20%	20%	10%	
Schmooze or Play racing	20%	20%	25%						
Specific competition training				30%	40%	45%	50%	60%	70%
COMPETITION									
Training to race ratio	1:2:1	9:1	7:1	6:1	5:1	4:1	4:1	3:1	3:1/2:1
Chair's timed	1 GS, 1SL stubby	1 GS, 1SL stubby	1 GS, 1SL stubby						
Kombi	2	1	1						
Slalom	2 Stubby	5 (2 stubby) 3 mini gates*		8	12	14	16	18	Based on
Giant Slalom		1	3	6	10	12	14	16	Specialization
Super G				2	2	2	4	4	
Super combined			1	2	2	2	2	2	
Downhill				Elementary	2	4	2	4	
Formal competition	4	6**	10-12	14-18	20-25+ speed	25-35	30-40	40-45	30-45

* Last race to season opening
** Club schmoosage races are extra
*** Race important during PW
**** Periodized
* Mini gates are 60 cm flex poles, 25-27 mm diameter



Long term skier development for alpine skiing

10. New Initiatives

Skiers at the elite level often feel they train very hard for eleven months of the year for about 20 minutes of total competition.

Skiers do not spend many minutes actually playing the sport of ski racing, therefore an environment for teaching skiers to also be "racers" must be provided. This is why during training at the earliest levels; coaches must skillfully introduce a fun spirit of competition while learning skills. There is not a high volume of accumulated time on snow so it is critical to use this valuable time creatively.

Race day is the reason athletes train. At the professional level of the sport, skiers earn their living on race day. During the early stages the race day must be about experiencing the fun, adrenaline and exhilaration of alpine ski racing while learning from the process and outcomes of the event. For this reason it is important that the races support the developmental requirements of the skiers for that stage.

In the later stages of Train to Race and Train to Win, a large percentage of training time is used for specific competition preparation. From the Skier Essentials stage up to the Train to Race stage, training and racing must be seen as "building the racer."

Several critical windows are situated in the heart of the Skier Essentials and Learning to Train phases. They are Speed 1 (quickness, agility, and responsiveness), Skills acquisition (coordination, fundamental movement and sport skills) and an opportunity to instill a fun spirit of competition by playing the game of racing. ACA has been working to create a philosophy of race design that matches the needs of these development phases. The following formats are race events that have been introduced to our system:

Dual Format Racing

- The thrill of head to head racing
- A visible opponent allows skier to gauge speed and sense momentum
- Increases spirit of competition
- Allows large field size to have many more runs on race day
- Important in that both courses have separate timing for individual times

Kinder Kombi

- Internationally recognized event. (Ex. Topolino and Whistler Cup)
- Promotes timely cognitive development, tactical awareness, reaction response and coordination skills
- Not to be confused with skill or obstacle event
- Blend a mixture of different gate types and turn radius
- Entry level uses Stubbies and GS panels. Kinder uses all gate types
- Building terrain is not critical as the course should be test enough

K1 Stubby Slalom

- Helps develop correct line and shinning skills
- Builds foundation for correct cross-blocking skills by eliminating early over rotation of the upper body
- Starting Stubbies at E2 (9/10) will progress K1's into long gates sooner
- Skiers should only progress to long gates when skiers mass is inside the stubby most of the time
- Promotes safety and helps to eliminate Slalom gate fear earlier

K1 Mini Gates

- ACA promotes the use of 60 cm / 25-27 mm flex gates for K1 slalom.

Long term skier development for alpine skiing



Increasing the Number of Runs at Entry and K1 levels

- Increases learning opportunity and maximizes value for money on race days
- Decreases boredom of waiting when field size is large
- Use several short timed sections or separately timed courses in dual format
- Not critical to adhere to traditional one or two run events at Entry and K1 level

10.1 Slalom and the ACA progression strategy

Canada must make strides to improve our world slalom rankings.

With the addition of the new "Super Combined" (SG or DH and one run of Slalom on the same day), slalom is now involved in two events at the World Cup.

We must focus on improving as a nation in the Slalom discipline. To do this we must stress it in the early years of development when young skiers are laying down the foundations of their quickness, agility, coordination and technical foundation. Basic elements such as a strong disciplined pole plant, centered and stable core and pressure before the gate.

Competition calendars and training programs from entry level to the end of K2 must provide more opportunity to experience and improve Slalom skills, whether it is in modified form for the very young or regular form.

When analyzing the Top 60 FIS world rankings for the first four years of FIS, it is evident that our numbers of Canadian athletes are relatively low.



Young Canadian ski racer



Long term skier development for alpine skiing

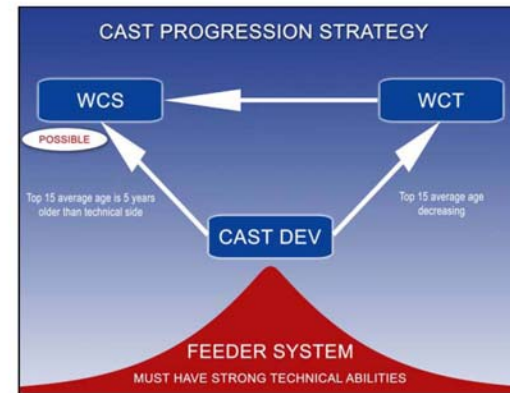
This pool of skiers is the potential for our future World Cup Slalom team. If our skiers are not arriving to this period with excellent skills in Slalom it will be very difficult to cultivate a strong team.

It is now evident on the World Cup that Slalom and Giant Slalom champions can move quickly to the top of the speed rankings once they begin to train and race the speed events. In the Top 15 of the speed side, skiers are on average five years older than the Top 15 on the technical side. For this reason there can be a longer progression to the speed side that first flows through the technical side. However this pathway demands that the technical abilities of our youth must be at the highest level possible sooner.

Of course there may always be cases where certain athletes are identified as physically and mentally gifted towards the speed events earlier.

The chart below demonstrates the Canadian Alpine Ski Teams preferred pathway of progression leading from the domestic level to our World Cup teams.

By focusing more on Slalom in any form during the early development years, we will not only be applying correctly timed skill development but we will also be forming the potential for our future Canadian World Cup Slalom and Super Combined team.



Long term skier development for alpine skiing



11. Schools, Costs and Summer Camps

Two of the greatest causes of athletes leaving alpine ski racing are rising costs and schooling. Ski racing loses large numbers of racers at 10 years old when entry level programs end and at 14 when kinder programs end. Each next step requires more time and financial commitment.

Travel is two thirds of costs while equipment and coaching fees make up the rest. These are realities of the sport.

Expensive summer camps in Europe and the southern hemisphere are great educational experiences. However, they must not be seen as absolutely critical to a young skier's path to the elite levels. Alpine Canada Alpin believes that money spent in one summer camp during the K1 and K2 years could be better utilized in terms of general and specific athletic development over a much longer period of time. By using the winter and spring months more efficiently to achieve on hill goals, combined with superior athletic skills, a far greater impact on performance for the skier's future years can occur.

However there are geographical realities in certain regions in Canada. Areas with shorter winter seasons may have to travel more in the off seasons in order to achieve the minimum number of on-snow days necessary to cover development needs.

12. Designing an Appropriate Long Term Skier Development Program

Development programs must not be modelled on programs for higher level racers. For example, the provincial development level should not have the same program as the provincial senior level just as a Grade 4 class would not be taught a Grade 7 curriculum.

Design programs specific to the development stage of the skiers where continual improvement permeates program design up to the Train to Win Stage.

Up to Train to Win, results and qualifying should not completely dictate program design.

A long term development culture will enable more skiers to meet their potential and enjoy the exhilaration of racing at higher levels.



12.1 Proactive Possibilities for Programs, Coaches, Parents and Racers

- Work with the schools in ways to minimize pressure on skiers absenteeism.
- Give as much lead time as possible when discussing missed days with teachers.
- Seek schools that are designed to accommodate ski racing students.
- Do not allow the race to be the only measurement of progress and success.
- Do not be afraid to miss certain events at certain times, thinking that a child's career will be sacrificed.
- If finances are tight, do not feel that expensive on snow summer camps will make all the difference to the child's career up to 16 years of age, as long as the program is conducting the correct development opportunities at other times.
- Up to 15 or 16 years of age, invest greatly into physical training, and creating exciting programs that help educate the incredible importance of physical abilities and fitness when trying to improve as a ski racer.
- Create ways to teach ski racing that doesn't require a lot of nights in hotels and away from school. Examples include local races, organizing day races with a club in close proximity, racing only weekend days, etc.
- Use local night skiing as much as possible.
- Ski as much as possible in the time allotted for on-snow days to accumulate critical on snow volume.
- Wherever possible club races for the first three stages of development should always be events that are more than two run events for both dollar value and learning opportunity for skiers.
- Maximize efforts to use race days as learning days.
- Teach a new culture of independence and self responsibility for race day.
- Program designers, coaches and parents must have the confidence to design programs that meet the needs of the particular levels without stressing over short-term results. Planning for the long-term needs to be of prime importance. Spending more time training is not a bad practice if racing at various times is not possible.



13. Canadian Ski Racing System

Qualifying to select teams and camps

In all sports there is always an elite core flow, although there are not set guidelines to determine when an athlete will advance to any of the elite core teams or events. Individuals learn and grow at very different rates. Achieving one of the core elite teams or events is always a boost of confidence and excitement. However, many of Canada's National Ski Team members achieved performance benchmarks and criteria at very different stages of their development. For example, Allison Forsyth placed in the 40's at the Whistler Cup but still earned a World Championship medal at the age 24.

In any national federation, some form of elite tracking is present. Selections to teams and camps are a reflection of the moment. There will always be early achievers and late achievers and progression to these groups will not always align perfectly with a skier's stage of development. Drive and passion, patience to grow and learn will eventually bring the deserving participants to the elite core flow at the right time. Talented skiers and athletes may miss the window the first time but with perseverance will arrive at the same point a little later. Believing elite levels can only be achieved by the regular steps is far too constrictive in the big picture of development.



Brady Leman

Select teams and camps in the Canadian Alpine System

Select teams

- Provincial team for a national championship
- Provincial team for Whistler cup
- Whistler Cup team Canada
- Provincial development ski team
- Provincial ski team
- Canadian Alpine Development Ski Team
- Canadian Alpine Ski Team

Select camps

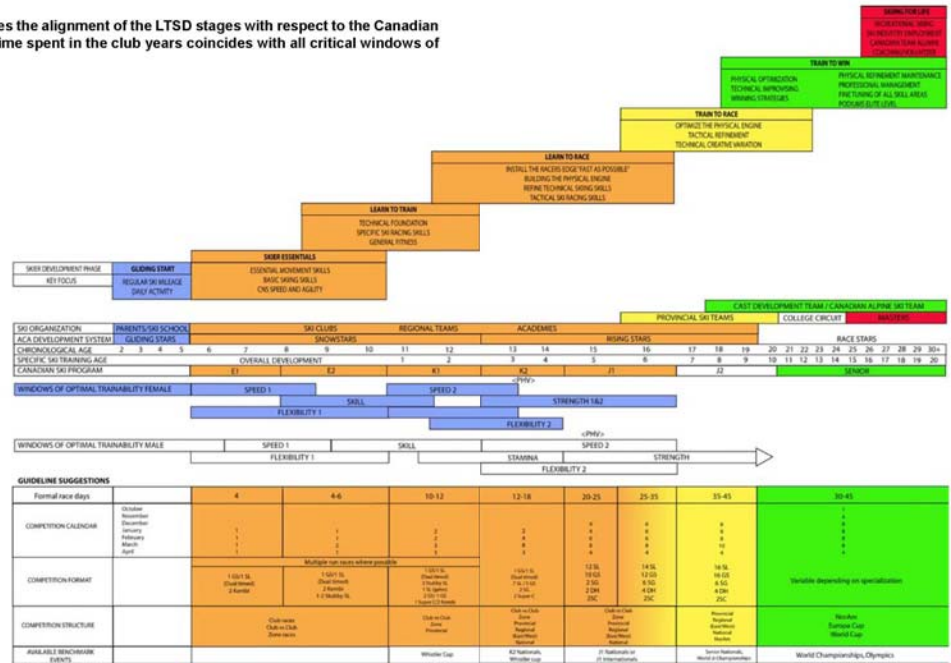
- Provincial development camps
- ACA Rising star development stars

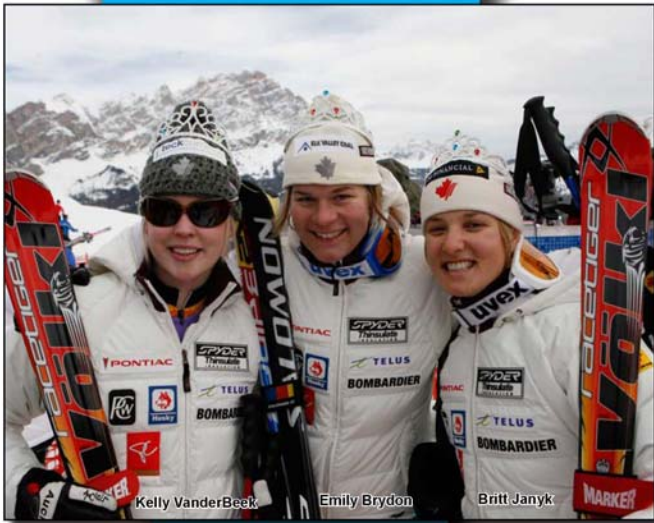
COMPETITIVE PATHWAY AND PERFORMANCE BENCHMARK EVENTS

Level	Competitive possibilities	Age	Performance benchmark events
Senior	Provincial FIS races Inter Provincial FIS races National FIS races National Championships Nor Am Cup European FIS races World Cup World Championships Olympics	Junior Elite	Nationals and NorAm Cup World Junior Championships Europa Cup World Cup
		Senior	NorAm Cup Europa Cup World Cup
		Senior Elite	World Championships World Cup Olympics
J2	Competitive training Provincial FIS races Inter Provincial FIS races National FIS races Senior National Championships NorAm Cup World Junior Championships	17-19	National FIS Series - PGMC Cup Senior National Championships NorAm Cup World Junior Championships
J1	Competitive training Club racing Club vs Club Provincial FIS races Inter Provincial FIS races National FIS races Canada Games J1 National Championships Senior National Championships NorAm Cup by qualification World Junior Championships	15-16	National FIS Series - PGMC Cup J1 National Championship J1 International Event Senior National by qualification NorAm Cup by qualification World Junior Championships
K1/K2	Competitive training Club racing/Team events Club vs Club Zone or regional races Provincial FIS races Inter Provincial FIS races Provincial Championships National Championships International benchmark races	13-14	Taschereau East/Gold Cup West Provincial Championships National Championships Whistler Cup
		11-12	Provincial Championships Whistler Cup exposure
Entry level	Competitive training Club racing/Team events Club vs Club Zone or regional races Provincial races	6-12	Husky Snow Stars guide

Canadian Ski Racing System Alignment

The following diagram illustrates the alignment of the LTSD stages with respect to the Canadian ski racing structure. Note the time spent in the club years coincides with all critical windows of development.





Kelly VanderBeek

Emily Brydon

Britt Janyk

LTSD Stages

Specifics of the LTSD stages

The following tables outline the specific development factors for each stage in the LTSD guide. These tables should be viewed as guidelines where certain aspects of training are followed throughout the stages.





GLIDING START

Igniting the spark

GLIDING START	
AGE RANGE	0 to 5 years
SKI CATEGORIES	Parent time or ski school programs
KEY FOCUS	<ul style="list-style-type: none"> • Learn fundamentals movement and link them into play. Learn to play on skis. • Regular time on snow during these years increases confidence, develops early kinesthetic sense for sliding and increases trainability for next phase
WINDOWS OF TRAINABILITY	Initiation of fitness and movement skill development
ACA / CSIA COACHING TOOL	Gliding stars. At five years old, may start at level 1 in Snowstars.
IDEAL ON SNOW TIME One session = 1-3 hours	<ul style="list-style-type: none"> • Two sessions per week during winter of on snow activity • Extra days of mileage skiing in spring where possible
DAYS PER YEAR ON SNOW	As often as possible between the ages of 3-5
IDEAL SPORT TIME	<ul style="list-style-type: none"> • Daily activity for at least 60 minutes per day • Up to several hours per day for toddlers and preschoolers, regardless of weather
TECHNIQUES	<ul style="list-style-type: none"> • Ability to control speed on all terrain • Skiing natural obstacles like trees trails, bumps and jumps will boost skills and natural confidence • Making clean lines in the snow, play racer arms, flat ski, tippy ski
STRENGTH	<ul style="list-style-type: none"> • Provide unstructured physical activity that promotes fitness and movement skills - active play • Physical activity will enhance bone and muscle growth, promotes a healthy weight, develops good posture and balance, improves fitness



Gliding start

GLIDING START - continued	
STAMINA	Through games and fun activities in a non-competitive environment
SUPPLENESS (flexibility)	Physical activity will improve natural flexibility
PSYCHOLOGY	<ul style="list-style-type: none"> • Physical activity enhances brain function, coordination, social skills, emotions, leadership and imagination • Helps to build confidence and self esteem
TACTICAL	At the end of the phase, aim for skier being comfortable in all kinds of terrain and conditions
COACHING STYLE	<ul style="list-style-type: none"> • Paint a clear mental image in relation to learner style while providing a safe and easy learning environment • Ensure a high volume of repetition
EQUIPMENT	<ul style="list-style-type: none"> • Boot 3-4 buckle overlap soft • Skis Recent model chin length • Bindings Recent model DIN suited to weight • Helmet Must comply with international rules • Poles Elbow 90 degrees on skis • Clothing Warm and well fitting • Eyewear Double lens goggle • Hand and toe warmers if very cold

Gliding start



SKIER ESSENTIALS

Forming the foundation

SKIER ESSENTIALS - Forming the foundation

AGE RANGE	Female: 6 to 8 years Male: 6 to 9 years
SKI CATEGORIES	Entry level E1/E2
KEY FOCUS	<ul style="list-style-type: none"> • Learn to move • Develop overall movement skills for all sports • Initiate the game of ski racing • Optimize critical windows of trainability
WINDOWS OF TRAINABILITY	<ul style="list-style-type: none"> • General athletic formation • Speed 1 training for the central nervous system • Female: 6-8 years • Male: 7-9 years
ACA COACHING TOOL	Husky Snow Stars
IDEAL ON SNOW TIME One session = 2-3 hours	<ul style="list-style-type: none"> • Four sessions per week during winter • One day is equal to two training session (i.e., morning/afternoon skiing) • A night session can be counted as a day
DAYS PER YEAR ON SNOW	<ul style="list-style-type: none"> • E1: 47+ • E2: 55+
IDEAL SPORT TIME	• Extra physical activity 3-4 times per week (school physical education)
PRE-SEASON TRAINING DAYS	<ul style="list-style-type: none"> • Not necessary • Extra days of mileage skiing in spring where possible
COMPETITIONS	Four to six technical starts
SUITABLE EVENTS	Kombi, dual formats, stubby slalom, modified GS



SKIER ESSENTIALS - Continued

TECHNIQUES	<ul style="list-style-type: none"> • Speed control • Introduction to vertical movement, experimentation of fore/aft movements • Recentering • Introduction to lower leg joint mobility, vertical explosiveness, experimentation of steering and sliding • Separation • Introduction to terrain parks - table tops, transition jumps • Introduction to the lateral movement (lateral push) • Angulation skills • Introduction to disciplined pole plant timing, lateral explosiveness, lateral quickness of feet • Introduction to ski sensitivity, clean carving, finesse and ski symmetry • Target Husky Snowstars Level 5
STRENGTH	<ul style="list-style-type: none"> • Medicine ball, swiss ball and own body weight exercises through games, skiing and other sports • Start with simple core program during dryland sessions and gymnastics, dynamic/static balance, leg/trunk stability
SPEED AND ANAEROBIC	<ul style="list-style-type: none"> • Agility, quickness and rapid changes of direction on and off snow • Speed work in five second bursts
STAMINA	• Through continuous skiing, dryland games and other sports
SUPPLENESS (flexibility)	<ul style="list-style-type: none"> • During on hill warm-up time, and dryland sessions and other sports such as gymnastics • Daily flexibility
PSYCHOLOGY	<ul style="list-style-type: none"> • Self confidence, confidence to ski fast, confidence in all terrain • Develop concentration skills • Achieve success and positive reinforcement • Positive thinking, stress management, relaxation • Introduction to imagery and focusing



SKIER ESSENTIALS - Continued

TACTICAL	<ul style="list-style-type: none"> • Introduction to the simple rules of racing. Teach looking and thinking ahead in courses. • Ability to adjust quickly and make decisions in all terrains and conditions • Introduction of correct slalom skills in Stubbies at 9/10
ATTITUDE	<ul style="list-style-type: none"> • Initiate fun competitive spirit, positive attitude to sport and fair play
ANCILLARY CAPACITIES	<ul style="list-style-type: none"> • Basic knowledge of how to use ski equipment and clothing • Introduction to sport cultural and lifestyle habits which include nutrition and hydration
CORRECTIVE	<ul style="list-style-type: none"> • This phase is the first important benchmark assessing the overall movement skills of the skier
COACHING STYLE	<ul style="list-style-type: none"> • Increase repetition (but not necessarily seeking perfection) • Allow athletes to learn by trial and error • Instructional feedback (what, where, how and when) • Use demonstration • Look and/or emphasize symmetry (right and left) • Adopt a set up and stand back approach changing the environment often • Introduce random and variable environments
EQUIPMENT	<ul style="list-style-type: none"> • Boot 3-4 buckle overlap soft, Children's race series • Skis Recent model, nose to top of head length, one pair at entry level • Bindings Recent model DIN suited to weight • Helmet Must comply with international rules • Poles Elbow 90 degrees on skis • Clothing Warm and well fitting • E2 If possible train in race suits, shorts and vest • Progression to K1 clothing • Eye wear Double lens goggles recommended • Hand and toe warmers if very cold • Maintenance sharpen and wax regularly



LEARN TO TRAIN

Learning the sport

LEARN TO TRAIN - Learning the sport

AGE RANGE	<ul style="list-style-type: none"> • Female: 9 to 11 years • Male: 9 to 12 years
SKI CATEGORIES	<ul style="list-style-type: none"> • Entry level E2 and K1
KEY FOCUS	<ul style="list-style-type: none"> • Consolidate and refine the basic skiing skills to play ski racing • Introduce general fitness for ski racing through team dryland and/or other sports
WINDOWS OF TRAINABILITY	<ul style="list-style-type: none"> • Development of sport specific motor skill and coordination • Female: 8-11 years • Male: 9-12 years
ACA COACHING TOOL	<ul style="list-style-type: none"> • Husky Snow Stars
IDEAL ON SNOW TIME One session = 2-3 hours	<ul style="list-style-type: none"> • Five sessions per week • One day is equal to two training session (i.e., morning/afternoon skiing) • A night session can be counted as a day
DAYS PER YEAR ON SNOW	<ul style="list-style-type: none"> • E2: 55+ • K1: 75+
IDEAL SPORT TIME	<ul style="list-style-type: none"> • Extra physical activity 3-4 times per week (school physical, other sports, team dryland)
PRE-SEASON TRAINING DAYS Last race - season opening	<ul style="list-style-type: none"> • Extra days of mileage skiing in spring/fall where possible (key to increase volume on snow) • 10-15 days
COMPETITIONS	<ul style="list-style-type: none"> • E2 6 starts • K1 10-12 starts
SUITABLE EVENTS	<ul style="list-style-type: none"> • Kombi, dual formats, stubby slalom, transition to full gate slalom in K1, Kinder GS, Kinder SG



LEARN TO TRAIN - Continued

TECHNIQUES	<ul style="list-style-type: none"> • Correct, basic skiing skills foundation consolidated by end of phase • Eliminate over rotation and tipping without separation • Demonstrate a quiet/relaxed upper body • Ability to carve the skis through the fall line, show a centered athletic, relaxed stance and use of all joints to create rhythm with vertical movement • Very strict towards correct use of the pole plant • Stress ski finesse and symmetry with a soft touch on the snow with a desire for speed • Basic event specific skills, for example, stubby slalom technique, GS technique and SG elements at K1 • Adaptation and consolidation in all planes of balance • Develop reaction speed and lateral, linear, vertical, rotational, explosive abilities • Consolidate single and double pole plant skills • Coordination and rhythm, lower leg joint mobility, steering, edging and pressure control skills • Introduction to speed events elements (jumping and gliding, etc) • Target Husky Snowstars level 7
STRENGTH	<ul style="list-style-type: none"> • Medicine ball, Swiss ball, and own body weight exercises through games, skiing and other sports, light tubing • Introduce simple hopping, and bounding once a base has been established • Specific core development regimes begin. Leg/hip, ankle and knee joint strength stability
SPEED AND ANAEROBIC	<ul style="list-style-type: none"> • Ability to change direction rapidly both laterally and vertically on and off snow. • Speed work 5-15 seconds
STAMINA	<ul style="list-style-type: none"> • Through continuous skiing, dryland games and other sports • Introduce training alone. Running / biking. Maximize during PHV
SUPPLENESS (flexibility)	<ul style="list-style-type: none"> • Introduction to basic flexibility exercises on dry land • Other sports and practice sessions daily

LEARN TO TRAIN - Continued

PSYCHOLOGY	<ul style="list-style-type: none"> • Positive thinking techniques, simple stress management skills, basic relaxation, imagery and self talk skills • Ability to concentrate and focus further developed
TACTICAL	<ul style="list-style-type: none"> • Start course inspection skills, further development of looking ahead, understand key rules, basic line and turn shape understanding • Ability to make decisions to increase speed
ATTITUDE	<ul style="list-style-type: none"> • Responsible attitude towards own and others safety • Introduction to dedication, persistence, team spirit, winning. Losing attitudes and competencies
ANCILLARY CAPACITIES	<ul style="list-style-type: none"> • Introduction to sport cultural and lifestyle habits, which include nutrition, hydration, recovery and regeneration • This should include both skier and parental education with respect to these issues. • Buckle boot shells when drying, separate and dry skis after use. • Learn proper wax and scraping techniques. • Start daily journal practices at K1
CORRECTIVE	<ul style="list-style-type: none"> • The end of this phase marks a critical technical benchmark. Skier must have a solid technical foundation in all situations and demonstrate an understanding of dynamic, athletic turns • Should be able to generate speed out of a turn with well coordinated vertical and lateral movement to the inside of the arc with correct timing and coordination of the pole plant. • Do not leave any technical weaknesses unattended. • Identify any early psychological traits that may hinder development in later years • Identify and follow up on any biomechanical or physiological problems

LEARN TO TRAIN - Continued

COACHING STYLE	<ul style="list-style-type: none"> • Expose athletes to a variety of training environments (terrain, conditions) • Perform a high repetition of training under continually changing challenges. • Challenge skier by more complex and demanding tasks. • Skier discovers more solutions through trial and error. • Give skier less feedback (Set up and stand back) • Ask specific questions (critical thinking) to increase athlete's awareness. • Facilitation of increasing athlete's knowledge base.
EQUIPMENT	<ul style="list-style-type: none"> • Boot Well fitted four buckle overlap soft. Children's or Junior race series • Skis Recent model, nose to top of head length, 1 pair at entry level. • SL/GS at K1 • Bindings Recent model DIN suited to weight • Helmet Must comply with international standards • Poles Elbow 90 degrees on skis • Clothing Warm and well fitting. • Protective gear Appropriate to discipline. • Eyewear Suitable goggle lenses as per conditions. • Maintenance Skis always sharp and waxed. • K1 Shorts and vest for training • K1 race suit for events



Learn to train



LEARN TO RACE

Building the racer

LEARN TO RACE - Building the racer

AGE RANGE	Female: 11 to 15 years Male: 12 to 16 years
SKI CATEGORIES	K1, K2 and J1
KEY FOCUS	<ul style="list-style-type: none"> • Train start to finish, as fast as possible, without falling and without supervision while operating excellent technical skills! • Develop specific fitness for ski racing, build the engine, refine event specific racing skills.
WINDOWS OF TRAINABILITY	Speed Development 2 <ul style="list-style-type: none"> • Female: 11-13 years • Male: 13- 16 years Aerobic Development <ul style="list-style-type: none"> • Female: prior to and during the growth spurt (PHV) • Male: prior to and during the growth spurt (PHV)
ACA COACHING TOOL	Husky Snow Stars at K1 Rising Stars (to be published)
IDEAL ON SNOW TIME One session = 2-3 hours	<ul style="list-style-type: none"> • 5-7 sessions per week • One day is equal to two training session (i.e., morning/afternoon skiing) • A night session can be counted as a day
DAYS PER YEAR ON SNOW	<ul style="list-style-type: none"> • K1: 75+ • K2: 100+ • J1: 115-127
IDEAL SPORT TIME	<ul style="list-style-type: none"> • Extra physical activity aiding overall athleticism 5-6 times per week • Others sports, school physical education, ski club dryland
PRE-SEASON TRAINING DAYS Last race - season opening	<ul style="list-style-type: none"> • K2 13-18 days. • One 7 day summer camp • Extra ski mileage in spring and fall in Canada where possible. • J1 23-28 days, including 12 days summer camp

Learn to race



LEARN TO RACE - Continued

COMPETITIONS	<ul style="list-style-type: none"> • K1 10-12 starts • K2 12 – 18 starts • J1 (1st year) – 20-25 starts+ speed • J1 (2nd year) – 25 – 35 starts
SUITABLE EVENTS	<ul style="list-style-type: none"> • K1 - Kombi, dual formats, stubby slalom, transition to full gate slalom, Kinder GS, Kinder SG with Super Combined. • K2 – Kinder Sl, Kinder GS, Super Combined, Kombi (training), dual format races, DH element training • J1 – All FIS events, including Super Combined and occasional dual format racing
TECHNIQUE	<ul style="list-style-type: none"> • Skiers should possess correct technical skiing package (refinement stage) in competitive and non-competitive environments by this phase • Ability to blend the four planes of balance throughout the turn (vertical, lateral, rotational, fore and aft) • Ability to tuck, glide, jump in speed events • Ability to adjust the turn shape to suit the course, terrain and conditions. • Generate and maintain speed throughout the turns. • Have the body well inside the gate when cross blocking.
STRENGTH	<ul style="list-style-type: none"> • Learn basics of strength lifting technique during (PHV) with light barbells or broomsticks • Core strength, leg/hip/glute strength • Power and speed of movement • Physical Stability of torso and legs to be solidified
SPEED AND ANAEROBIC	<ul style="list-style-type: none"> • Second speed optimal window of trainability • Ability to change direction rapidly laterally, vertically and rotationally • Speed work 5-20 second sprints, alactic power and capacity



LEARN TO RACE - Continued

STAMINA	<ul style="list-style-type: none"> • Prior to and during PHV, critical that training focuses on aerobic capacity • Immediately following PHV, training should progress towards aerobic power with high intensity training for a duration of 3-5 minutes. Maximum 1-2 times per week • Maintain and continue aerobic development
SUPPLENESS (flexibility)	<ul style="list-style-type: none"> • Dynamic mobility and partner stretching • Minimum 20 minutes daily
PSYCHOLOGY	Learn and apply effective goal setting, imagery, thought control, attention control, course focus techniques, pre-race preparation and evaluation
TACTICAL	<ul style="list-style-type: none"> • Master start technique • Ability to display and understand where and when specific turn shapes are suited in producing optimum line speed for all events, terrains and conditions • Ability to adjust the turn shape to suit the course, terrain and conditions
ATTITUDE	<ul style="list-style-type: none"> • Exhibit a disciplined approach to training • Exhibit a self responsible work ethic and the desire to excel • Exhibit good sportsmanship and morale development • Develop patience, control and communication skills • Start to display all out race approach
ANCILLARY CAPACITIES	<ul style="list-style-type: none"> • Develop effective time management. Athletes should keep a training diary • Knowledge of training principles – hydration, nutrition, recovery and regeneration, and initiation of athletic lifestyle • Perform equipment maintenance, develop an understanding of equipment and basic ski testing (towards end of phase)
CORRECTIVE	<ul style="list-style-type: none"> • Critical benchmark for correct technical foundation is early in the phase • Address any technical or biomechanical needs • Identify psychological obstacles and develop strategies to overcome them by end of phase



LEARN TO RACE - Continued

COACHING STYLE	<ul style="list-style-type: none"> Expose athletes to complex and demanding competitive situations that require the skill to be executed at a very high level Train skier to develop solutions to problems independently Coach to encourage more internal feedback from the athletes (critical reflection) Perform high volume of varied repetition (reduce amount of verbal feedback)
EQUIPMENT	<ul style="list-style-type: none"> • Boot Well fitted four buckle overlap soft Junior race series (K1-K2) Race Series softer models (J1) Professional boot fitting recommended • Skis K1, K2 - Race model, SL, GS skis J1 to comply to FIS specifications • Bindings Recent model DIN suited to weight • Helmet Must comply with international standards • Poles SL and GS 90 degrees on skis. • Clothing Appropriate to discipline. Train in Race Race suits as often as possible. • Protective gear Appropriate to discipline Spine protectors for speed and possibly GS. • Maintenance All equipment in perfect condition.



Learn to race



TRAIN TO RACE Optimizing the engine

TRAIN TO RACE - Optimizing the engine

AGE RANGE	Female: 15 to 21 years Male: 16 to 23 years
SKI CATEGORIES	J1, J2 and Senior
KEY FOCUS	<ul style="list-style-type: none"> Optimize the engine for ski racing competition Master the event specific ski racing skills Learn winning strategies
ACA COACHING TOOL	Rising Stars (to be published)
IDEAL ON SNOW TIME One session = 2-3 hours	<ul style="list-style-type: none"> J1: 5-7 sessions per week J2/Senior: 8-10 sessions per week One day is equal to two training session (i.e., morning/afternoon skiing) A night session can be counted as a day
DAYS PER YEAR ON SNOW	<ul style="list-style-type: none"> J1 127 J2 (1st year) 115-127 J2 (2nd year) 147 Senior 130-165
IDEAL SPORT TIME	<ul style="list-style-type: none"> J1: 10-12 sessions per week including on snow sessions in winter Dryland and complimentary sports can be used for off snow sessions J2 / Senior: 12-15 sport specific sessions including on snow sessions in winter.
PRE-SEASON TRAINING DAYS Last race - season opening	<ul style="list-style-type: none"> J1 (15, 16 years) 23-28 J2 (17 yrs) 30-40 J2 (18, 19 years) 45-55 Senior 40-50 off season training days – prior to first race.

Train to race



TRAIN TO RACE - Continued

COMPETITIONS	<ul style="list-style-type: none"> • J1 (1st year) 20-25 + speed • J1 (2nd year) 25-35 • J2 Max 45 recommended • Senior Max 45 recommended • Identify specialization at end of phase
SUITABLE EVENTS	All FIS events, including super combined and occasional dual format racing
TECHNIQUE	<ul style="list-style-type: none"> • Maintain and improve good technical skiing in all situations • Continue to improve the ability to produce speed with line and turn shape • Maintain the agility and reaction speed on skis • Master all event specifics • Technique will be a function of line, creative variations, physical ability and a personal style that is efficient
STRENGTH	<ul style="list-style-type: none"> • Solidify lifting techniques • Engage in formal structured weight training, hypertrophy, strength power • Use of free weights and Olympic lifts (towards end of phase) • Core stability, dynamic strength • Explosive power, maximum strength of leg / hip / glutes • Strong upper body development • Be aware of PHV (early vs. late maturers)
SPEED AND ANAEROBIC	<ul style="list-style-type: none"> • Maintain speed, agility and coordination sessions with intervals of 5 to 20 seconds in duration • Develop anaerobic power and capacity with intervals of 30 to 120 seconds in duration towards end of phase
STAMINA	Very important to continue to develop aerobic capacity and power
SUPPLENESS (flexibility)	Structured part of regular training program
PSYCHOLOGY	<ul style="list-style-type: none"> • A winning mind • Develop a professional attitude to all facets of program • Full mental management program • Self-evaluation and prescription

TRAIN TO RACE - Continued

TACTICAL	<ul style="list-style-type: none"> • Mastery of line selection and adjustment of turn shape for all events, terrains and conditions • Ability to adjust equipment to suit individual tactical strategies and style towards end of phase • Specific training at race speeds
ATTITUDE	<ul style="list-style-type: none"> • Develop a professional attitude to all facets of program • A desire to excel in any performance • See oneself as elite
ANCILLARY CAPACITIES	<ul style="list-style-type: none"> • Plan for career and education • Balance training, school and social life • Plan rest breaks from high level of training
CORRECTIVE	<ul style="list-style-type: none"> • Refine and master all skills for specific ski racing events • Correct any physical, technical, psychological and tactical weaknesses early in this phase. • Mastery of these elements later in the phase
COACHING STYLE	<ul style="list-style-type: none"> • Set up environments to enable athletes to develop their own solutions • Ask for perfect execution in demanding and competitive situations • Teamwork between athletes and coach (regarding all decisions) • Focus on external cues (use of timing) • Feedback mostly situational (based on the environment)
EQUIPMENT	<ul style="list-style-type: none"> • Best possible domestically • Boot: race series professional boot fitting • Skis: SL, GS, SG skis must comply with FIS specifications • Bindings & plate: must comply to FIS specifications • Helmet: must comply with international standards • Spine protectors for speed events • Maintenance: equipment always race ready



TRAIN TO WIN Professional

TRAIN TO WIN - Professional

AGE RANGE	Female: 18+ years Male: 19+ years (regarding as early, but possible)
SKI CATEGORIES	National Alpine Ski Team
KEY FOCUS	<ul style="list-style-type: none"> • Realization and refinement of winning strategies • Podium performances at the elite level • Excel at any performance
ACA COACHING TOOL	• High performance reference material
IDEAL ON SNOW TIME	Individualized for periodization of program
DAYS PER YEAR ON SNOW	<ul style="list-style-type: none"> • Senior 130-165 • Senior elite individualized based on skier needs
IDEAL SPORT TIME	9 to 15 sport specific training sessions - individualized based on elite level periodization
PRE-SEASON TRAINING DAYS April 15 - 1st race	Senior / Senior Elite 40-70 off season training days (from last race) - individualized based on development and phase of Olympic quadrennial
COMPETITIONS	Individualized based on athlete specialization
SUITABLE EVENTS	All FIS Events, including Super Combined and occasional dual format racing
TECHNIQUE	<ul style="list-style-type: none"> • Mastery of all skiing skills in a competitive environment • Individual physical abilities will form technical style • Continue to stress speed generation through rhythmical blend of movements in relation to forces • Technique must be automatic



Train to win

TRAIN TO WIN - Continued

STRENGTH	Individualized based on application of sport science and elite level testing
SPEED AND ANAEROBIC	Individualized based on application of sport science and elite level testing
STAMINA	Individualized based on application of sport science and elite level testing
SUPPLENESS (flexibility)	Individualized based on application of sport science and elite level testing
PSYCHOLOGY	<ul style="list-style-type: none"> • Prepared to perform under pressure at major events • Full mental management program
TACTICAL	<ul style="list-style-type: none"> • Individualized based on athlete specialization • Own style becomes tactical approach
ATTITUDE	<ul style="list-style-type: none"> • Athletes are ready to assume responsibility and accept consequences of their actions • Winning becomes major objective • Full professional athlete on and off the snow
ANCILLARY CAPACITIES	Major decisions about career, education and lifestyle become a priority during this phase
CORRECTIVE	<ul style="list-style-type: none"> • Diagnostic testing to determine physical needs • Sport psychologist to aid with mental management • Continue to refine technical skills in relation to equipment
COACHING STYLE	<ul style="list-style-type: none"> • Coaches act as managers and engineers of the environments rather than managing every action • Creating opportunities (cross-team training)
EQUIPMENT	<ul style="list-style-type: none"> • Individualized • World class with professional service



Train to win



SKIING FOR LIFE

Coaching / Recreation
Volunteer / Official / Alumni

SKIING FOR LIFE Coaching, Recreation, Volunteer, Official, Alumni	
AGE RANGE	Racers can enter this stream at any point along the development journey
SKI CATEGORIES	<ul style="list-style-type: none"> • Club programs • Recreational racing • Masters racing
KEY FOCUS	<ul style="list-style-type: none"> • Enjoyment of physical activity • Continued participation in ski racing as coaches, volunteers, administrators or officials • Enter sport-related career
PHYSICAL DEVELOPMENT	<ul style="list-style-type: none"> • Active through participation in sport • Continue training to maintain endurance, strength and flexibility
PSYCHOLOGICAL	<ul style="list-style-type: none"> • Readjust to non-competitive environment • Relaxation • Involvement as a skier for fun, fitness and challenge
TRAINING AND COMPETITIVE ENVIRONMENT	<ul style="list-style-type: none"> • Maintain ongoing participation in sports for a minimum of 30 minutes a day or 60 minutes three times a week • Enter Masters events, local race leagues at appropriate skill level
TECHNICAL	<ul style="list-style-type: none"> • Continue to seek out improvement while having fun • Retain skills
TACTICAL	<ul style="list-style-type: none"> • Avoid injury • Focus on development of the sport for others • Pass on knowledge and experience
ANCILLARY	Maintain and pass on ancillary knowledge and practices. Hydration, warm up, cool down and nutrition
EQUIPMENT	Suitable for ski level. Not necessarily equipment you last used for competition.
LIFESTYLE	<ul style="list-style-type: none"> • Pursue family and personal goals • Continue education or career development • Continue involvement as a coach, official or administrator • Reset goals, apply skills developed through sport into life. Critical thinking, leadership, problem-solving



Skiing for life



Peter McGibbon - President - ACA Masters Committee



Skiing for life

Canadian Technical Vision

Alpine Canada Alpin's goal is to produce skiers that, upon completion of Skiers Essentials, should:

- Have fast feet and be overall athletic on skis
- Explore movement limits easily in all planes of balance
- Exaggerate movements by utilizing all the joints of the body
- Confidently ski any terrain inside the ski area boundaries
- Enjoy the spirit of fun competition
- Display an understanding of ski performance (carving) and basic technique (upper body angulation and separation)

Upon completion of the Learn to Train phase, skiers should have the above plus:

- Natural fluid balance in all situations
- Functional upper and lower body separation
- Use of all joints to produce the range of motion
- Use of various pole planting for timing and stability
- Ability to carve the skis at any phase of a turn in short and long turns
- Correct basic skiing skills. No tipping or over rotating.
- Display symmetry and finesse with the skis on the snow.

With these foundations in place, skiers can strive to become:

- Racers that can ski as fast as possible from the start to the finish, without falling and without supervision
- Skiers that appear rhythmical, have natural fluid balance, and have a soft touch or sensitivity to the snow
- Skiers that are technically sound in all situations but whose form is a function of their line and tactic
- Skiers that are versatile in all situations
- Skiers with strong cognitive skills that can use technical and tactical decision making techniques quickly to go faster
- Skiers with intuitive skills and fast reflexes gathered from a huge inventory of athletic and motor skills developed during the windows of trainability
- Skiers that aren't afraid to try new ways, improvise and compose to explore the limits in their skiing
- Skiers with excellent competitive skills to complement a winning mind
- Skiers who can consistently reproduce high quality runs.



Canadian technical vision

Basic Slalom Skiing Goals



12-year-old Canadian skier

At the gate

- Upper/lower body separation
- Body and head are inside the gate
- Gate is blocked with pole and shin

All elements executed with rhythm and flow. All movements are progressive.

Between the gates

- Body athletically re-centers towards inside of next gate
- Solid single or double pole plant
- Skis roll over quickly and pressured above the next gate. 90% outside ski

Tactical considerations

- Controlling speed
- Maintaining speed
- Generating speed
- Calculated risks on an effective line

Approaching the gate

- Skier angulation and edge angle increases as the pressure of the turn increases
- Centre of mass moves forward along the line of travel

Our skiers should be technically correct by the end of "Learning to Train." Approximately 12/13 years old. (Refinement Skill level)

Basic slalom skiing goals



Basic GS Skiing Goals



At the gate

- Upper/lower body separation while carving outside ski
- Centre of mass moves along the line of travel

Between the gates

- Body athletically moves over skis in direction of new turn
- Pole touch movement
- As body crosses to the inside of the arc, skis are rolled over simultaneously before fall line
- Carving begins with lower joint flexion

Approaching the gate

- Body faces the same general direction as it did at the top of the turn
- Skier angulation and edge angles increase as the pressure of the turn increases

All elements executed with rhythm and flow. All movements are progressive.

Tactical considerations

- Controlling speed
- Maintaining speed
- Generating speed
- Calculated risks on an effective line

Our skiers should be technically correct by the end of "Learning to Train." Approximately 12/13 years old. (Refinement Skill level)



Basic GS skiing goals

Canadian Ski Coaching Vision

Alpine Canada Alpin and the CSCF goal is:

- To increase the number of highly skilled and internationally competitive Canadian ski racers
- To design programs that provide the building blocks of long-term athlete and skier development.
- To coach with an athlete-centered approach that helps instill self-responsibility in skiers
- To develop athletes to be independent thinkers who can critically reflect on their actions and give knowledgeable answers to any questions
- Train athletes to have good skills of interaction and communication with coaches, parents and peers.

Coaches should:

- Display a strong passion for skiing and racing
- Be excellent sport and life role models
- Enable skiers to retain skills and knowledge by involving them in the decision making process of their learning path
- Be extremely well prepared with a strong work ethic
- Be lifelong learners
- Never be afraid to coach outside of the box creating new ideas and experiments. Ex. On safe terrain with cross-country skis or snowblades etc.
- Understand the process of development en route to the ultimate goal of winning. The "Relentless Pursuit of Excellence."

Innovate around the following strategies:

3D training

- Use "scrimmage" or "play-racing" regularly to involve the three pillars of performance simultaneously. Technical, cognitive (decision making and tactical) and physical aspects.

Situational training

- Train in ways to equip skiers for the athletic and skill demands of the competition environment
- Create situations for constant adaptation. Strive to vary the training site as often as possible
- Nurture the training and competitive skills relative to the level
- Use volume, intensity and demands of quality as tools of learning
- Realize that a skier's form is a function of tactical execution, (line and strategy in one turn or an entire race)
- Strive to create natural, athletic skiers. Allow skiers to maintain and develop their positive individual characteristics

Full spectrum approach

- Experiment to expand the skier's skill limits
- Increase the athlete's knowledge of the sport
- Teach skiers to understand the outcomes they are striving for
- Recognize that the clock is the ultimate judge
- Create an early culture of a fearless all out approach: a will to go as fast as possible with calculated risks.

Canadian ski coaching vision



Appendix

Appendix



- A1. ACA STANDARD FITNESS TESTING PROTOCOLS
- A2. ACA STANDARD FITNESS TESTING - RECORDING SHEET
- A3. ACA STANDARD FITNESS TESTING PROTOCOL TARGET LEVELS
- B. ADDITIONAL TESTS FOR PROVINCIAL ATHLETES AND CAST ATHLETES
- C. COACHING EDUCATION
- D. COGNITIVE DEVELOPMENT - DECISION TRAINING FOR SKIERS
- E. COURSE SETTING
- F. BENCHMARKING THE SKILL OF YOUR SKIERS



Appendix A1 - ACA Standard Fitness Testing Protocols

WEIGHT

Record the athletes body weight in kilograms (to convert pounds to kilograms – simply divide body weight (lbs) by 2.2). Athletes should be dressed in minimal clothing (i.e. shorts/t-shirt) WITHOUT shoes and weight is recorded to the nearest decimal place.

STANDING HEIGHT

Have the athlete stand against a wall WITHOUT shoes on. Be sure that heels, buttocks, shoulders and back of the head are all in contact with the wall. Using a set square, place at a right angle with the wall and in contact with the apex (highest point) of the head. The athlete should then take a big breath in and then step away from the wall while height is recorded. (Height is measured in centimeters to nearest 0.5cm e.g.: 165.5cm)

SIT AND REACH

This is a measure of flexibility of the hamstrings, shoulders, calves and back extensors.

Materials: Sit and Reach board or tape measure

1. PROCEDURE FOR STANDARD SIT AND REACH BOX

- Have the athlete sit with their feet up against a sit and reach box.
- Have the athlete slowly reach forward with both hands keeping their knees locked. Have them hold this position for 2 seconds.

To get the best stretch, have the athlete exhale and drop the head between the arms when reaching. Be sure that the athlete keeps the hands parallel and does not stretch or lead with one hand. Finger tips should be in contact with the box. The tester should measure to the nearest .5 cm and record the best of two trials.

2. PROCEDURE FOR MEASURING STICK

Place a yardstick on the floor and put one piece of tape about 12 inches long across it at a right angle to the 15 inch mark.

Utilize the same protocol as above but have the athlete sit with the yardstick between their legs with the 0 mark toward the body and the legs extended and spread apart about 12 inches to the taped line on the floor. The heels of the feet should nearly touch the edge of the taped line and be about 10-12 inches apart.



VERTICAL JUMP :THREE METHODS

This test is to measure explosive power of the lower body.

BASIC METHOD

Materials: Meter Stick, Wall and Masking Tape, OR chalk board and chalk

Procedure

1. Athlete starts facing sideways to a wall with a piece of 'doubled over' masking tape on tip of index finger. Standing erect with feet flat on floor, they reach as high as possible and stick the tape to the wall in line with the body. This provides a baseline from which the vertical jump height will be measured.
2. Next, the athlete places another piece of tape on the tip of the index finger.
3. The athlete will perform a jump by quickly sinking down to a 90 degree knee angle and then jumping as high as possible, placing the tape on the wall. The distance between the two pieces of tape is recorded as the height of the jump. The greater of two attempts is recorded. Measure the jump height in centimeters (cm).

Calculate Leg Power using the following equation:

$$\text{Power (kg/m/s)} = 0.49 \times \text{Body Mass (kg)} \times \text{Jump Height (m)}$$

JUST JUMP SYSTEM set the display unit to measure four jumps.

Procedure

The athlete stands on the mat with hands placed on the hips. The athlete must perform a series of four consecutive counter movement jumps. The goal of the test is to jump as high as possible with as little ground contact time as possible. However, the athlete must sink to a minimum knee flexion of 90 degrees at the bottom of each CMJ. Measure Average Tc (contact time), Jump height (inches) and the ratio between Tc (contact time) and Tf (flight time) and compute leg power with the equation provided below. Record the best of three (4jump) repeats.

$$\text{Leg Power (W/kg)} = (9.81)2 \times \text{Tf} \times [(Tc + \text{Tf}) / (4 \times Tc)]$$

Where Tf (flight time) is calculated as follows:

$$\text{Tf} = (\text{Tf}/\text{Tc}) \times \text{Tc}$$

Example Data: Tc - .59
Tf/Tc - 1.01
HT - 17.1 therefore Tf - .60

$$\text{Leg Power (W/kg)} = (9.81)2 \times .59 \times [1.1859/2.36] = 28.8$$

OPTO JUMP SYSTEM

Procedure

Set the system to record multiple jumps, and evaluate contact time (Tc) and flight time (Tf) simultaneously. Follow the same procedures as the "Just Jump" System to perform four consecutive counter movement jumps. After each trial calculate the average Tc and Tf. To compare data from the two systems a correction factor must be applied. Add 0.1 seconds to the average Tf score. Next, input the average Tc, and corrected average Tf values into the above equation to calculate Power in W/kg.

PENTA JUMP

The purpose of this test is to measure coordination and explosive power through a series of five consecutive jumps.

Materials: Tape Measure (25m) non-slip surface with a marked starting point (box/bench).

Procedure

1. Athlete starts with both heels touching the box or bench.
2. Athlete jumps five consecutive times using both legs with no pause or stopping between jumps.
3. Distance is measured from the starting line to the back of the heels at the finish. The best of two attempts is recorded as the final result.
4. Perform each sequence on both legs, right leg only, left leg only.

BROAD JUMP

The purpose of this test is to measure explosive power.

Materials: Tape Measure (25m) non-slip surface with a marked starting point (box/bench).

Procedure

1. Athlete starts with both heels touching the box or bench.
2. Athlete jumps as far as possible using both legs - must land in a stable tuck position.
3. Distance is measured from the starting line to the back of the heels at the finish. The best of two attempts is recorded as the final result.



40M SPRINT

The purpose of this test is to measure pure linear running speed and explosive power.

Materials: Timing lights or stop watch, measuring tape (60m), pylons and at least 60m of running space.

PROCEDURE

1. Have the athlete start from a stationary position at the start pylon with one or two hands on the line.
2. On the 'Ready, Set, Go' Command, the athlete sprints 40m distance and decelerates once crossing over the 40m mark.
3. If not using a timing device, the timer should start the watch on the first movement of the athletes' hand and stop the watch as the athlete crosses the 40m line.
4. Perform two trials allowing a 3-minute rest between trials. Measure to the nearest 0.1sec, taking the best trial as the score.

60-90 SECOND BOX JUMPS

The purpose of this test is to measure anaerobic power/capacity in an athlete through a series of consecutive lateral jumps.

Materials: 20-40cm box (applicable height(cm) x 35(cm) width x 60(cm) length), stopwatch, two people to be counters.
20cm high (K1) x 60seconds
30cm high (K2) x 60seconds
40cm high (FIS and older) x 90seconds

PROCEDURE

1. The athlete will start standing sideways to the box (either on left or right side).
2. On the command 'Ready, Set, Go', the athlete jumps laterally up onto the box and then down off the other side. This is done continuously for 90 seconds.
3. The timer starts the watch on the 'Go' command. The timer will call out when 30 and 60 seconds have gone by and will give a verbal cue of '15 seconds left' and 'stop' at 90 seconds.
4. Someone will stand at either end of the box with their foot in the handle to keep it steady and serve as counters. On the 'Go' command, the first counter will start counting—each time two feet touch the top of the box. When the timer shouts out '30 seconds', the counter records the number of touches under the 30 second column. At the '60 seconds' cue the counter records the number of touches total under the 60 second column. Finally, upon the 'stop command' the counter records the total number of touches achieved in the 90 second period.
5. The counter then should calculate out from the totals the number of contacts that occurred from 0-30sec, 30-60sec, and finally 60-90sec.



20M SHUTTLE RUN

This is a very easy test to administer and is designed to measure VO₂ max without the necessity of expensive laboratory equipment. Each stage of the test is assigned a number which is correlated to a predictive estimate of VO₂ max. The VO₂ max is a measure of your aerobic capacity. This is important for skiers as they must have the ability to tolerate high training volumes during training and camps. A solid aerobic base is crucial when training at altitude.

Materials: Leger Boucher CD
<http://www.mentone-educational.com.au/products/>—to order the CD
CD player, Tape Measure (50m), pylons.

PROCEDURE

1. Pylons or masking tape is set in two parallel lines 20m apart
2. The Leger Boucher test portion of the CD (Track 3) commences after the athletes line up on the line.
3. Once the CD commences, the athletes begin running from line to line in sync with the beeps on the CD.
4. If the athlete loses pace with the CD, they are issued a warning to maintain the pace. If an athlete falls short of the line twice in a row, the test is terminated.

The last stage completed is recorded for the athlete. The athlete should try to reach the highest possible stage as the predicted value is based on a maximal effort. The test is best conducted by having each athlete work with a partner (one runs, the other records the final stage number.)



Appendix A2 - ACA Standard Fitness Testing Protocols - Recording sheet

Name: _____ Date: _____
 Birth date: _____ PSO: _____
 Weight (kg): _____ Height (cm): _____

Sit and Reach
 Trial 1 _____ (cm) Trial 2 _____ (cm) Best _____ (cm)

Vertical Jump
 Trial 1 _____ (m) Trial 2 _____ (m) Best _____ (m)

Broad Jump
 Trial 1 _____ (m) Trial 2 _____ (m) Best _____ (m)

Penta jump:
 Trial 1 Both _____ (m) Left _____ (m) Right _____ (m)
 Trial 2 Both _____ (m) Left _____ (m) Right _____ (m)
 Best Both _____ (m) Left _____ (m) Right _____ (m)

40 meter sprint
 Trial 1 _____ (sec) Trial 2 _____ (sec) Best _____ (sec)

60-90 second box jumps
 0-30sec _____ 30-60sec _____ 60-90sec _____ Total _____

***** Note : K1 – 20cm box height for 60seconds
 K2 – 30cm box height for 60seconds
 FIS – 40cm box height for 90seconds

20meter shuttle run

Stage _____ Predicted VO2 max _____ (ml/kg/min)



Appendix A3 - ACA Standard Fitness Testing Protocols Target Levels

CORE TESTING PROTOCOLS - MEN

	K1	K2	J1	J2	PSO	CAST
Body weight (kg)	n/a	n/a	n/a	n/a	n/a	n/a
Standing height (cm)	n/a	n/a	n/a	n/a	n/a	n/a
Sit and reach (cm)	40+	40+	40+	40+	40+	40+
Vertical jump (cm)	35+	50+	55+	55+	60+	60+
Broad jump (m)	2.0+	2.50+	2.65+	2.75+	2.75+	2.9+
Penta jump (m)						
Both legs	9.5+	11.0+	12.5+	13+	13.5+	14.75+
Right leg	8.0+	9.5+	11.5+	11.75+	12.0+	12.5+
Left leg	8.0+	9.5+	11.5+	11.75+	12.0+	12.5+
40m sprint (sec)	<6.7	<6.3	<6.1	<5.9	<5.7	<5.5
60-90 second Box jump	60" box 20 cm box	60" box 30 cm box	90" box 40 cm box	90" box 40 cm box	90" box 40 cm box	90" box 40 cm box
0-30 sec	30	35	35	35	35	35
30-60 sec	30	35	28	28	28	34
60-90 sec			17	17	22	25
Total	60+	70+	80+	80+	85+	90+
20m shuttle run Level	9.1+	11.0+	12.0+	12.0+	12.0+	12.0+
Predicted VO2max	40.2+	50.2+	54.3+	54.3+	54.3+	54.3+



CORE TESTING PROTOCOLS - WOMEN

	K1	K2	J1	J2	PSO	CAST
Body weight (kg)	n/a	n/a	n/a	n/a	n/a	n/a
Standing height (cm)	n/a	n/a	n/a	n/a	n/a	n/a
Sit and reach (cm)	40+	40+	40+	40+	40+	40+
Vertical jump (cm)	35+	42+	45+	47+	50+	50+
Broad jump (m)	1.8+	2.15+	2.25+	2.5+	2.5+	2.65+
Penta jump (m)						
Both legs	9.0+	10.5+	10.75+	11+	11.25+	11.5+
Right leg	7.5+	9.5+	9.75+	9.75+	10.0+	10.25+
Left leg	7.5+	9.5+	9.75+	9.75+	10.0+	10.25+
40m sprint (sec)	<6.8	<6.7	<6.5	<6.3	<6.2	<6.0
60-90 seconds	60" box	60" box	90" box	90" box	90" box	90" box
Box jump	20 cm box	30 cm box	40 cm box	40 cm box	40 cm box	40 cm box
0-30 sec	30	35	30	30	30	31
30-60 sec	30	30	25	25	24	26
60-90 sec			15	15	21	23
Total	60+	65+	70+	70+	75+	80+
20m shuttle run						
Level	8.1+	9.6+	10.8+	10.8+	10.8+	10.8+
Predicated VO2max	43.6+	45.2+	49.3+	49.3+	49.3+	49.3+



Appendix B - Additional tests for provincial athletes and CAST athletes

INCREMENTAL LACTATE TEST

Standard Warm-Up

This test is conducted on an electronically-braked cycle ergometer (Sensormedics Cycle Ergometer). Have the athlete perform a self-paced warm up on a cycle ergometer for 10 minutes at a HR < 120bpm. Once the 10 minute warm up is completed the athlete should sit for 5 minutes before a resting lactate sample is taken. If the resting sample is below 2 mmol, proceed with the test. If not, wait for an additional 5 minutes or until lactate drops below 2 mmol.

The Test

The starting workload is 80 watts (women) and 100 watts (men). The athlete will cycle continuously at 90 rpm for the duration of the test. Workload is increased by 25 watts every two minutes. Heart rate should be recorded every minute of exercise and blood lactate should be measured (lactate pro-analyzer) at the end of each stage of exercise (every 2minutes).

The test is terminated once blood lactate exceeds 6mmol.

(Optional MAP determination)

The test may continue past a lactate reading of 6 mmol – increase the workload by 25W every minute until the athlete can no longer maintain a cadence of at least 75 rpm or ends the test due to volitional fatigue. Record MAP as the workload last completed during the test.

PSO/CAST - Incremental Lactate Test

	MEN 60 kg squat test 8.1W/kg	WOMEN 60 kg squat test 8.1W/kg
Recovery workload	175 Watts	155 Watts
Aerobic Threshold	200 Watts	180 Watts
Anaerobic Threshold	250 Watts	230 Watts
Maximal Aerobic Power	375 Watts	330 Watts



Equipment and software set up:

- Set up a squat rack and bar with a total of 60 kg (i.e. 20 kg bar + 40 kg of weight) at a comfortable height for the athlete. It is preferable to use Olympic bars and rubber plates as these are most likely calibrated at the correct mass.
- Attach the Velcro strap of the linear encoder to the left side of the bar just inside the collar
- Place the encoder box on the floor at the left of the athlete so that the wire runs vertically
- Click on "Make a new test" → "Power and force/velocity" in the muscle lab software
- Click on the "Person" drop down menu and select the name of the athlete to be tested (Note: You will need to set up the person files beforehand.)
- Click on the "Exercise" drop down menu and select "60kg Power Squat 0%BW"
- Under "Test Type" click the box next to "Concentric"
- Under "Side" click the box next to "both"
- In the "Set External Load" section enter 60 and ensure that the total load is exactly 60kg

Performing the Test:

- Click on "Setup" → "Set Lower Position"
- Have the athlete lift the bar from the rack and prepare to do a squat
- With the athlete standing upright (i.e. knees and hips extended) click the "Press when in extended position" button
- Have the athlete squat down to a knee angle of 90 degrees
- With the athlete in this 90 degree squat position click the "Press when in lower position" button
- Allow the athlete to stand up with the bar, rack it and take a one minute rest
- Have the athlete lift the bar from the rack again and prepare to do a set of power squats
- Instruct the athlete to squat down to the 90 degree squat position and come to a complete stop
- Next ask the athlete to powerfully perform the concentric phase of the squat without any pre-load or countermovement from the bottom position
- Allow the athlete to rise up on their toes at the top of the movement but DO NOT allow them to jump
- Repeat this for a total of four repetitions and record the highest Average Power (AP(W)) score from the four reps
- Give the athlete at least three minutes rest and repeat for a second set of four repetitions
- The highest score from all of the repetitions will be taken as the athlete's Power score on this test

LEG POWER (60KG SQUAT TESTING)

Using the "Muscle Lab" System

Sensor Registration and Calibration:

- Register and calibrate the linear encoder (a.k.a. position transducer) as per manufacturer's protocols.

Create a test:

- To create a new test click on "File" → "Exercises" → "General Exercise Description" in the muscle lab software
- Click on the + icon to insert a new test
- In the exercise description box, type "60kg Power Squat 0%BW"
- Click on the yellow drop down menu tab and select "Barbell – Free Load"
- This will give you the option to select your linear encoder / position transducer that you registered and calibrated earlier, select it and leave the Percentage of Body Weight area at 0%.
- Click the green check-mark and exit from the file screen



Incremental lactate testing recording sheet

NAME: _____

DATE: _____ WEIGHT (kg): _____

STARTING WORKLOAD (Men 100W, Women 75W @ 85-95 rpm constant)

*Increase workload by 25W each two minute until lactate exceeds 6 mmol, then increase 25W each one minute.

RESTING LA: _____ (<2mmol)

Time (min)	Workload (watts)	Heartbeat (bpm)	Lactate (mmol)
0-1			---
1-2			
2-3			---
3-4			
4-5			---
5-6			
6-7			---
7-8			
8-9			---
9-10			
10-11			---
11-12			
12-13			---
13-14			
14-15			---
15-16			
16-17			---
17-18			
18-19			---
19-20			
20-21			---
21-22			
22-23			---
23-24			
24-25			---
25-26			
26-27			---
27-28			
28-29			---
29-30			



Appendix C - Coaching education

The coaching education program is designed and delivered by Alpine Canada's partner, the Canadian Ski Coaches Federation, and is based on National Coaching Certification Program (NCCP) and AIM 2 WIN long term skier development standards. The program takes a competency-based approach emphasizing what the coach should be able to do and not simply what they should know.

Each program level consists of a coach development "pathway" recognizing TRAINED, CERTIFIED and ADVANCED stages in coach development. Program content is based on athlete needs identified in AIM 2 WIN guidelines.

ENTRY LEVEL PATHWAY

Entry Level coaches work with participants, 12 years old and under, at a club or in a ski school program at the "Skier Essentials" stage of development in the long term skier development module. Entry Level coaches work under the direction of a more experienced certified coach.



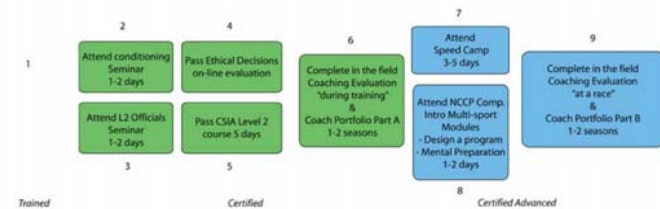
ENTRY LEVEL PROGRESSION

Time frame	Tasks	Certification status	What can be done?
Year 1	1	Trained	<ul style="list-style-type: none"> • can be hired by a club • can coach/assist with skiers at the Skier Essentials Level
Year 2	2 and 3	Certified	<ul style="list-style-type: none"> • evaluated as competent entry level coach • can be lead coach for a group of Skiers Essentials level skiers
Year 3+	4 and 5	Certified advanced	<ul style="list-style-type: none"> • fully equipped to develop children in the Skier Essentials development stage



DEVELOPMENT LEVEL PATHWAY

Development Level coaches work with participants at a club who are at the "Learn to Train" and "Learn to Race" stages of development in the long term skier development module. This corresponds to K1 and K2 programs. Development Level coaches work under the direction of a more experienced certified coach.



DEVELOPMENT LEVEL PROGRESSION

Time frame	Tasks	Certification status	What can be done?
Year 1	1	Trained	<ul style="list-style-type: none"> • can coach/assist with skiers at the Learn to Train and Learn to Race level
Year 2 and 3	2, 3, 4, 5 and 6	Certified	<ul style="list-style-type: none"> • evaluated as competent Development Level Coach • can be lead coach for a group of Learn to Train and Learn to Race level skiers in a Development Level Ski racing program
Year 4+	7, 8 and 9	Certified advanced	<ul style="list-style-type: none"> • fully equipped to manage at the Learn to Train and Learn to Race development stages



PERFORMANCE LEVEL PATHWAY

Performance Level coaches work with athletes in regional and provincial programs who are at the "Learn to Race" and "Train to Race" stages of development in the long term skier development module. This generally corresponds to J1 and J2 programs. Performance Level coaches also tend to have more leadership roles.



PERFORMANCE LEVEL PROGRESSION

Time frame	Tasks	Certification status	What can be done?
Year 1 and 2	1, 2 and 3	Trained	• can coach/assist with skiers at the Learn to Train level
Year 3 and 4	4 and 5	Certified	• evaluated as competent Development Level Coach • can be lead coach for a group of Learn to Race level skiers
Year 5+	6 and 7	Certified advanced	• fully equipped to develop and manage skiers in the Learn to Train and Learn to Race development stages



HIGH PERFORMANCE LEVEL PATHWAY

High Performance Level coaches work with athletes at provincial and national levels who are at the Train to Race and Train to Win stages of development in the long term skier development module. This generally corresponds to Provincial Team and National Team programs.

Pathway

Transition to a competency-based program for the High Performance Level will start during 08/09 and 09/10.

The current pathway involves completion of Level 4 Tasks. Level 4 tasks can be accessed individually at various events and conferences or through the National Coaching Institute (NCI) programs provincially across the country. The CSCF "Advanced Coaching Program Policy" governs current alpine Level 4 programming.



"Sometimes the simplest advice is the best advice. My coach before I made the national team often said two things:

1- It's simple, Go Faster!

2- If you were just a bit stupider you'd be so much faster!

In the first quote, I know he meant to tell me to keep things simple, don't make racing more complicated than it has to be. Secondly, it's good to turn your brain off and let your body do what it does best without the interference that often comes with thinking/analysis."



Appendix D - Cognitive development - Decision training for skiers

ACA and the CSCF in the past three years have introduced this important subject and approach to "how skiers can learn" into the coaching education system. This section is based on the work of Dr. Joan N. Vickers, Professor, Faculty of Kinesiology, University of Calgary (Author of: Perception, Cognition and Decision training – The Quiet Eye in Action, Human Kinetics Publishers, 2007).

"A ski race in relation to training, places greater cognitive demands on the skier. The ability to think and act in split second decisive ways can be trained."

Cognitive skills that can be developed during a training session:

- To anticipate what is going to happen. Vision Perception. To react to critical cues
- To be able to concentrate and focus on the task at hand thus avoiding distractions.
- Attention – the ability to select the correct cue to attend to before or during performance.
- To recognize patterns of objects while moving at high speeds.
- To retrieve solutions from memory under varying time constraints.
- To solve problems in known and new settings quickly.
- To make fast effective decisions under all conditions.

Coaching goal: to identify decision making skills and athlete needs.

Cognitive triggers tell a skier and coach if the right decision was made:

- Using objects as cues. Ex. Which direction is the gate hitting the snow?
- Using location cues. Were you in the right place to be fast?
- Reaction time cues. Did you start the turn quick enough to be smooth in the hairpin?
- Timing cues. Did you time each section of the race optimally? Could you react to unexpected events? The clock is the ultimate judge.
- Self coaching cues. Did you come up with a remedy to improve your line?

Coaching goal: To invent drills that help skiers make the right decisions in training and racing.

THE COMPLETE SKIER

A training session is made up of physiological, biomechanical or technical and psychological elements. A key to successful coaching is increasing the amount of cognitive effort a skier expends in order to train the mind within the daily practice environment.

The research foundations of exercise physiology, biomechanics and sports psychology are well established however through studies by Dr. Joan N. Vickers and many other researchers in the area of motor learning and control. We are gaining more insight into the training of the cognitive processes that has led to the term "Decision training". It can actively train your athletes to make better decisions in practices then these will transfer to the real world of racing. Decision training occurs at the same time as physiological and biomechanical training.



Physiological training helps an athlete become faster, stronger, more flexible and to have better nutrition which all help the athlete to become more capable. Biomechanical or technical training helps an athlete move in efficient ways along economical lines with maximum efficiency effort. Cognitive or "Decision training" helps an athlete develop decision making skills needed to perform under pressure at the highest level. Being decisive means to become more and more certain with time, that your actions will be the best during the unpredictable conditions of competition.

To accomplish this, skiers must have the opportunity to develop critical perceptual, attention, problem-solving and other cognitive skills needed in competition during regular training sessions.

There are seven tools of Decision training that a coach can use within a program.

The goal of these tools is to improve the long-term retention and transfer of critical physical and mental skills. In time and with practice your athletes will learn to automatically recall the core abilities they need in competition, while at the same time freeing up additional cognitive resources to deal with new and unexpected events that are an integral part of racing.

1: Variable training

As opposed to repetitive or blocked simple to complex training.

Use smart variations that are realistic and developmentally appropriate. For example, avoid training repetitive symmetrical corridors. Instead setting "A" rhythmically and safely changing one or several gates often, without the skier's knowledge.

2: Random training

This is using smart combinations of two to three skills in a race or training setting. An example of a random setting is the "Kids Kombi" which is a race or training, combining SL, GS and SG turn shapes with two to three different types of gates in the same course. This event is now well established in our system.

Variable and random training increases cognitive effort.

3: Bandwidth and delayed feedback

This involves having the coach intentionally reduce the frequency or timing of feedback in order to allow the skier to solve problems more on their own. We must not develop "Feedback Junkies" where skiers get used to hearing comments from the coach every run. Too much feedback leads to athletes becoming too dependent on their coaches, instead of being self-reliant and confident in their abilities. The coach sets a developmentally appropriate bandwidth of performance and only gives feedback if the performance falls outside that acceptable performance bandwidth.

4: Questioning

When feedback is reduced and delayed without a questioning strategy, a breakdown in communication occurs.

Feedback should be delivered in such a way as to involve the skier in the process of designing the prescription to a lacking skill or performance.

Instead of the coach always telling the skier what to do in the form of direct instruction feedback, they ask questions that probe what the skier understands about the skill, tactic, drill or decision being trained. Questions also probe the skiers inner feelings, a critical kinaesthetic dimension often ignored in a "Direct Feedback" approach.

As a result of this process the skier gains more knowledge about their sport, retains the outcome of improvement for the long term and has more input into their personal development. Communication also increases between coach and athlete during practices – communication skills are developed that really pay off in competition.



5: Video feedback and self regulation

Video is feedback. Set the stage and allow skiers to view themselves.

If video is used, the skier views his or her own performance in order to detect what is done well and what needs to be improved. Once cued by the coach on what to look for, skiers should learn to analyse specific skills and tactics and respond to questions about their own performance. Once skiers know what to look for they should eventually learn to run their own video sessions, under the guidance of the coach.

6: Hard first tactical instruction and modeling.

When "hard-first instruction" is used, complex thinking skills and concepts are introduced early in training, rather than later as is often the case. It is important to stress that the term "hard-first" applies to thinking skills and concepts and not to hard-first physical skills or terrain, especially when your skiers are young and at the beginning level. The physical demands placed on your athletes should always be safe and developmentally appropriate even as you teach quite complex thinking skills important in racing. One way to introduce hard-first skills and concepts is through the use of video models (more below), demonstrations, computer simulations and explanations of skiing strategies. Why use hard-first instruction? When "easy-first" instruction is used, the basic skills are trained over and over, and research shows a mindset is established from the beginning that underestimates the cognitive effort required to learn more advanced skills. This leads to a slower improvement and a mental state that is difficult to change later on.

When complex thinking skills are presented from the beginning, skiers more accurately see what needs to be done and are able to handle more complex skills or tactics later on. Hard-first instruction increases the amount of athlete cognitive effort used and this ensures longer term retention that is more easily recalled in a competition or demanding environment.

For older more developed skiers, hard-first concepts with both physical and cognitive skills can be used by manipulating speed and terrain in many challenging ways.

Modeling

The ability to copy or mimic another person's movement is present from birth.

Modeling occurs when the skier views an expert or another skier in order to learn what is required to perform better. Being able to watch coach demonstrations, other athletes, video, computer simulation, pictures or photographs often is a powerful "hard-first" learning tool due to the cognitive effort it takes to see what is happening. Although this is beneficial it can take four to seven weeks or more of continued use for the benefits to be realized.

It is important the skiers learn not only how to analyse the best skiers but also the not so skilled. They need to be comfortable, in their own mind, analysing teammates and competitors' performances and know how to detect what is good and not so good in all levels of performance. They should learn to talk about these differences in technically mature ways.

Visual exposure to the top skiers in the world or to the next level is something we need to create more of in Canada. Young Europeans have the opportunity to see the best skiers on TV or in newspapers every day as our Canadian youth have with hockey.

Creating video loops of specific sections of a run that demonstrate specific skills or tactics can be a powerful modelling tool that has long-term beneficial effects.



7: External focus of instruction

In traditional forms of coaching, instruction is often phrased so that attention is drawn to the internal requirements of the skill. Most statements made in feedback or for instruction are about how to control technical movements. This process creates an internal focus where the skier's attention is drawn into the body and its processes. Recent research shows that when an internal focus of instruction is used too much, gains in long-term performance are lower than when an external focus of instruction is used. When a coach uses an external focus, the emphasis is on the goals of the task and specific objects and locations in the environment.

Ex. Gates and their relative location, terrain changes, parts of the turn, the functionality of the equipment etc. Instead of feeling the skier to roll their ankle in, tell them to show the base of the ski to the sky. Thus creating edge angle.

"Conscious attempts to control movements interfere with automatic motor control while focusing on the remote allows the motor system to self organize more naturally unconstrained by conscious control." (Wulf, Shea and Park 2001 p 342).

An external focus can free the internal systems to function at a more optimal level. In many sports (but not yet in skiing), the critical cues used by top athletes have been identified using mobile eye trackers which they wear while performing. Elite athletes possess a quiet eye, which is located on a specific location in the environment well in advance of movements that need to be made. This allows the athlete to anticipate what is going to happen well in advance and overall leads to higher levels of performance. In ski racing, the quiet eye is probably located in advance of each gate, but the precise location, onset, offset and duration of the quiet eye in ski racing requires research to identify.

Decision making drills

Setting environments that present skiers with choices. Training to make the right choices at increasing speeds will enhance the cognitive development as the skier matures. Husky Snow Stars introduces some of these drills from the Skier Essential stage.

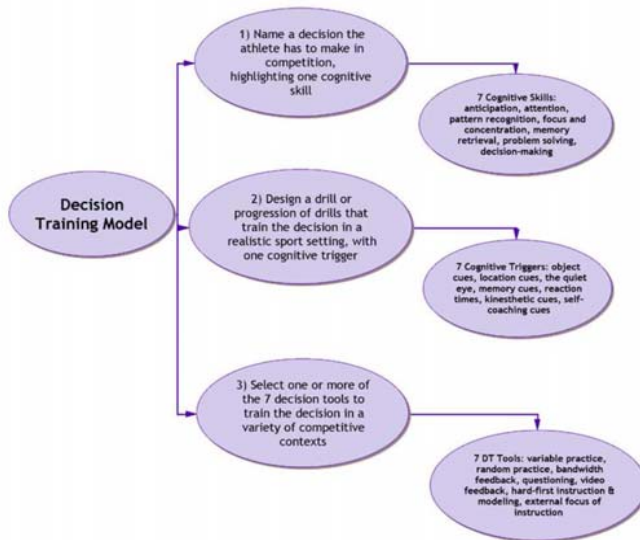
Summary

Decision training leads to an increase in intrinsic motivation, independence and goal setting by the skier which involves them more fully into the training process.

These tools can be applied in an appropriate manner from the earliest stages of skier development.



Creating environments to train decision making skills



The Decision Training Model is shown in total above, courtesy of Dr. Vickers.

Appendix E - Course setting

Course setting is the personal signature of a coach. Setting is the primary tool for the manipulation of a skier's learning environment. Setting skills allows a coach to design environments that specifically promote the skier's development phase requirements. A high finish rate in a competition commends the setting of the coach. Coaches need to be comfortable setting quickly and efficiently.

General guidelines for competition course setting

- Risk assessment - safety is a priority therefore familiarity with terrain and snow conditions of the piste and skill level of the participants is important. If possible ski the piste approximating event speed and turn radius.
- Complete knowledge of the event specifics - vertical drop and min/max number of gates (National/ FIS. Rules and regulations).
- Ensure all available equipment for setting is in working order (drills, batteries, gates, flags etc.)
- Safety - set with spill zones and potential skier error in mind.
- Focus downhill to visualize course design.
- Confirm rhythm and distances by studying what has been set prior.
- Course design should promote fluid movements and linking of turns.
- Course design should encourage skiers to look for speed (challenge) rather than just trying to survive.
- Course design should match the skill level and physical requirements of the skier development phase. Ex. Less vertical distance, quicker rhythm for early phases.
- Set variety in training and set for success in competition.
- Start and finish with open gate rhythm.
- Set gates vertical in the snow.
- Set gates so they are easily seen at race speeds. Try to avoid blind gates.
- Set above or below knolls and rolls. Try to avoid the gate being exactly on knoll or roll.
- Set rhythm changes on terrain that is suitable for the level of skiers.
- Re-check course by skiing or sliding through it from above.
- Allow time for skiers to inspect the course.
- Use of range finders can be helpful especially in speed events.
- Set easy, into and out of combinations

Setting for Training and preparation for Competition

In order to create an effective learning environment, the coaches training methods must reflect what skill demands and discipline elements the skier will encounter in a competitive environment. Training must challenge and enhance further technical and tactical skills while working within the parameters of the participants physical and psychological abilities. Always put safety first. Refuse to train too close of the side of the runs. When nets are available use them.

Basic progression

- Drills and short courses. Refer to decision training tools
- Full length courses
- Race simulations. Single course and dual courses
- Competition

Setting for Skier Essentials

The goal of setting gate drills at this stage of development should be to familiarize the skiers with gates.

Courses should be set in many different styles that challenge the skiers to be quick and agile. Courses should be short to maintain a specific focus. Course demands must meet the growth and maturation limitations. Use brushes, Stubbies and long gates without cross blocking introduce cross blocking towards end of phase.

- Goal - Motor skill development.
- SL Quickness Drills-from 2-6m
- GS explosive drills 10-18m
- Carving drills 18-20m

Setting for Learn to Train

The goal of setting at this stage of development should be to continue to match the environments to the windows of trainability. Variety is critical. Short drill courses, quickness, agility and coordination being key and duals for competitive spirit. An introduction to the more formal courses can start here. Although technical free skiing drills are still emphasized, the skiers should be challenged to adapt and refine their skiing skills in an environment orientated more towards basic line tactics. Use the Kombi with all types of gates often.

- Goal - Motor skill training and intro to tactics.
- SL drills from 4-12m.
- GS drills from 15-20m - explosive drills
- 20-25 carving drills

Setting for Learning to Race

The goal of setting at this stage should be to test the transfer of technical free skiing and performance skills from drill courses in an environment more oriented towards final form and strategic planning. Here the athletes should be introduced to the specifics of the various disciplines and refine their skills in more competitive environments.

- Goal - introduction to training at highest possible speeds in formal environments. More frequent use of timing devices.
- Maintain motor skill training and automation of basic tactics.
- SL distances from 8-12m
- GS distances from 15-25m
- 25-28 high speed training

Setting for Training to Race

The goal of setting at this stage of development is not only to assist the athletes in their abilities to refine and vary their skill development in the technical components of skiing but also in tactics and strategies as well. Gate training should be designed to challenge the athletes to adapt and refine existing skills in tactics and strategies within a more competition-orientated environment. At this stage coaches must expose skiers to the widest variety of competitive possibilities and administer higher volumes for optimal automation to occur towards the end of the phase.

- Goal - Wide variety of regulation setting.
 - Maintenance of motor skill performance.



Athletes should be encouraged to perform as close to their optimal performance state as often as possible so they are challenged to become more innovative in their skill development.

- Goal - Full automation at race speeds in regulation courses.
 - Continue specific maintenance of motor skills.

Setting for speed events

• Risk assessment – analyze track and environmental conditions that may compromise safety.

- Match hill selection and course design to the skill/age level of the skiers.
- Increase knowledge of contemporary ski technology and the resulting impact on speed and pressure in Super G and downhill events.
- Understand the psychological factors that may affect skier performance in speed events.
- Understand the age and gender differences, specifically physical factors that may impact performance.
- Use sequence training in order to maximize skill acquisition and to build confidence.
- Jumping can be the major cause of injury, therefore allow ample preparation time for building and check and re-check the suitability of the take off and landing zones.
- Gates immediately before the jump must direct the skier to take off in a suitable balanced position.
- Landings must not be flat.
- Gates immediately after the jump must lead the skier easily back into the rhythm of the course.
- Provide ample safe stopping space.
- Understand safety protocols for speed events.

Building Jumps

• A suitable venue that is secure and has a steep enough landing. Coaches need to secure and clear via radio.

- Ideally a "table" needs to be built with a Snow Cat that has the following properties:
 - Table should be long enough so that there is a VERY easy terrain transition towards the "nose of the jump."
 - There should be NO "ramping" or upwards angle towards the "nose."
 - There should be enough time for the racer to stabilize their position before take off.
 - There should be no turning to the take off point i.e. taking off with a heavily loaded ski ... except in specific preparation with a high level of skier. (Not lower than J1 level.)
- The take off point should be set back approximately 3-10 meters from the natural drop off of the landing slope. The goal is to keep racer relatively low to the ground and following the natural slope during flight.

Progression

- Step up the speed gradually and have racers experiment with different movements with a controlled speed Ex.. Riding off, popping, absorbing etc.
- Work on take off tactics, body position in the air and the often forgot on landings, where racers can make or lose a lot of speed.

Setting tools for variety

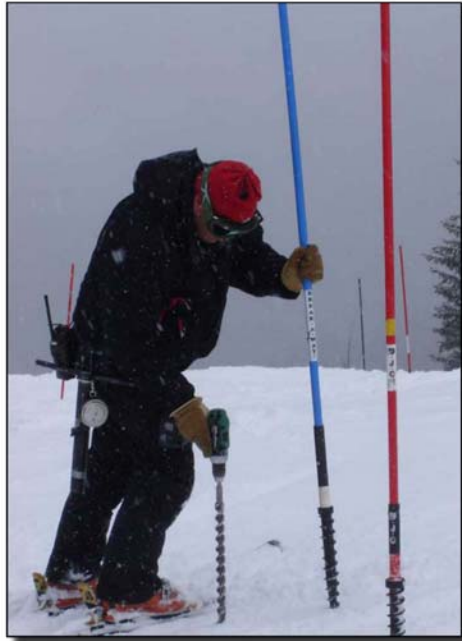
- Alternating vertical and horizontal distances to create varying rhythms.
- Rhythm of open gates into combinations.
- Training specifically with combinations.
- Fall line set / off fall line.
- Varying terrain. Setting safe but difficult transitions in training.



- Setting in different but safe snow conditions.
- Alternating disciplines from run to run or within the same course.
- Adjusting the start run in speed to the first gate.
- Dual formats.

Setting for race simulation

- Vary setting types
- Full courses with outside poles
- Flagged gates
- Timed runs. Start wand and finish eyes
- Start and finish area
- Typical race terrain
- Set to event specific speeds
- Skiers wear bibs
- Invite other competitors
- Blue dye


CANADIAN SETTING GUIDELINES FOR CHILDREN ALPINE SKI RACING - Alpine Canada's Alpin - April 2008

Age	Events	Duals	Kombi (see FIS guidelines)	Slalom	Giant Slalom	Super G
E1 6,7,8	Vertical drop	60	100-120	100 max	120 max	
	Number of gates	SL 20-30 GS 15-20	25-30	20-25	25 max	
	Vertical distance	SL 4-6M GS 10-14M	SL 4-6M GS 12-16M	4-6M Stubbles	16-18M 60CM gates if available	
	Type of gate	Stubbles Panels	Stubbles Panels	Stubbles	60CM gates if available	
	Turn shape	1/2 3/4	1/2 3/4	1/2 3/4	3/4 full	
	Combinations	Stubbles to GS possible	Multi slip in series	Only single or 2 by each turn		
	Number of turns	Max 20	2,3,4	2,3,4	Multi	
	Snowstarters level	2,3,4	2,3,4	2,3,4	Multi	
	Vertical drop	60-80	140 max	100	180 max	200 max
	Number of gates	SL 25-35 GS 20	40 max	25-35 max	13-15%	13-15%
Vertical distance	SL 5-6M GS 12-18M	SL 4-8M GS 14-18M SG 30M	4-8M Stubbles	20M	35M max	
Type of gate	Stubbles Panels	Stubbles Panels	Stubbles	60CM gates if available	60CM gates if available	
Turn shape	1/2-3/4	all	Vertical 3/4	1/2 full	3/4 full	
Combinations	Stubbles to GS possible	Multi slip in series	Only single or 2 by each turn			
Number of turns	Multi/individual timed courses	Multi slip in series	Multi slip in series	Multi slip in series	Multi 2 if possible	
Snowstarters level	4,5,6	4,5,6	4,5,6	4,5,6	4,5,6	
Safety						
E2 8,9,10	Vertical drop	60-80	170	120 max / 100 max multi runs	250 max / 200 max multi runs	225-330
	Number of gates	SL 25-30 GS 15-25	50 max	Closed 5-6M Open 9-11M	30-35% +/-3	8-10%
	Vertical distance	9-11M	SL 4-8M GS 14-18M	4-8M	20M	35M max
	Type of gate	Stubbles/long gates/panels	Stubbles/long gates/panels	Stubbles/long gates/panels	27m barrier	Panels
	Turn shape	1/2-3/4	Long gates 10m / 20m / 27m	Long gates 10m / 20m / 27m	27m barrier	Downhill screw in
	Combinations	None	Multi slip in series	Multi slip in series	Multi slip in series	Speed control
	Number of turns	Multi/individual timed courses	Multi slip in series	Multi slip in series	Multi slip in series	Multi 2 if possible
	Snowstarters level	6,7	6,7	6,7	6,7	6,7
	Safety	Protective gear	Protective gear	Protective gear	Consider spine protectors	Spine protectors
	Vertical drop	80	160 max	160 max	250/2 run - 300/1 run	250-450
E3 13,14	Number of gates	SL 25-30 GS 15-22	30-35% +/-3	Closed 5-6M Open 10-12M	20M max	40-10M max
	Vertical distance	10-12M	20M	20M	13-15%	8-10%
	Type of gate	Long gates	Panels	Vertical and full	1/2 Full	Speed control
	Turn shape	3/4	3/4	Traditional	Traditional	Traditional
	Combinations	Multi/individual timed courses	Multi/individual timed courses	Multi/individual timed courses	Multi/individual timed courses	Multi/individual timed courses
	Number of turns	Multi/individual timed courses	Multi/individual timed courses	Multi/individual timed courses	Multi/individual timed courses	Multi/individual timed courses
	Snowstarters level	6,7	6,7	6,7	6,7	6,7
	Safety	Protective gear	Protective gear	Protective gear	Consider spine protectors	Spine protectors
	Vertical drop	80	160 max	160 max	250/2 run - 300/1 run	250-450
	Number of gates	SL 25-30 GS 15-22	30-35% +/-3	Closed 5-6M Open 10-12M	20M max	40-10M max

* All race slopes should be adequately tested for skier protection (see run homologation reports)

* Events should be run with FIS approved timing systems (inable portable timing systems should only be used in special circumstances at the entry level)

* Snow surface should be run made snow or heavily worked natural snow

* Individual event slope width shall insure safety, speed event slope width shall insure safety

Appendix F - Benchmarking the skill of your skiers

Coaches must be competent in assessing at which stage of skill development their skiers are at. This will allow the coach to realize the correct timing of moving a skier on to more challenging tasks of skill development.

The following terms explain the stages of skill development that a skier will progress through when learning new skills. This progression will aid the coaches in determining where their skiers are on the continuum.

Initiation

- First contact with the skill and may have no idea what to do.

Acquisition

- The skier coordinates and executes the key components in the correct order.
- It is in rough form, lacks synchronization, rhythm and flow.
- Execution is inconsistent and lacks precision.
- Skier needs to think about what they are doing during the execution.

Consolidation

- Coordination of movements begins to appear.
- Skill is performed with control and rhythm under stable conditions.
- Some elements of performance are maintained (when athlete is under pressure, conditions change or demands increase.)
- But performance remains inconsistent.

Refinement

- Performance is very consistent.
- Precision is high in demanding conditions.
- Movements are automated.
- Only minor fine tuning may be necessary.
- Critical reflection and correction is possible by athlete.

Create variation

There are three different steps in the create variation stage of the skill development in alpine skiing

- Varying
- Improvising
- Composing

Varying step

- The movement is perfect under complex situations.
- Athlete has developed a personal style that is efficient.
- Movements can be performed according to the ideal model.

Improvising step

The skier can spontaneously use novel combinations of movements to cope with unexpected situations.

- Competitive and unfamiliar situations develop personalized movements that are efficient.

Composing step

- The skier is capable of creating skills based on preference, laws, and principles.
- Movements become more unique and an athlete own personal way of doing things are individual, intuitive and the skill is performed automatically.
- Other skiers want to reproduce this model.



References

LTSD Steering Committee

- Dr. Stephen Norris, LTAD Expert, Canadian Sport Centre, University of Calgary
- Mark Sharp, ACA National Development Director
- David Ellis, ACA Sport Science Director
- Benoit Lalonde, ACA National Development Director

References

- LTAD - Canadian Sport for Life - Long Term Athlete Development - Canadian Sport Centres Vancouver 2005
- AIM 1 - Istvan Balyi, Dee Dee Haight, Alpine Canada Alpine High Performance Committee 1998
- Dr. Joan Vickers - The Quiet Eye - Perception, Cognition and Decision Training. Human Kinetics Publisher 2007
- CSCF - Various coach education material
- Husky Snow Stars

Websites:

- Alpine Canada Alpin - www.canski.org
- CSCF - www.snowpro.com
- LTAD - www.ltad.ca

Provincial Ski Organizations:

- Alberta Alpine - www.albertaalpine.ca
- Alpine Ontario Alpin - www.alpineontario.ca
- Alpine Ski New Brunswick - www.nbalpine.ca
- BC Alpine - www.bcalpine.ca
- PEI Alpine Ski Association - sports@sportpei.pe.ca
- Yukon Ski Division - jbc@kionchiker.com
- Alpine Manitoba Alpin - www.skimantoba.com
- Alpine Saskatchewan - www.saskalpine.com
- Alpine Ski Nova Scotia - alpinski@sportns.ns.ca
- Newfoundland/Labrador Ski Division - www.comet.nl.ca/web/alpineski/
- Ski Quebec Alpin - www.skiquebec.qc.ca



Jan Hudec





ALPINE CANADA ALPIN
LONG TERM SKIER DEVELOPMENT
FOR PARA-ALPINE SKI RACING
(Athletes With A Physical Disability)



PARA-ALPINE INTEGRATION MODEL - PARA AIM 2 WIN



Contents

Table of Contents

ACKNOWLEDGEMENTS.....	106
FOREWORD.....	107
GLOSSARY OF PARA-TERMS.....	108
INTRODUCTION.....	110
LTSD FOR PARA-ALPINE SKIING.....	112
AWARENESS STAGE.....	113
FIRST CONTACT/RECRUITMENT STAGE.....	113
MULTI STREAM COMPETITION PATHWAYS.....	114
RECREATION STREAM.....	114
COMPETITION/CLUB STREAM.....	115
AGE OF EXPERIENCE.....	116
PLANNING FOR COMPETITION.....	117
ALPINE CANADA ALPIN PARA SKI RACING EVENTS.....	117
CANADIAN PARA-SKI RACING SYSTEM - THE NATIONAL DEVELOPMENT INITIATIVE.....	118
QUALIFYING TO SELECT TEAMS.....	121
PERIODIZATION AND SPECIFICS OF EACH STAGE OF DEVELOPMENT.....	122
PHYSICAL TESTING AND ATHLETE TRACKING.....	123
CLASSIFICATION OF DISABILITIES IN PARA-ALPINE SKIING.....	127
HISTORICAL CONTEXT.....	127
CLASSIFICATION.....	127
THE HANDICAP SYSTEM.....	128
THE THREE CATEGORIES.....	128
VISUALLY IMPAIRED CATEGORY WITH THREE CLASSES.....	128
STANDING CATEGORY WITH SEVEN CLASSES (4 SUB-CLASSES).....	129
SITTING CATEGORY WITH 3 CLASSES (3 SUB-CLASSES).....	130
SUMMARY PRINCIPLES.....	131

Acknowledgements

This document would not have been possible without the input and feedback provided by the 2005-07 CPAST Coaching staff. Maggie Phillips, the CPAST Conditioning Coach, provided the content covering physical testing and athletic tracking.



"Have faith in all your training and hard work, and remember in the start to go fast and have fun. If you don't enjoy the race you will never enjoy the results."

Chris Williamson, July 2007

Foreword

Athletes with a disability, or Para-athletes, are above all else just that, athletes. As a result, most of the principles considered in AIM 2 WIN are applicable to this specific group of athletes. Having said this, it is critical that we look at the unique elements of long term athletic development in relation to the Para-athlete for two key reasons. First, to remain at the highest level of competition on the international stage, and second, to provide a resource through which the grassroots and entry level athlete can be introduced to alpine racing through a meaningful progression; and one that understands the nuances of the Para-athlete. PARA-AIM 2 WIN is a tool to assist the entry level athlete in developing sound fundamentals, while mapping out the progression that same athlete can follow through to the high performance opportunities available to them in the competitive alpine environment.

Canada has been recognized as a leader in Para-alpine skiing since the inception of competition for Para-alpine athletes. As recognition of the abilities and opportunities available to Para-athletes continues to evolve on the world stage, including a stronger fundamental understanding of LTAD principles, Canada is encountering an environment in which it is now seeing competition from nations that seven years ago were simply not contenders on the international stage. Although this has led to added competitive pressures, it is very healthy for Para-alpine sport. What this international competitive awakening has created is a recognition that to remain a podium contender on the international stage, Canada must focus not solely on its high performance programs, but on the entire development progression, hence the impetus for the creation of PARA-AIM 2 WIN.

The foundation of the PARA-AIM 2 WIN principles are a reflection of the Canadian Sport for Life resource document and its supplement, *No Accidental Champions*, which provides the foundation principles of LTAD for PARA-athletes. In addition to these foundation documents, feedback was solicited from all levels of the Para-alpine sport community in Canada, including athletes and coaches from grass roots through to the high performance level, as well as sport scientists. An effort to involve a cross-section of feedback from across the country was also solicited.

Gathering feedback from such a variety of interests was important, as this ties into one of the key messages in Para-alpine sport, which asks, "Where are our athletes coming from?" Once we gain a solid understanding of the response to this question we can move toward a professional approach to delivering on Alpine Canada Alpin's goal to "BE THE BEST IN THE WORLD... AT EVERY LEVEL."

As with our able-bodied counterparts, LTAD success will evolve from an underlying philosophy of winning, as well as knowing that we are providing an environment at all levels of the development spectrum that make ski racing fun. In terms specific to Para-alpine sport, the focus must also be on "Age of Experience," as Para-athletes can enter the competitive framework as children or as adults, depending on their disability context being congenital or an acquired disability. Recognition of this final key element facilitates the widest spectrum of involvement in alpine sport, which allows an increased number of the 10% to 14% of Canadians with a disability to not only fully engage in physical activity but to strive towards new life goals. These goals will ultimately create positive growth as members of Canadian society and maintain a national awareness and pride that will continue to foster a mentality of leadership and podium performance on the Paralympic stage.

A handwritten signature in black ink, appearing to be 'M.' or similar.

Ozzie Sawicki, M. Sc., Ch.P.C.

Former Program Director and Head Coach Canadian Para-Alpine Ski Team (2000-2004)

Glossary

Glossary of Para-Terms

- ADAPTATION** refers to changes in the body as a result of a stimulus that induces functional and/or morphological changes in the organism. The degree of adaptation is dependent on the genetic endowment of an individual. However, the general trends or patterns of adaptation are identified by physiological research and guidelines are clearly delineated of the various adaptation processes such as: adaptation to muscular endurance or maximum strength.
- ACQUIRED DISABILITY** refers to an individual who has been physically disabled through injury or illness. These are individuals who, prior to injury or illness, were considered able-bodied participants in sport.
- ADAPTIVE/ASSISTIVE EQUIPMENT** A special device which assists in the performance of activities or physical exercise.
- AIM** Alpine Integration Model
- ASD** Alpine Skiing Disabled. This refers to the IPC/FIS alpine committee governing body for Para-alpine sport, which determines events that are sanctioned in each participating alpine nation. The points structure allows Para-athletes in a domestic race series to acquire points that will ultimately determine their ability to reach higher level races, including Nor Am, Europa Cup, World Cup and Paralympic competitions.
- CADS** Canadian Association for Disabled Skiers. CADS is a volunteer-based organization having as its main objective, assisting individuals with a disability to lead richer and fuller lives through active participation in recreational and competitive snow skiing. Founded in 1976 by Jerry Johnston, the organization now promotes the movement of talented individuals towards opportunities in competitive skiing.
- CONGENITAL DISABILITY** refers to an individual who has had a disability since birth, but is not necessarily hereditary.
- CPAST** Canadian Para-Alpine Ski Team.
- CSCF** Canadian Ski Coaches Federation. The CSCF, with its partners, educates coaches to lead and develop excellence in ski racing.
- LTAD** Long Term Athlete Development Model. This generic framework was produced in 2006. Visit www.ltad.ca for a complete guide.



- LTSD** Long Term Skier Development Model. This sport specific model has been produced by Alpine Canada Alpin to guide coaches, administrators, program directors, and parents on the scientific and artistic approach to long term athlete development in alpine ski racing.
- PARA AIM 2 WN** Para Alpine Integration Model Supplement. The supplement pertains to athletes with a physical disability and is to be applied in conjunction with the AIM 2 WN document.
- PHYSICAL LITERACY** refers to the mastering of fundamental motor skills and fundamental sport skills.
- STAGES OF DEVELOPMENT** refers to the various stages in the LTSD model that an athlete progresses through from entry level ski racing to success on the World Cup international scene. The stages in the LTSD model are Gliding Start, Skier Essentials, Learn to Train, Learn to Race, Train to Race, Train to Win, and Skiing for Life.
- WINDOWS OF TRAINABILITY** refers to the period in an athlete's development where the five basic S's (speed, stamina, strength, skill and suppleness) of training and performance are best trained.
- SPECIFIC SKI TRAINING AGE** refers to the actual number of years a child has been exposed to a ski training environment. Although a child can begin a ski program at any age, it is common and advantageous to begin the Skier Essentials stage around six years of age.
- TRAINABILITY** refers to the faster adaptation to stimuli and the genetic endowment of athletes as they respond individually to specific stimuli and adapt to it accordingly. Trainability has been defined as the responsiveness of the developing individuals to the training stimulus at different stages of growth and maturation.



Introduction

In 1999 Alpine Canada Alpin produced a document titled "Alpine Integration Model", known as "AIM". Under the leadership of Istvan Balyi and Dee Dee Haight and in conjunction with the High Performance Advisory Committee (HPAC) and the Canadian Ski Coaches Federation (CSCF), AIM was created on principles of the Long Term Athlete Development Guide (LTAD).

One of the key elements of change as we move ahead to AIM 2 WIN, is the recognition and integration of LTAD principles in relation to the Long Term Development of athletes with a physical disability, or Para-athletes. As with AIM 2 WIN, PARA-AIM 2 WIN is also based on the foundation principles of the original AIM, and is intended to be an integrated resource that reflects many of the elements introduced in AIM 2 WIN. The focus of PARA-AIM 2 WIN is to introduce the elements of LTAD that are unique to the Para-athlete. This includes, in addition to the new AIM 2 WIN fundamental stage of development, Learning to Train, two key stages of Awareness and First Contact/Recruitment.

For many years, high quality coaches have been working with high level athletes but one of the core messages from PARA-AIM 2 WIN is the importance of having high quality coaches working with children with congenital disabilities and individuals with newly acquired disabilities during the early stages of their involvement in skiing.

Within the Canadian Alpine Ski racing system, coaching tools such as the entry level and development level coach training and certification progressions, administered by the Canadian Ski Coaches Federation, are now also offering courses and the associated material that has been tailored to the coach interested in working with Para-alpine athletes.

PARA-AIM 2 WIN identifies skier development and performance pathways from both the physically disabled learn to ski programs and ski club level to the Canadian Para-Alpine Ski Team national level. The document provides a framework of what to do and ensures that those involved with a skier's development have guidance. It should not be seen as a rigid set of rules, but as a guiding set of principles, which can lead to informed decision-making.

As with AIM 1, PARA-AIM 2 WIN will continue to place emphasis on flexibility of implementation as to the LTSD model. Implementation will be influenced by such factors as club/program capacity for working with Para-athletes, age range of club members, number of clubs in the region, and philosophy of the club. Other factors include length of the winter season, relationship with local ski resorts and ski schools, volunteer base, and availability of qualified coaches.

Alpine Canada Alpin's goal is that any child entering the Para-alpine ski racing system is given every opportunity to experience the necessary building blocks with optimal sequencing in order to reach the desired highest levels of the sport. Although the primary objective of PARA-AIM 2 WIN is to produce greater numbers of ski racers capable of achieving at the highest level, it also provides a platform for clubs and coaches to encourage and support participants at every level to fulfill their potential and maintain a lifelong involvement in the sport of alpine skiing.

As AIM is a recognized term in the ski racing community, this latest Long Term Skier Development guide (LTSD) for alpine ski racing will be addressed as AIM 2 WIN, while its Para-alpine supplement will be addressed as PARA-AIM 2 WIN.

The PARA-AIM 2 WIN document is intended as a guide for coaches, managers, administrators, parents, teachers and volunteers who play a role in the development of Para-alpine racers.



Lauren Woolstencroft



LTSD for Para-Alpine Ski Racing

Although the Para-athlete goes through the majority of similar LTSD factors, as presented in AIM 2 WIN, there are some specific differences that change the LTSD process for PARA-athletes. This section will focus on these unique elements, while the reader is encouraged to make reference to AIM 2 WIN for the balance of LTSD elements that pertain to all athletes, both Para and able-bodied.

Differences that change the LTSD process for Para-athletes include the following considerations (modified from No Accidental Champions, page 15):

- Para-athletes may have been born with a disability (congenital disability) or may have acquired a disability later in life.
- Children with a congenital disability may not have the same opportunity to learn FUNDAMENTAL movement skills because they do not always have the same opportunities for vigorous, physical play during their early years (Active Start). This is sometimes due to long periods of hospitalization and the lack of suitable rehabilitation and physical education programs, but may also be due to parents or caregivers being overly protective, a situation that can also occur with an acquired disability.
- Para-athletes may operate in a sport environment in which there are participants not found in able-bodied sport. For example, skiers who are blind need sighted guides and competitive skiing requires officials who determine the classification or division of competition into which the athlete best fits to ensure fairness of competition. Failure of the sport system to develop these supporting roles will have a long-term negative impact on athlete development and the competition experience.
- Many Para-athletes in alpine skiing require equipment adapted to take full advantage of their athletic ability and to minimize the sport-performance impact of their disability. This includes sit-skis and outriggers, which will be dealt with later in this document.
- Because there may be only a few other Para-athletes with the same type and/or level of disability, access to appropriate competitive experiences may be difficult.
- Some Para-athletes, especially at the developing levels, require personal support for access to venues and equipment not found in able-bodied sport.

Considering the aforementioned differences, the holistic development of a Para-athlete requires two additional stages to the able-bodied LTSD progression. These stages are called Awareness and First Contact/Recruitment. Although significant to all Para-athletes, these two additional stages are of particular importance for individuals with an acquired disability who, prior to injury or illness, may not have had contact with, nor knowledge of Para-sport (No Accidental Champions, page 16).

Following the acquisition of a disability, a significant period of transition and life change occurs for most individuals. Activities in which they were previously engaged may no longer be open to them in the same form, and their awareness of sport opportunities, including alpine skiing, that may still be available to them may be limited. The purpose of the Awareness and First Contact/Recruitment stages are to primarily inform individuals of the opportunities available to them in sport. In the case of PARA-AIM 2 WIN, these two stages are intended to build a foundation through which the individual can pursue competitive alpine skiing from an entry level through to a high performance capability should they so choose. Ultimately, the goal is to involve individuals in Para-alpine sport as a life sport, be it at a recreational or competitive level.



Awareness stages

Opportunities for involvement in competitive alpine skiing for an individual with an acquired disability have been limited until now, as most foundation programs that offer learn to ski opportunities do not extend themselves to presenting the competition environment of the sport. The goal of the awareness stage in alpine skiing is to provide Para-athletes the opportunity to discover alpine skiing through a "learn to ski" element that then provides the option of competitive alpine skiing as a "next step," within the programs that introduce skiing to both congenital and acquired disability athletes.

The awareness stage is promoted from both a bottom up and top down approach. The bottom up element is managed through the Learn to Ski programs for athletes with a physical disability. These programs, which are run throughout Canada by the Canadian Association for Disabled Skiers (CADS), provide the foundation for athletes with a physical disability to become engaged in the sport of alpine skiing. As individuals gain confidence and expertise in the sport, they can then choose to move into one of two competition pathways, to be discussed in a later section of this document. The top down approach is facilitated through a combination of provincial race development teams and/or the provincial sport organization (PSO). These groups are both focused on the recruitment of talented Para-athletes into higher levels of competition.

First Contact/Recruitment Stage

The primary intent of this stage is to ensure that the individual be met with a positive environment relative to their initial experience in alpine skiing. It is often not easy for an individual to first approach a sport such as alpine skiing, which is considered a high-risk sport, especially in the competitive realm. Should the individual be exposed to a less than optimal scenario, they may be lost not only from alpine skiing, but often from sport, and as a result, may be removed from an opportunity to be engaged in a healthy lifestyle.

To ensure that the individual Para-athlete has a positive exposure in their initial experience, the key is to provide a fun, yet professional atmosphere that is led by qualified coaches who are trained to work with Para-athletes. The CSCF has introduced both entry level and development level coach education courses and related materials specific to coaches working with athletes with Para-athletes. The following resources are also available through the CSCF:

- Athletes With a Disability: An Introduction
- Athletes With a Disability: Technical Considerations

Both documents provide strong foundation information that will enhance the ability of the coach to place emphasis on a positive first contact.



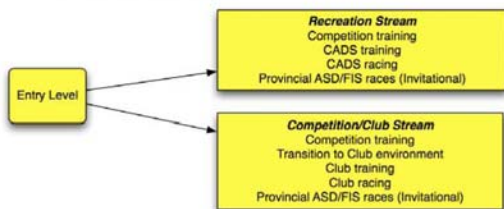
Multi-stream Competition

Multi-stream competition pathways

There are two distinct competition pathways or streams that a Para-athlete can follow in their development progression. These are the recreation stream and the competition/club stream.

Para-athletes in both streams follow a similar progression at the Active Start and FUNDamentals stages, with the separation between the two streams occurring during the Learning to Train stage and sometimes as far as the Train to Train stage. Figure one conveys the two possible progressions that an alpine Para-athlete may follow.

Figure One: Para-Multi-Stream Competition Pathway



Recreation stream

The recreation stream is intended to be a Para-athlete's introductory phase in the alpine racing process. The focus is on an active start and discovery element of ski racing. Typically, the recreation stream will be facilitated by trained or certified entry level coaches who are active within the CADS learn to race programs, ski schools running adaptive race programs or clubs offering Para-alpine entry level programs.

These coaches need to be specialists in working with developing athletes and need strong knowledge of adaptations of activities for skill and physiological development and knowledge of alpine disability sport rules and classifications. Talent identification skills and sport specific technical knowledge are critical as is knowledge of disability characteristics related to sport participation. Coaches will focus on familiarizing the Para-athlete with the basic principles of ski racing, working on sound technical development and physical ability. The Para-athlete will also be in an experimentation phase relative to gaining experience with specialized adaptive equipment. Knowledge of fitting the Para-athlete to sport specific equipment is important.



Competition/Club stream

The recruitment element of the second stage leads to the competition/club stream. The goal of this stream is to motivate Para-athletes that show the potential for advancement in the competitive progression of alpine skiing into club-based programs that will allow these athletes access to more challenging levels of training and competition. Para-athletes in this stream will have the opportunity to focus on development towards provincial Para-alpine team status, and the potential for advancement to the Canadian Para-Alpine Ski Team.

Coaches at this level will be expected to have at minimum Para-entry level trained status, while typically expectations will be that of coaches at Para-development level trained or certified status. As the coaching pool tends to be smaller in the Para-alpine environment, coaches at this level need to be specialists in working with developing athletes and need strong knowledge of adaptations of activities for skill and physiological development and knowledge of disability sport rules and classifications. Talent identification skills and sport specific technical knowledge are critical as is knowledge of disability characteristics related to sport participation. Knowledge of fitting the Para-athlete to sport specific equipment becomes increasingly significant.



Age of experience

Before moving on to the competition formats for Para-alpine athletes, it is important to be aware of the chronological context that Para-athletes are entering the sport in. Having provided the Para-athlete the opportunity to become engaged in alpine skiing, and having also provided the Para-athlete competition pathways in which to progress in the sport, a significant difference from the AIM 2 WIN process is not the developmental stages, but rather the removal of the chronological context. This is especially true when considering a Para-athlete with an acquired disability.

It is important that each athlete be evaluated based on their developmental stage rather than a purely chronological stage, as some Para-athletes may only be at the active start stage at ages in their teens or beyond. The assessment of a Para-athlete's developmental stage is referred to as their Age of Experience.

To provide clarity of comparison, Table One, which follows, provides chronological age for each stage of athlete development for the typical athlete with a congenital disability, and the number of years of skiing in relation to each stage of development for the athlete who enters the Para-system as a newly disabled athlete.

Table One: Development Stages for Athletes With Congenital Disabilities Versus Athletes With Newly Acquired Disabilities.

Stage	Disability	
	Congenital disability Age of experience	Newly acquired disability Number of years skiing
Gliding Start	2 to 6	1
Skiier Essentials	6 to 11	1 to 2
Learn to Train/Train to Train	8 to 13	2 to 3
Learn to Race	11 to 17	2 to 4
Train to Race	13 to 23	3 to 6
Train to Win	18 to 30+	4+

The intent is to convey that the chronological data presented in AIM 2 WIN is based on the latest scientific research and expert knowledge from the able-bodied context, and should not be dismissed in its entirety when working with Para-athletes. Rather, apply the principles where it is logical to do so, and consider the equivalent number of years of skiing relative to the athlete with a newly acquired disability in which the context of Age of Experience has greater relevance.

In summary, whether considering an athlete with a congenital disability, or an athlete who is newly disabled at a later age, the theme of developmental age should be a constant consideration when looking at the nature of competitions that an athlete is to participate in relative to their developmental needs. It is also important to recognize that the timelines established above are guidelines based on an athlete with a high level of commitment to the sport and their own personal development in the pathway. Exceptions will occur in which athletes proceed through the development pathway in a shorter time frame, but coaches are encouraged to be realistic in their long term athlete assessments and the associated planning that applies.

The concept of Age of Experience can be better understood when looking at the fact that many of our CPAST athletes can often compete well into their 40s, and remain highly competitive in those age groups.



Planning for competition

Having established the long term athlete pathways shown in Table One, Table Two, by comparison, is intended to provide a guideline as to the recommended race to train ratios that the athlete should be exposed to. Also considered are the expectations of off-snow dryland training in relation to the stage of application. Again, consider the information provided as a guideline for an athlete committed to a performance stream. Coaches are encouraged to build equivalent programs based on the level and expectation of their athletes. Consideration of on-snow training availability, limitations due to the nature of the disability, and other related areas will determine the specific program on an athlete by athlete basis.

Table Two: Guideline of Recommended Race to Train Ratios for Para-Athletes

Stages	Recommended ratio race days: training days (on snow)	Dryland days
Gliding start (Active start)	One specific ratio	0%
Learn to race/ Train to race	1:10 (at end of phase)	10% - 20%
Learn to train/ Train to train	1:7 (at end of phase)	20%
Train to race	1:5 (at end of phase)	30% (off-snow equivalent training 40%)
Train to win	1:4 - 1:3 (at end of phase)	30% - 100% (on-snow training)
Train to win	1:4	100% (on-snow)
Train to win	1:3 (at end of phase)	100% (on-snow)

ACA Para-Ski Racing Events

Para-Alpine ski racing consists of five events.

- Slalom (technical) two timed runs
- Giant Slalom (technical) two timed runs
- Super Giant Slalom (speed) one timed run
- Dowrhill (speed) one timed run
- Super Combined one speed run and one slalom run on the same day

Alpine Canada Alpin also promotes three other events up to and including the Learn to Race stage.

Kinder Kombi

All events mixed into one course.

Dual format racing

Regular courses with individual timing set side by side with two skiers racing simultaneously.

Stubby slalom

Slalom races using stubby gates only.

A traditional technical race consists of two runs and a traditional speed race consists of one run. ACA promotes the use of multi-run races in the first three stages of development whenever possible.

See the Alpine Canada Alpin Domestic Handbook for Event Guidelines.



Para Ski Racing System

Canadian Para-Ski Racing System - The National Development Initiative

For Para-athletes who have progressed into the competition/club stream of ski racing, the new national initiative will provide these athletes the potential to build a national Para-points profile that will then be considered as the progression tool for moving towards higher competitive levels. The Para-points profile will be based upon a combination of able-bodied race entries and Para-race entries in a given competition season.

For an athlete who is just entering the competition/club stream, they will follow the potential race progression as defined in Table Three, below. The intent of the progression is to allow the Para-athlete to compete both in club based able-bodied races in combination with Para-events run at the provincial or Nor Am level. The club-based events would occur in either the K1 (as shown) or K2 Kinder race series, and could ultimately include FIS Junior J1/J2 races. The Kinder level Para-athlete would be in the developing stages of Learn to Train, Train to Train, and transitioning towards Learn to Race and Train to Compete. The Junior level Para-athlete would be focused on the Train to Compete stage transitioning to the Train to Win stage on occasion. The Senior level Para-athlete will have attained the goal of focusing on the Train to Win stage of development.

An athlete can progress through to a provincial, and ultimately a national level through either the able-bodied, disabled or a combination of the pathways discussed.

When considering the number of years of combined training and race experience associated with the able-bodied nomenclature of Entry Level, K1, K2, J1/2 and Elite, the equivalency in relation to the Para-athlete is shown in Table Three below.

Table Three: Equivalency of Pathway Categories to Years of Training and Race Experience for the Para-Athlete

Pathway Category	Years of training and race experience
Entry level - K1/2	1 to 3
J1/2	2 to 4
Elite / Senior Level	3+

The Kinder level Para-athlete will be under consideration for potential movement to the Para-provincial team programs, while the Junior athletes will be under consideration for movement to CPAST Development Team status and ultimately CPAST Senior status. Figure Three provides a summary diagram of the Para-alpine Competitive Pathway in Canada.



The races entered on the able-bodied club scenario would be multiplied by a factor, as published in the Alpine Canada Alpine Domestic Handbook on an annual basis. The combination of factored national points and Para-national points acquired through ASD sanctioned events will determine an athlete's position nationally in Para-alpine competition. This can then become a tool through which coaches at club, provincial and national team levels can assess Para-athletes progressing to higher levels of competition and ultimately to higher-level team status.

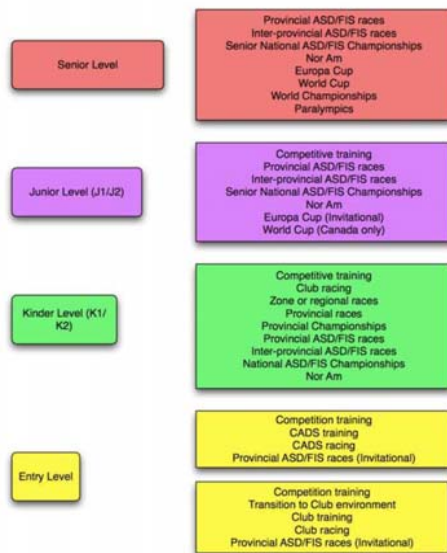
The goal is to allow Para-athletes the opportunity to participate in a club structure similar to that of their able-bodied counterparts, while still requiring a defined presence in Para-alpine events. Having knowledge of this structure, both the coach and athlete can better plan the training versus competition ratios for each athlete to best suit the needs and capacity of the individual Para-athlete.

The competitive pathway structure just described is presently under development and planned for a 2007-08 pilot and 2008-09 implementation.

Figure Two: Competition/Club Para-National Points Structure



Figure Three: Para-Alpine Competitive Pathway



Qualifying to Select Teams

As has been evident throughout this document, the goal, beyond provision of programs that involve Para-athletes in alpine skiing as a life sport, is that of creating a winning philosophy and a winning team at the elite level. Hence, a flow or progression has been demonstrated that combines the Para-alpine elements presented in this PARA-AIM 2 WIN Supplement in combination with the AIM 2 WIN document.

Individuals grow and develop at varying rates, especially when one considers that a Para-athlete can be entering at a variety of chronological points, yet at the same developmental entry point. Expectations and abilities will vary to where Para-athletes may excel at differing stages and often at accelerated rates towards their goal of elite CPAST status.

Given that the Para-alpine athlete pool is much smaller than their able-bodied counterparts, national and provincial coaches are in a strong position to effectively track Para-athlete performance measures. Selections to teams and camps are a reflection of the moment. There will always be early achievers and late achievers and progression to these groups will not always align perfectly with a skier's stage of development. Drive and passion, patience to grow and learn will eventually bring the deserving participants to the elite core flow at the right time. It is important not to base a career on any specific event. Talented skiers and athletes may miss the window the first time but with perseverance will arrive at the same point a little later. Believing elite levels can only be achieved by the regular steps is far too constrictive in the big picture of development.

As a result, a number of events throughout a competition season will determine the ability for an athlete to progress. Progression will not be linked to singular events, but rather a collective of events, invitational camps, and collaboration between coaches at the provincial and national level, and given the small pool of Para-athletes, will often involve direction from club coaches.



Josh Dueck

Periodization

Periodization and Specifics of Each Stage of Development

The reader is encouraged to review a combination of both the AIM 2 WIN document pertaining to this similar topic, and the No Accidental Champions document, as two resources to provide guidance as to Para-athlete development. The nuances of Para-athlete development are covered through coach training offered through the CSCF, and it is the responsibility of the CADS Recreational race program, or the Competition/Club race program to ensure that coaches are trained in this knowledge to allow for realistic and manageable decision making to be made throughout a Para-athlete's developmental career.



Kimberly Joines

Physical testing

Physical Testing and Athletic Training

The purpose of fitness and performance monitoring is to provide training evaluation and prescription, create a benchmark from which the athlete can be monitored throughout his/her career, help predict performance, and provide subsequent motivation for the athlete. As well, monitoring can play an essential role for fatigue and preparedness for the athlete.

At the national level, physiological monitoring is administered three times per year (April, July, October). Lab tests are conducted for the more experienced athlete who has a substantial training base. Field tests, which are far less expensive and provide a general monitoring tool, are conducted with the development athletes.

In the lab, an incremental lactate test is utilized to establish the anaerobic, aerobic and recovery thresholds. As well, musculoskeletal fitness (strength, endurance, flexibility, agility and power) is tested, as shown in the diagram below with examples of tests used for both the standing and sit-skier.

The results of the physiological tests are then analyzed and interpreted to allow for an individualized dryland training program for the athlete which is executed throughout the off-snow phase of the program in a periodized manner.

Parameter	Clinical test	Field test
Aerobic & Anaerobic Power & capacity	Submax or maximal: Lactate incremental Arm crank ergometry test	Leger 20m shuttle wheel on track
Power	Exploding push up on jump mat while lying on BOSU	Med ball throw (dist)
Strength	Max horizontal pull ups Grip test	Max push ups/pull ups Wall sit/lean
Agility	Hex Rail agility w/ foam blocks Pro Fitter lateral sit (4 touches)	Lateral jump over foam block (or line)
Balance	Sit balance w/ 4 way touch (dist)	Sit balance (timed)
Flexibility	Sit & reach Lateral side bend Shoulder flexibility (via goniometry)	Sit & reach Lateral side bend Shoulder flexibility (via goniometry)
Functional ability	Functional movement screen (Gray cook)	Functional movement screen (Gray cook)

Dryland programs are based on the results of the fitness tests. A periodized approach is utilized to ensure that a proper foundation of physical fitness is built. A strong aerobic foundation is crucial for recovery between workouts while off snow and between training or race runs while on snow. As well, strength, power, agility, balance, and flexibility are all developed throughout the dryland training phase with adaptations being made to meet the individual athlete's needs.

When on the road, the dryland workouts are done in a group format; dividing the team into either: "standing" or "sitting" athletes. The off-snow program is based on the same principles as an able-body off-snow program, using a periodized approach as shown below:

The following phases are built into the 8 months off-snow season:

Initial Adaptation

- 3 days per week
- Basic large group strength exercises for hypertrophy
- Incorporates cardiovascular conditioning (aerobic) exercise
- Emphasis on core strength, flexibility and balance

Acquisition Phase: VOLUME

- 5 to 6 days/week
- Incorporates cardiovascular conditioning with strength (aerobic and anaerobic)
- Introduces agility work
- Continues to maintain core, balance, flexibility

Specialization Phase: INTENSITY

- 5 to 6 days/week
- Builds in power (speed strength & max strength are undulated)
- Continues to maintain cardiovascular exercise, anaerobic work
- Continues to increase agility work
- Balance, flexibility

Realization Phase

- Coordinating with the on-snow program, this phase seeks to maintain the level of fitness attained during the off-snow season

Workouts typically include a dynamic warm up and are then followed by agility work for development of speed and coordination. The strength workouts incorporate functional movement with specific exercises for each athlete's needs. Core and pre-hab training (hips, shoulders, scapula) are incorporated into every session. Warm down is performed as a component of the cardiovascular conditioning program. Anaerobic intervals and large volume cardiovascular conditioning are done on separate days from the strength work.

It is crucial to examine the athlete at a physiological and functional level to determine what his/her strengths and weaknesses/imbalance may be to be able to conduct a successful off-snow program. This can be accomplished using Gray Cook's Functional Movement Screen (1) or, if the budget exists, having a qualified Kinesiologist or physiotherapist perform a functional assessment.



When the needs of the individual athlete are determined the program is executed accordingly. The following are considerations taken into account for each category:

Visually impaired

○ Goal: develop balance and proprioception to increase confidence with movement

○ Considerations:

- Strength: no restrictions (ie. train upper and lower body). Often difficult to encourage body awareness, so typically start with leg press, progress to smith squat and then BB squat. Education re: jump landing (ACL prevention) and pelvis and core alignment.
- Agility: teaching movement patterns through dynamic warm ups and agility are crucial. It has been observed that there is a lack of body awareness, often secondary to lack of free-play/exploration as a child so movement development is often lacking. Progress from jumping over a line (white on black or vice versa) on the ground... increase to using foam blocks or an agility ladder. Modify the hex rail jump to using foam blocks.
- Power: confidence with jumping; proprioception with Olympic lifts, education re: athletic stance.
- Cardio: no restrictions if indoors. Outdoors (eg. cycling) will most often require a guide with experience.

Sit skiers

○ Goal: develop/improve sit balance, core strength (if possible), scapular stabilizers, rotator cuff and a good neutral "power posture"/athletic sit stance.

○ Considerations:

- SAFETY: gain awareness of their ASIA status and lesion level. Gain a clear understanding of their current function (both sensation and motor) prior to starting the program.
- Orthostatic hypertension: gradually change positions
- Autonomic dysreflexia (T6 and above): ensure they have used the washroom prior to their workouts and there are no bladder infections, restrictive clothes or other potentially noxious stimuli present
- Respiratory function: do they need an assisted cough
- Cardiovascular function: T6 and above can not use their heart rate in a reliable manner (max = 120bpm)
- Caution with over-training as this will affect their ability to carry out activities of daily living such as transfers.
- Strength: incorporate the use of tubing, medicine balls, free weights and some machines (will need assistance with machines- include as few transfers as possible). Perform all exercises that require a sitting position at one time (as opposed to doing circuit exercises requiring lots of position changes). Sitting in chair, lying supine, and sometimes prone are all good positions (caution with prone: hip flexor contractions can be problematic). Be able to assist with transfers (ex. holding legs). Use straps and tubing to help tie their legs together if necessary. Use lots of mats and BOSU balls behind them if doing lots of sitting exercises requiring sit balance.
- Agility: med ball work in sitting (front, overhead and side throws), sitting on top of pro-fitter machine to develop lateral agility through core.
- Power: exploding movement with med balls, also push ups and lateral push off maneuvers
- Cardio: variety is key, especially considering they wheel for transportation. Encourage the use of a handbike, or back wards wheeling, hand erg, swimming, rowing ergometer.



Standing skiers:

◦ Goal: address muscular imbalances that occur from the prosthetic limb(s). Encourage proper movement patterns and body awareness.

◦ Considerations:

- SAFETY: if working with an amputee, ensure that skin care is managed, particularly if training in a hot environment. Be aware of imbalances occurring as a result of the prosthetic. Incorporate the use of straps in place of handles if there are grip problems.
- Strength: develop strength in the hip and pelvic stabilizers, core scapular stabilizers and rotator cuff. Start new athletes with the leg press- progress to Smith squat machine. The Smith squat machine is great for anyone with an amputation or imbalance (eg. CP or stroke as well) because it allows the athlete to train in a functional position but with stability and confidence. Posterior chain development (eg. hamstring and gluteals) is also crucial.
- Agility: being aware of volume (ie. do not over-do it), incorporate movement work such as controlled jumps (eg. squat jump) as well as agility ladder work. This area of training is very individualized but allows for much creativity.
- Power: Encourage the use of jumps and Olympic lifts with dumbbells where appropriate. Do not use Olympic lifts if they demonstrate a significant muscular imbalance. Rather, encourage explosive movement using such devices as the Smith squat or leg press.
- Cardio: no restrictions- ensure proper form (pelvis) and equipment fit.

Although there are similarities to working with the able-bodied athlete, such as using a periodized approach and developing strength, aerobic and anaerobic fitness, it is also imperative that the coach is aware of the athlete's functional status, in addition to their technical level of athletic ability. So regardless of their status as a high performance athlete or an entry level athlete, addressing the athlete as an individual and tailoring his/her program accordingly, their off-snow training program can help improve performance and decrease risk of injury throughout the season.

-Maggie Phillips MKIN MPT CSCS

(1). Cook, G. (2003). Athletic Body in Balance. Human Kinetics: Champaign, IL.



Classification

Classification of Disabilities in Para-Alpine Skiing

Historical context

In the 1970's and 80's, Disabled Alpine Skiing integrated all the disabled in their competitions with the exception of the deaf and the mentally challenged. The three to six different disability classifications that existed then gradually evolved into 13 classifications for each gender. That necessitated 26 victory celebrations with 26 first-placed, 26 second-placed and 26 third-placed medal winners. In order to put this medal abundance into a more manageable position, a handicap system has evolved over the past decade to its present format. This entailed that all the classes in the three categories: blind, standing, and sitting were combined and are now separated only by gender. This way there is only one winner in each category and not a winner in each class/classification, hence a "three category system."

The three category system has been applicable at the World Cup level for at least five years, while the Paralympic Games of 2006 in Italy and the 2007 World Championships were the first International Paralympic Committee (IPC) major alpine events to apply the three category system, based on a Nations vote to apply the three category system as the world-wide standard.

Classification

Before his/her first race, each disabled athlete must submit to a medical examination by a doctor or an IPC-recognized physiotherapist in order to obtain a classification. This means being placed according to his/her disability into one of the categories and classes discussed as part of this document. The nature and means of classification has in recent times been subject to changes based on new insights, and most of all, due to constant changes in performance levels. Today most of the disabled are functionally classified, that is, testing the bodily ability that allows the person to use that ability in competition. For the wheelchair athlete it is the neurological cancellation that is of most importance, that is, which body functions can be controlled and which cannot. The extent of a sight disability has to be diagnosed by an eye doctor and classified accordingly. The totally blind (B1) are required to wear totally dark ski glasses during a race. Borderline disabilities are mostly classified through observation at the races. Therefore, exact observations of the various movements during the course of events are important to the classifier. The visual classification points to the importance of assigning classes. Physiotherapists are always present at races and examine the racers at regular intervals for any changes to their disabilities.



The handicap system

The RHC-KREK System (Realistic Handicap Competition and Kreative Renn Ergebnis Kontrolle), or in short, the Handicap System is a factor system which has the objective to adjudicate as fairly as possible the various disability classes in the categories: blind, standing, and sitting and to ascertain a winner in each category. That way, even with different disabilities, a race within a category can take place. The Handicap System was adopted in 1990/91 by the then newly constituted Alpine Cup Committee, combining the two already existing systems and developing improvements to them. Through it the goals of manageable and fair evaluations and rankings were made possible. Today, the Handicap System has received worldwide acceptance. The following examples will clarify the calculation of such handicaps.

Currently the fastest class of males in Slalom is the Crutch Skier (Class LW2) who therefore obtains a factor of 1.0. The double leg amputee (Class LW1) in the same category of the standing skier requires considerably more time and obtains a factor of 0.7999898. Therefore, if a racer in Class LW2 obtains a time of 1min. 40 sec., a racer in Class LW1 must obtain a time of 2 min. 5 sec. to win the race, because his handicap is larger by his factor (125 sec. x 0.7999898 = 99.99 sec.). The factors of all classes are calculated to eight decimal points and rounded to seven. Should the result or the factor of the actual race show a variation of plus 5% or minus 3% then no new factor will be calculated so as not to include extreme results in the consideration. Should the factor lie within the two extremes, with a positive deviation only 30% of the difference will be added to the old factor, and with a negative difference only 5% subtracted.

These classes are adjusted from time to time based on findings and experiences from actual races. That's how at the World Cup Technical Meeting in July 97 the LW9 and LW12 classes were subdivided into two further classes each: LW9/1, LW9/2 and LW12/1, LW12/2. The differences of the disabilities in these classes were too large to provide a fair factor for the calculation of the handicaps.

The three categories

Visually impaired category with 3 Classes

The category for the visually impaired is subdivided, according to degree of blindness, into three classes B1 to B3.

Class B1	Completely Blind
Class B2	Visually Impaired – Limited Sight
Class B3	Visually Impaired – More Sight

The visually impaired are guided through either verbally called or directions provided through wireless helmet radios. The guide, who directs the racer by skiing ahead of them in the case of B2 and B3 athletes and either behind or in front in the case of a B1 athlete, provides instructions to the racer allowing them to navigate down the course at maximum speed.

The mutual trust between the racer and the guide is critical to the success of the racer, and the pairing is considered to be a team in that should the guide miss a gate or go off course, the racer is automatically disqualified.



The distance between the guide and athlete in technical events (slalom and giant slalom) must not exceed two direction changes and in speed events (downhill and super G) must not exceed one direction change. Should these criteria not be met, the pairing will be disqualified.

The guide must also wear a competition bib, in a fluorescent colour, with the letter "G" or "Guide" indicating their guiding status.

Standing Category with 7 Classes (4 sub-classes)

The category for standing athletes is subdivided into seven classes and four sub-classes. The category includes arm and leg amputees, as well as those athletes with arm and leg disabilities, which limit movement, but allow for standing position in competition. The "LW" refers to the term locomotor winter.

These disabled athletes travel either on one ski and 2 ski crutches, or below-the-knee amputees with one joint prosthesis on two skis, arm amputees travel on two skis and one or no ski pole.

Class LW1	Double-leg Amputee
Class LW2	Single-leg Amputee (Crutch Skier)
Class LW3	
LW3/1	Double Below-the-Knee Amputee or Partial Paralysis
LW3/2	Cerebral Palsy
Class LW4	Single Below-the-Knee Amputee (Prosthesis Skier)
Class LW5/7	Disability – Both Arms
Class LW 6/8	Disability – One Arm (Single Pole Skier)
Class LW9	
LW9/1	Arm Disability and Leg Amputee or serious to moderate paralysis
LW9/2	Arm Disability and Below-the-Knee Amputee or light paraplegic

The common misconception is that an athlete with a disability will be very obvious, but in the standing category it is often difficult to determine if the athlete actually has a physical disability, and if they do what that disability might be.

Although the majority of athletes use alpine equipment typically familiar to an alpine ski coach, athletes in certain classes of the standing category use outriggers as a balance mechanism to replace ski poles. Outriggers are adapted forearm crutches with ski tips mounted on the bottom on a pivot mechanism. They aid the skier in balance, mobility, and turning. They are also used as crutches when not on the snow.

The typical outrigger is made from materials such as aluminum, carbon fiber and titanium depending on the level and personal needs of the athlete.

Athletes with arm disabilities (LW 5/7, 6/8) typically ski without a pole or poles depending on whether a single arm or both arms are disabled.

While athletes with an arm disability or amputation typically do not use a ski pole, in some events, primarily slalom, a small number of competitors experiment with prosthetic attachments, which allow for the use of a ski pole or partial pole to provide a balance and/or timing mechanism.



Sitting Category with 3 Classes (3 sub-classes)

The category of the sitting, with the three classes LW10 to LW12 and three sub-classes, includes disabilities, such as paraplegic and the double-leg amputees, travel with the so-called skibob on a spring-loaded sitplatter and short ski crutches. The skibob is typically called a mono-ski, which is a seat mounted within a frame that is attached into a single ski with binding.

Class LW10/1	Mono Skier (With no muscles in lower body)
Class LW10/2	Mono Skier (With limited muscles in lower body)
Class LW 11	Mono Skier (With muscles in lower body)
Class LW 12	
LW 12/1	Mono Skier (Lower incomplete paralysis)
LW 12/2	Mono Skier (Double Leg Amputee)

The functional classification of the sit-ski is based on medical documentation of the disability of the athlete, a series of six functional tests as per the IPC alpine rules (<http://www.asdracing.org/html/rules-regulations-r.htm>), and observation in practice and/or competition.

Aside from the obvious disability requiring the athlete to work in a sit-ski setup, the coach must be aware of some of the key equipment components.

The sit ski itself can come in a variety of shapes, frames, etc. The seat itself is typically custom molded to fit the specific athlete. The seat is mounted onto a frame that is designed around the disability, for example paraplegia or double leg amputation.

As with the standing skiers requiring outriggers, the sit-ski or mono ski athletes relies on outriggers in all cases as a key balance and initiation tool.

The other key consideration is that of lift access for sit-ski athletes. Although most athletes will have the ability to load themselves, the coach should both be aware of the athlete's loading requirements and should have made the lift operator aware of the loading scenario. This may include requests to slow the lift temporarily, assistance in pushing the ski onto the lift, etc. Note that the lift attendant should only proceed with requests directly from the athlete or from the coach on behalf of the athlete. The athlete is the only individual who will know if they feel as though their position on the chair is secure.

A final note that applies in North America is that of a safety harness. The harness is an insurance requirement at most ski areas in North America, and while not implemented in the past, it is becoming a recognized equipment requirement as the sport moves ahead. The harness should be one that allows the sit-ski and skier to be lowered from a chairlift in an emergency download scenario.

Visually impaired category:



Chris Williamson

Standing category:



Matt Hallat

Sitting category:



Kimberly Joines



Summary principles

In some instances, some adaptation of a sport may be necessary to enable participants with a disability to fully enjoy the activity.

Whether adaptation occurs on a recreational or competitive level, a key principle to keep in mind is to adapt only if necessary. Needless to say, it must always be the sport or the activity that is adapted, not the person with a disability. If a sport or an activity must be adapted, it should also be kept as close as possible to its traditional counterpart. This is important in order to maintain the integrity of the sport for everyone involved: the person with a disability and the other participants/athletes.

Key parameters that can be used to adapt an activity include:

- Space
- Time
- Speed of execution
- Equipment/environment
- Rules

In summary:

- Adapt only if necessary
- Adapt the environment/situation/activity not the person
- Be creative using one of the variables listed above.
- Keep the activity as close as possible to its traditional counterpart.
- Ensure the challenge remains adequate/reasonable for everyone.



Karolina Wsniowska



Closing Remarks

Canada is winter. From our earliest days we can recall hours of fun in the snow and for millions of Canadian families, this enjoyment revolves around skiing.

Every day is an adventure - riding the lifts, listening intently to coaches, working on skills - and there is always time for fun: racing, jumps, terrain parks - the day never seems long enough. Youngsters race to be first on the lift, with a cursory wave to parents in the lodge. Every run is explored for adventure, until the race for the final lift ride.

The winter which dominates the Canadian landscape is our closest friend. Snowstorms are sentinels of good times. It's all about having fun, enjoying nature, bonding, and taking advantage of the climate that makes Canada an interesting place to live.

It is also about becoming the best we can be. Six months of outdoor action filled with racing, always pushing the limit, creating dreams to tread in the footsteps of our ski heroes.

Parents and dedicated volunteers organize the events throughout the season, ensuring hills are prepared, timing in place and gates ready for the big races. This same scene is played out at ski resorts and hills across Canada every weekend. The reward is to see committed youngsters, whose personal sense of accomplishment grows with each outing as they acquire the skills of a sport that will last them a lifetime.

This passion for winter is the foundation of every ski racing family, a dedicated commitment to head for the hills every weekend, for quality time en route and great fun on-site. This core value becomes the burning desire to challenge to become the best - to fervently believe that Canadians can be best in the world.

Alpine Canada Alpin knows exactly why the early years are so important. We should strive to set the initial table by age 12-14. What a youngster does on skis between the ages of five and 12 can determine the depth of skills they will have to work with in later years as they look towards provincial or Olympic Teams. These early years shape agility, pressure sensitivity and balance, all key components of technique.

This is one reason the athletic program of Alpine Canada Alpin has invested in the upgraded Husky "Snow Stars" skill development program and our new long term athlete development plan (AIM 2 WIN), to provide science-based athletic guidance to parents, coaches and everyone dedicated to developing a world-class alpine ski racing system that will provide our athletes with the roadmap to ski racing excellence. This is this foundation that will ultimately build a sound athlete development system, a program built on passion, driven by excellence and shaped by our tradition of success.

For over 85 years Canadians have been participating in organized ski racing, years before even the first rope tows graced the hills of Quebec. Since the 1956 Olympics in Cortina, ITA, we've shown the world we can be amongst the very best at it, a legacy of success initiated by Lucille Wheeler with her bronze medal performance in the downhill. Today, Alpine Canada Alpin is an organization of more than 225,000 athletes, coaches, volunteers and supporters who participate in a sport that stirs national pride when the maple leaf waves on the podiums in Canada and around the world.



Closing remarks

The ski racing family is the dedicated nucleus of more than four million skiers of all ages and skills in Canada: outdoor enthusiasts who share sport, the bonding of family and friends, a healthy lifestyle, and the joy of some of Canada's most awe-inspiring magical landscapes.

In 2002, Canadian ski racing launched the renewal of alpine skiing in this country with a single, sharply focused goal: to make Canada a leading nation in alpine skiing by the time we host the 2010 Olympic and Paralympic Winter Games in Vancouver/Whistler. In a technically advanced world where our competition raises the competitive bar across all levels every season, Canada has not - and will not - stand still. We intend to win.

It has been an effort of unprecedented magnitude, one involving thousands of Canadians unwavering in their commitment. It has been a true team effort, at all levels and abilities, and one of solid progress. We are engaged in a relentless effort to improve the quality of our racing programs, the quality of our coaching, world-calibre technical support and the skills of our athletes, from the youngest Nancy Greene Husky Snow Star to the elite racers of the Canadian Alpine Ski Teams. Through innovative development camps, we have begun developing the stream of athletes between the ages of 12-16, introducing them to the coaching expertise of the national teams.

Our ski clubs and provincial ski associations have produced champions from right across the country - from Mt. Washington on Vancouver Island to New Richmond, Quebec on the Gaspé coast near Fredericton. Across our vast geography, every athlete of the Canadian Alpine Ski Team shares a common bond - a shared passion for snow. This has produced a team of dedicated athletes who are relentlessly pursuing excellence, all drawn from a foundation of families and many influential coaches that nurtured their talent. The Canadian ski family whose passion for snow, for the winter, defines us all as Canadians.

We have the talent, resources, knowledge, ski clubs and resorts to aim to set our goals high. Every young ski racer dreams of representing our country in World Cup, World Championship and Olympic or Paralympic competition. Let's share this passion and aim high - to be best in the world... at every level.

Ken Read
CEO of Alpine Canada Alpin

Closing remarks





CANADIAN SKI FEDERATION
FÉDÉRATION DES SKIERS DU CANADA

Canada

We acknowledge the financial support of the
Government of Canada through Sport Canada,
a branch of the Department of Canadian Heritage.
Nous remercions l'appui financier du gouvernement du Canada
par l'entremise de Sport Canada, une direction ministérielle du
ministère du Patrimoine canadien.



ALPINE INTEGRATION MODEL - AIM 2 WIN / PARA-AIM 2 WIN