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INTERPRETING NATURE TO PHYSICALLY DISABLED CHILDREN; WITH A PILOT PROPOSAL FOR KINSMEN CAMP HORIZON

By

Heather J. Ferguson, B.Sc.

A Master's Degree Project

submitted to the Faculty of Environmental Design

in partial fulfillment of the requirements for the degree of

Master of Environmental Design

(Environmental Science)

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THE UNIVERSITY OF CALGARY
FACULTY OF ENVIRONMENTAL DESIGN

The undersigned certify that they have read, and recommend to the Faculty of Environmental Design for acceptance, a Master's Degree Project entitled

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Dr. R. Revel (EVDS) Richard Revel

Supervisor

Dr. C. Lumby (Phys. ed.) Colin E. Lumby.

Prof. J. Brown (EVDS)

Date 89/10/12

ABSTRACT

INTERPRETING THE NATURAL ENVIRONMENT
TO PHYSICALLY DISABLED CHILDREN

By Heather Jean Ferguson

Sept 12, 1989

Submitted to the Faculty of Environmental Design in partial fulfillment of the requirements for the degree of Master of Environmental Design (Environmental Science).

Supervisor: Dr. Richard Revel

This environmental education program presents a sensory rather than a scientific approach to environmental interpretation for physically disabled children between the ages of 6 and 12. That is, instead of learning rational scientific information about the environment, the children use their sensory faculties of hearing, sight, smell, taste, and touch to become more aware of the natural world. General capabilities, limitations, and abilities of handicapped children are outlined, and the implications limitations have for active involvement in outdoor interpretive activities are addressed. Design guidelines are outlined for trail and site locations, and a specific section is provided for the visually impaired. These guidelines address trail surface treatments, ramps, steps, interpretive sites, rest stops, and signage.

This program is presented as a pilot proposal for Kinsmen Camp Horizon in Bragg Creek, Alberta. Information is provided on the physical and natural components of the site. There are two maps; one outlines the wetland and dryland communities, and the other shows the barrier-free trail and interpretive site locations. Twenty five interpretive activities are provided for five interpretive sites. The sites are located in a mixed forest, an Aspen community, a Spruce forest, a Pine forest and a bog.

This environmental education program should be of interest to all individuals who work with the physically disabled in an outdoor setting. The information provided will be useful and helpful to counsellors, recreation therapists, interpreters, educators or any other individuals who are interested in helping physically disabled children participate in outdoor education activities.

10 Key Words: Outdoor Education, Environmental Interpretation, Acclimatization, Handicapped, Physically Disabled, Interpretive Activities.

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CHAPTER 1

INTERPRETING THE NATURAL ENVIRONMENT TO PHYSICALLY DISABLED CHILDREN: WITH A PILOT PROPOSAL FOR KINSMEN CAMP HORIZON

INTRODUCTION

The study of the environment and the world around us has for many years been regarded as a fundamental part of the education of all children (Peterson, 1978). Physically disabled children are no exception. Unfortunately however, physically disabled children who live in urban areas, often suffer from lack of first hand experience and contact with the outdoors. Their wheelchair, stiff limbs, or limited physical endurance often prevent them from participating in the many joys of childhood.

Physically disabled children are often restricted from obtaining first hand experience in the outdoors partly because of their handicap, and partly because of a world that was not designed to accommodate them. Programs and facilities have traditionally been designed for physically able people, and have for the most part ignored the fact that a segment of the population is handicapped in some way (James, 1982). Consequently, disabled individuals are less likely to handle soil or grass, go on an expedition to see wild flowers and animals, or indulge in creative outdoor activities.

For many disabled individuals, being involved in interpretive activities in the outdoors continues to be a luxury pursuit rather than an opportunity available to any interested citizen (Bialeschki, 1981). Yet, physically disabled individuals have a need for, and can benefit from outdoor environmental activities (Beechel, 1975). While the benefits are the same as those for non-handicapped persons, the ways of achieving them are necessarily different. The design of the built trail and the interpretive activities must reflect the abilities and limitations of those individuals who will use the program. The purpose of this project therefore is to determine the characteristics, abilities and limitations of physically disabled children, and to understand the implications their disabilities have

on the development of interpretive activities within an environmental education program.

Regardless of ability or disability, participation in outdoor activities should be a possibility for everyone. All individuals, have a right to a change of environment, to be introduced to new knowledge, to be stimulated to pursue new interests, and, to interact with others. The physically disabled, like everyone else, should benefit from the opportunity to explore the world in which they live.

Children who are physically disabled are often underdeveloped physically, socially, mentally or culturally due to a lifestyle that has been restricted partly by the impairment and partly by a poorly designed environment (Beechel, 1975). This proposed environmental education program is designed for physically disabled children between the ages of 6 and 12 in order to provide them with an opportunity to participate in accessible and enjoyable outdoor activities in a natural setting. Involvement in the program will present these children with an opportunity to participate in group activities and hence encourage personal, physical and social growth. Individuals travelling along the interpretive trail will be guided, and at various sites will engage in sensory activities to enhance their curiosity about the site.

The proposed project should help promote awareness of the environment through active involvement in interpretive activities in the outdoors. The involvement will be at a sensory rather than a rational level. That is, instead of learning rational scientific information about the environment, the participants will use their sensory faculties of hearing, sight, smell, taste, and touch to become more aware of the different characteristics of nature. The interpretive activities involving the body's sensory system will help individuals distinguish between different colors, patterns, smells, sounds, and textures found in nature. Active sensory involvement in interpretive activities should encourage physically disabled children to become more curious about their surroundings, and should further stimulate them to become more interested in the world around them. Ultimately, an environment which is better understood, will seem less inhibiting. The program will utilize the resources of the natural surroundings at Kinsmen Camp Horizon in Bragg Creek, Alberta.

The environmental education program is intended to promote a unifying experience with nature and help emphasize individual awareness and sensitivity towards nature. There should be a sense of blending with the environment rather than trying to conquer it, as is the case with so many camping and hiking activities. The concept of mind over body and mind over nature detaches the individual from the natural environment and creates an unhealthy polarity where the individual is not going 'with' nature but 'against' it (Van Matre, 1974). This environmental education program will place individuals in touch with their natural world.

The handicapped will learn to become better perceivers of the natural world, and will be encouraged to really notice things within it. They will group and order objects on a very general scale on the basis of such properties as color, shape, size, and texture. They will listen to, respond to, and interpret sounds found in the environment. They will be actively engaged in exploration of the environment and emphasis will be placed on discovery rather than analysis of hidden treasures.

The children will be encouraged to be curious about such things as trees - the bark, the color, the leaves, the variety, where and how fast they grow, how tall they are, what the leaf bud looks like and the shape of the cones the trees bear, whether the wood is hard or soft, and what it is used for. These activities will stimulate wonder about the trees and create a desire to look at, feel, and smell them.

Through these activities, the physically disabled children in the program will explore the environment with all parts of their bodies and all their sensory faculties. This program is not so much the learning of names and classifications as it is discovering about the environment. It is the ability to see diamonds in the grass on a frosty morning, to construct a story about Mrs. Fieldmouse's multi-colored leaf quilt, to follow the adventures of a jolly beetle, and to mix a potpourri of scented treasures from the forest floor.

Finally, it is hoped a sense of conservation will be gained through this program. This understanding will make the individuals realize that the ecosystem is comprised of a series of sensitively balanced components and man's activities can and do affect this balance. It is hoped they will learn that the environment is sensitive to many

things, and what they themselves do makes a difference to the environment in which they live.

The proposed environmental education program should be of interest to all individuals who work with the physically disabled in an outdoor setting. The information provided in this project will be useful and helpful to counsellors, recreation therapists, interpreters, educators or any other individuals who are interested in helping physically disabled children participate in outdoor education activities.

This MDP is organized in two major parts and 5 chapters. Chapter 1 provides an introduction to the reader. It outlines objectives and benefits of the interpretive program to physically disabled children, and informs the reader of the problems associated with applying group labels to individuals. This first chapter is followed by Part I of the MDP. Part I includes Chapters 2 and 3 and provides information on the Physically Disabled, and Interpretation respectively. Part II includes Chapter 4 on the Camp Horizon site characteristics and Chapter 5, Environmental Interpretation Activities To Use On The Trail.

Chapter 2 is fundamental to the design of the interpretive trail and activities. It is devoted to understanding the characteristics of physical disabilities of the chosen user group; that is physically disabled children between the ages of 6 and 12. Information is written on the characteristics of physical disabilities, including the hearing and visually impaired. Implications for involvement of these handicapped individuals in interpretive activities is discussed in relation to their particular handicapping condition.

Chapter 3 provides information on interpretation. The origins of interpretation are discussed, and an explanation is provided on the evolution of interpretation from environmental education and outdoor education. Information is provided on interpreting to physically disabled children, and a discussion is presented on how individuals perceive and understand environmental stimuli in order to provide insight into how the physically disabled learn in the outdoors. This chapter also provides a discussion on using the senses to increase environmental awareness, and touches on the fundamentals of raising awareness levels. Information is then provided on presenting the environmental interpretation activities. The chapter ends with design guidelines for building an interpretive

trail for physically disabled and visually impaired individuals. These guidelines are provided to help individuals responsible for trail design and construction make interpretive trails accessible and enjoyable to individuals with physical disabilities.

Chapter 4 documents the chosen site area, which is Kinsmen Camp Horizon, in Bragg Creek, Alberta and provides general information on the physical and natural components of the site. In the design of any interpretive program, it is important to have knowledge and understanding of the area to be interpreted. Most of the information goes beyond the level necessary for presenting the awareness activities to the physically disabled. However, it was necessary to have an understanding of the area and the surrounding environment in order to design the activities and choose potential interpretive sites. This chapter includes an interpretive map of the area showing the barrier-free trail and interpretive site locations.

The project concludes with Chapter 5. This chapter provides a number of interpretive activities based on sensory techniques, and serves as a pilot proposal for Camp Horizon. The first series of activities concentrates on 'exercising', or 'tuning in' the senses in order to make them more receptive to environmental stimuli. Participants will then use their enhanced senses to discover the different colors, patterns, and textures found in nature.

Objectives Of The Environmental Education Program

The objectives of the environmental education program are:

1) To determine the characteristics, abilities and limitations of the physically disabled group. This group includes children between the ages of 6 and 12 who are physically disabled, hearing disabled and/or visually impaired. The program will then outline the implications these handicapping characteristics have on the design of the interpretive trail and program activities. Implications such as mobility, intelligence and learning, communication, and psycho-social characteristics will be discussed in relation to the participants' ability to participate in the program.

2) To provide a brief history on interpretation. The origins of interpretation will be determined and insight will be presented on

how interpretation grew from outdoor education and environmental education. This program will determine the relationship between outdoor education, environmental education, and interpretation, and discuss how each works to provide information on the out-of-doors.

3) To seek information on how physically disabled children perceive and learn about their environment. This project will develop a strategy for improving the use of the senses to increase environmental awareness, and outline the most beneficial way to present interpretive activities to physically disabled children.

4) An objective is to develop design guidelines for the construction of an interpretive trail for the physically disabled. Guidelines will also be provided for the visually impaired.

5) To determine the general physical and natural components of the site which has been chosen. This will include a brief description of the flora and fauna of Kinsmen Camp Horizon so that potential interpretive sites can be chosen.

6) To design a series of interpretive activities. These activities will be non-scientific in nature, and will emphasize the use of the senses of hearing, sight, smell, taste and touch to distinguish between characteristics such as colors, patterns, and textures found in nature.

The Benefits Of An Environmental Education Program For Physically Disabled Children

The physically disabled are sometimes included in supervised camping programs, but little has been done to explore the endless possibilities of their involvement in a variety of environmental awareness activities (Wehman, 1979). An expansion of outdoor opportunities for these individuals would be quite beneficial not only in providing enjoyment and productive use of leisure time, but it would allow them to become more familiar and comfortable with the world around them.

In the program, children should learn to feel good about themselves even though they may be physically handicapped. They should learn to establish and promote a feeling of worth and importance even

though they may be limited by their disability and unable to produce intelligible speech. Through social interaction, and engaging in a variety of activities, it is hoped the individual will benefit from greater personal satisfaction and a higher level of self-esteem.

The program should arouse a sense of curiosity, stimulate spontaneous expression, provide enjoyment, and accelerate the learning process. By participating in the program, these children should have fun in the outdoors. They should experience satisfying contacts with nature, and as a result, they should become more comfortable in an outdoor setting.

This program will increase the interest, knowledge and understanding of the natural environment which is outside the buildings in which physically disabled children live. As they come to understand the outdoors environment, it is hoped their thoughts and actions will be further motivated so they will have the desire to learn as much as possible about the world around them. This growing awareness should help them develop into happy, emotionally stable individuals.

Physically disabled children will benefit from the opportunity to exercise mind and body in healthful activity, and as a result should foster better mental and physical health, courage, and confidence.

Active involvement in the interpretive activities will provide opportunities for the development of initiative and leadership, and participants should develop a sense of responsibility. Active involvement will physically help individuals who suffer from ambulatory disabilities such as Monoplegia (total or partial paralysis of one extremity) or Scoliosis (lateral curvature of the vertebral column). These individuals must exercise the affected limb in order to maintain normal range of motion in the joints and to avoid muscular atrophy, and what better place than along a nature trail. (Peterson, 1978).

Participants will learn to become more perceptive of the environment and the many living things within it. The activities will stimulate the sensory faculties of sight, sound, touch, hearing, and taste. By becoming aware of the environment, they can begin to learn about some of the beneficial and interesting things within it. Participants will benefit from this growing awareness, since the

more they know about their environment, the more comfortable and happy they will be within it.

A Note on Labeling

Prior to discussing the characteristics of physical disabilities, a note on labeling is included. Various labels are used to classify individuals with disabilities, but like any system of classification, there are dangers associated with applying group labels to individuals. Labels should only be used as a descriptive tool, and should not be used in a pejorative way to judge an individual's capabilities or limitations. The use of labels can actually shape a child's limitations and failures. Classification, or inappropriate classification can blight the life of physically disabled children, reducing opportunity, diminishing their confidence and self-esteem, and may alienate them from others (Haring, 1982).

There are advantages and disadvantages of classifying and labeling children with special needs. But before describing these characteristics it is important to note that no one category can adequately describe the social, educational, psychological, or physical advantages or disadvantages of a handicapped person (Haring, 1982). Labels serve to help us understand an individual's general condition, but one must never lose sight of the fact that a real person is being considered.

Identifying and classifying characteristics of the different disabilities is necessary for health care professionals if they are to design appropriate services and programs for the handicapped. Labels also serve to simplify information for administrators, placement counselors, educators, and legislators, however they frequently do more harm than good to the individuals to whom they are applied. Too often, a child's individual differences and strengths are obscured by an oversimplified label. The negative picture that results can adversely affect the child as well as the quality of the services offered by professionals (Palmer, 1983).

Too often, a label describes only an individual's deficiencies and can actually shape a child's limitations and failures. Called the Pygmalion effect, this phenomenon was observed in a study of teachers and their students (Rosenthal & Jacobson, 1968; Rolison &

Medway, 1985). The teachers were told that certain students in their classes were slow learners, unable to keep up, and that others were "late bloomers," likely to catch up with the average students in their classes. The result was that the students' actual performance exactly reflected their classification, although there had originally been no actual differences in the learning capabilities of the two groups. This experiment has been challenged (Elashoff & Snow, 1971), but other studies support the notion that, to some degree, students will perform much as their teachers expect them to perform (Beez, 1968; Fine, 1970).

The use of particular labels is necessary for understanding and categorizing a plethora of disabling conditions However, if we are to be helpful toward their potential growth, it must be remembered that, not only is every person an individual with individual characteristics, but that every person is a human creature with intrinsic worth. In this context, one is labeled physically disabled, learning disabled or retarded, in the same way as one is labeled a university student, a conservative or a camper - without prejudice.

CHAPTER 2

THE PHYSICALLY DISABLED

Individuals with physical disabilities are generally referred to as physically handicapped, and physically disabled. Physical handicaps include a variety of conditions associated with musculoskeletal or neuromuscular dysfunction (Radcliffe, 1979).

Physical disability generally refers to any person whose functioning is reduced as a result of a physical deficit (Haring, 1982). A physical disability is usually due to either congenital defects, disease, infection, or accident, and has resulted in the loss of some part of a person's body or some of their sensory faculties (Beechel, 1975). It can be caused by many afflictions including polio, cerebral palsy, multiple sclerosis, muscular dystrophy, amputation, arthritis, and aging (Beechel, 1975).

Disabilities can arise from problems occuring in the prenatal, perinatal, or postnatal stage of life. Disabilities which occur prenatally, can be caused by genetic factors such as muscular dystrophy or hemophilia. If an expectant mother contracts an infectious disease, such as German measles, the development of the fetus may be impaired. They may also be caused by other factors which are related to the mother's overall health and condition. Inadequate prenatal medical care and diet, smoking, excessive consumption of alcohol or abuse of drugs, or accidental injury during pregnancy are all potentially harmful to a developing fetus (Haring, 1982).

Physical disabilities which occur perinatally, result from problems during the birthing process such as difficult birth, lack of oxygen, changing the unborn baby's delivery position, or trauma due to external causes. Disabilities which occur postnatally, (birth to 2 years), can be the result of accidents, in particular traffic accident-related spinal cord and head injuries, infection and health impairments, and bacterial and viral infections that attack the central nervous system (Haring, 1982).

Characteristics of Physical Disabilities

People with ambulatory limitations have difficulty moving and must use a wheelchair, crutches, a walker, leg braces, or a cane to assist them in locomotion. Physical disabilities can be divided into two broad categories: orthopedic and general health impairments.

Orthopedic impairments, are described as those disabilities which relate primarily to disorders of the skeleton, joints, and muscles. They may include clubfoot, the absence of some member, or other congenital anomalies (Haring, 1982). Diseases such as poliomyelitis, or cerebral palsy can also impair the normal functioning of the skeletal system, as can amputations, and/or contractures (permanent shortening of some member) (Baker et al, 1979).

The second category, health impairments, is comprised of physical conditions that affect a child's educational performance (Haring, 1982). Health impairments reduce strength, vitality or alertness, and are due to chronic or acute health problems such as a heart condition, tuberculosis, rheumatic fever, nephritis (kidney disease), asthma, sickle cell anemia, hemophilia, epilepsy, lead poisoning, leukemia, cystic fibrosis, or diabetes.

Musculoskeletal diseases such as arthritis and related rheumatic diseases and muscular dystrophy may require individuals to use leg braces and crutches. The principal purpose of braces is to support the body weight, to control involuntary movements, and to prevent and correct deformities. Crutches, on the other hand, are to assist those who use braces or those who are in leg casts to move (Baker et al, 1979).

It should be noted however, that although only the more severely disabled are restricted to wheelchairs, there are some disabled people who could walk with braces and crutches but do not do so because of insecurity or lack of the necessary physical energy (Baker et al, 1979). A major concern for wheelchair-bound individuals is to have unimpeded access to facilities and amenities (Peterson, 1978). This includes barrier-free interpretive trails. In chapter 3, there are guidelines on designing a barrier-free interpretive trail for the physically disabled.

Physical disabilities affect mobility in different ways. Mobility impairments which are caused by physical handicaps can be categorized as nonambulatory, when the individual is not able to move; semi-ambulatory, when the individual can partially move; and incoordination, when the individual has faulty coordination or palsy (Baker et al, 1979).

Nonambulatory individuals are usually severely physically disabled (Peterson, 1978), and unable to move without the use of a wheelchair (Baker et al, 1979). A variety of disorders may cause an individual to be confined to a wheelchair, such as quadriplegia, paraplegia, muscular dystrophy, spina bifida, or cerebral palsy (Peterson, 1978). Semiambulatory individuals have orthopedic disabilities in which they have partial movement only. Individuals walk with difficulty or insecurity, or require the use of prostheses, braces, or crutches (Baker et al, 1979). Incoordination disabilities are neurological disorders that cause faulty coordination or palsy. The frequent causes of disability that produce incoordination are associated with damage to the brain, brain stem, spinal column, and peripheral nervous system (Baker et al, 1979). In children, the most serious of these diseases is cerebral palsy (Haring, 1982).

In each of these categories, the severity of the limitation can range from mild to severe. If the physical disability, because of muscular, skeletal or joint impairments has little effect on the mobility for the ordinary functions of life, the person is categorized as mildly disabled. If the individual has limited mobility, and requires the use of crutches, braces, prosthetics, or other special equipment for mobility assistance in the upper and/or lower extremities, that individual is said to be moderately physically disabled. And if the individual needs the use of a wheelchair and/or other specially designed equipment for mobility assistance in upper and/or lower extremities, that person is severely physically disabled (Peterson, 1978).

Regardless of the severity of the limitation, mobility is not the only ability affected by physical handicap. Additional problems may arise which must be taken into consideration since they will affect an individual's ability to participate in the program. For example, physically disabled individuals often exhibit problems in learning, communication and self awareness; blind individuals usually have

perceptual problems; and hearing impaired individuals have limited communication in both sending and receiving messages.

Any combined limitations must be addressed in order to develop an appropriate trail and interpretive activities for this particular user group. In the following section, information is presented on the implications these handicapping limitations have on an individual's ability to participate in interpretive activities in the outdoors. Understanding the limitations and implications is necessary for the successful design of this environmental education program.

Implications For Involvement In Interpretive Activities

This section will discuss the limitations physical disabilities place on individuals, and the implications these limitations have on the design of the interpretive trail, and interpretive activities. This section will also provide information on how a guide or interpreter might adapt an interpretive activity in order to minimize problems. For the purpose of this study, I have concentrated on the limitations of physically disabled children between the ages of 6 and 12.

Children who are physically disabled are often underdeveloped physically, socially, mentally or culturally due to a lifestyle that has been restricted partly by the impairment and partly by a world that has not been designed for them (Beechel, 1975). Consequently, there are special considerations which should be taken into account in the design and implementation of the interpretive activities.

As a result of limitations imposed by disability, physical exploration of the environment may be limited, conceptual development may be retarded, intellectual and/or perceptual abilities may not be at age-expected levels, and language may be inappropriate, inarticulate, or inadequately processed (Best, 1978).

Interpreters who present the activities in the program will need to be sensitive to the conceptual, intellectual and perceptual capabilities of the participants, to ensure they function at appropriate personal levels. Comprehensive explanations of interpretive activities may be required. During the activities, physically disabled children may need support and reassurance to help them overcome any feelings of fear and apprehension they may have about the outdoors environment. Activities should not be

rushed, and participants should be given ample time for exploration and discussion, particularly if communication disorders exist.

Physically disabled children require materials which they can manipulate, which will allow practice in observation, help develop confidence in their abilities, provide practice in working cooperatively with others, and give them practice in self-directed activities that require the use of imagination and thought (Best, 1978). The most important task physically disabled children must accomplish is that they must come to see themselves as persons able to think and create for themselves (Nemarich and Velleman, 1969).

Physical Limitations

Physically disabled children generally have slower, more restrictive motor performance, and poor coordinated balance than nonhandicapped children. They may have decreased functional strength in limbs, or impairments in vision, and hearing as a result of their handicap (Haring, 1982). Patience and time will be needed to encourage the individuals to engage in the interpretive activities.

The interpretive guide who will accompany each and every group, must take care to tailor physical activities to each individual's ability level; encouraging a nonambulatory individual to perform an almost impossible task will only lead to feelings of frustration and failure. Along the trail, interpretive positions should be found which enable the participants to use their hands to the best advantage, that will be easiest for eye-hand coordination and will present the least difficulties for balance (Finnie, 1975).

Interpretive guides will also need to be sensitive to additional limitations placed on individuals with sensory handicaps; individuals with visual and hearing impairments should be encouraged to use their other senses when engaging in the interpretive activities.

It is important to note that if an individual has a sensory impairment such as hearing or vision loss, it does not cause the other senses to be any better or worse because of the impairment. Acuity may be increased however in the other senses, but only because the individual has developed them to a higher degree in

order to compensate for the loss in the other sensory faculty (Seven, 1980; Haring, 1982).

Individuals may have a heightened or depressed response to touch or temperature (Baker et al, 1979), and interpretive guides will need to be sensitive to any individual who has a diminished sense of touch or who is tactile defensive. An individual who exhibits tactile defensiveness, will become tense or shy away from any form of tactile stimulation.

When involving handicapped individuals in interpretive activities which involve tactile stimulation, touch should first be attempted on the back of the hands and the fore-arms since they are reported to be the least defensive areas of the body (Wehman, 1979). Many individuals classified as paraplegics, triplegics, and quadriplegics have a loss of sensation in the involved extremities (Baker et al, 1979). If an individual has a depressed sense of touch, tactile experiences should incorporate the most responsive areas to stimulation such as the stomach, chest, face, and feet (Geldard, 1972).

Throughout the interpretive activity, the interpretive guide should always be aware of the individual's response for information on the effect of the stimulation. An avoidance response does not mean the tactile stimulation should be abandoned altogether; it may simply need to be modified or given at a different frequency, or for a shorter or longer period (Wehman, 1979).

Children with physical disabilities may have low physical endurance because of inefficient movement patterns, muscle fatique, or insufficient muscle strength. Overactivity may result in generalized weakness, muscle fatique, and shortness of breath; pain and muscle spasms and cramps may be associated with the disability (Baker et al, 1979). Because of their handicaps, some individuals may tire more easily on the trail than others, or develop problems during the course of the activities. Although natural fatique is healthy, sensitivity is required on the part of the interpretive guide to relax an individual or group if excessive tiredness or weakness jeopardizes health and safety, or if an individual is experiencing pain.

Physically disabled children who are weak, uncoordinated, or have missing or dysfunctional limbs will not be able to attempt some of

the interpretive activities without some kind of change in procedure, special supportive aids, adapted materials, adapted equipment, or other aids (Best, 1978). When engaging in an interpretive activity, it will be necessary to devise alternative ways and supply whatever supports are needed for them to perform these tasks. For example, if the child has difficulty holding a magnifying glass, it can be sewn onto a mitt that fits onto the hand. The magnifying glass would never be dropped because it is attached to the mitt.

Sitting posture may be difficult for some individuals with physical disabilities (Haring, 1982). Some may have difficulty in the use of prosthetic devices, braces, walkers, or crutches. A child using a long leg brace will have difficulty in performing motor skills from a standing position (Baker et al, 1978). Assistance may be required and the interpretive guide should ask that person what help is needed. If an individual's balance fails, it is best to catch hold of the hip area in order to help that person regain his/her balance (Pomeroy, 1970).

Some individuals who are confined to wheelchairs may experience some seating discomfort from pressure sores as a result of poor circulation (Baker et al, 1979). Individuals who are unable to shift positions, will need assistance along the trail to make them more comfortable (Pomeroy, 1970).

Most individuals who use wheelchairs are capable of going anywhere on their own provided access to buildings and facilities is properly provided (Beechel, 1975). Adults in wheelchairs often travel unaccompanied by a non-handicapped person, however, children, because of their age, seldom travel alone. The main obstacle confronting these children is in the physical design of the built environment; if they are to travel unassisted, they will need an environment which is accessible to them (Beechel, 1975). If physically disabled children are to become involved in interpretive activities, they must first have a trail which is accessible to them and their apparatus. This environmental education program provides design guidelines for an interpretive trail at the end of chapter 3.

Intelligence and Learning Limitations

Most people with ambulatory limitations have the same mental capabilities as the rest of the population; if a mental disorder

exists, it is a separate problem (Beechel, 1975). Although intellectual ability must not be underestimated because of the presence of a physical handicap, guides should be aware of potential learning problems (Haring, 1982).

Physical disabilities are frequently accompanied by one or more other handicaps such as communication disorders, speech problems, vision and hearing impairment, and behavioral disorders. The existence of these disorders impedes functioning and learning in physically disabled children (Haring, 1982).

The severity of learning problems can in no way be related to the degree of physical disability. Some individuals with only a mild physical disability may have severe retardation while others with severe physical handicaps may have the same capacity for learning as their nonhandicapped peers (Haring, 1982).

Depending on the nature and degree of disability, individuals may have problems in relation to attention, memory, and communication. In addition, persons may feel frustration at being unable to understand an activity if it does not relate to their everyday functioning (Best, 1978). Interpretive guides must be patient, since not all activities will interest everyone. They must also be flexible to different methods of instruction. Within the limits of reason, safety, and appropriateness, if something works, the guide should use it; and if an experience has meaning for the participants, the guide should see that it is incorporated into the interpretive activity.

Communication Limitations

Communication skills vary greatly among individuals with physical disabilities and may range from a minimal level such as indicating yes or no through body movements or signals to the use of communication boards, electronic communication devices, typing, handwriting, and highly intelligible speech (Haring, 1982). A child who has a severe speech impairment will need to be provided with a means to communicate with the guide. For individuals with severe speech impairments, a response system of eye blinks by the individual, pointing with the hand or with a head or hand wand, or other forms of gesturing will be necessary to further the abilities of the person to communicate (Best, 1978).

Reading may be a problem for some disabled children (Best, 1978). Problems may originate from not being able to symbolize language, or auditory or visual perception may prevent sound or print discrimination. Deficiencies in memory (for sequence), head and eye control, and attention to task may lead to problems of left-to-right progression, object location, and difficulty in understanding instruction, content, and meaning. Inability to comprehend what is read may be exacerbated by an individual's lack of experience in a particular subject. Distractions from the outdoors and from the other children will add to a child's reading problems.

Visual, auditory, and kinesthetic approaches to reading will improve comprehension for these children, and interpretive guides are encouraged to use them when assisting a child with reading problems. These approaches will be particularly useful during the outdoor interpretive experience; children will be able to see, hear, and/or feel the object of the material which is being read. According to some authorities, children learn 85% by visual stimuli, 11% by auditory stimuli, 2% by kinesthetic means, 3% by olfactory stimuli, and 1% by tasting (Love, 1978).

For children with perceptual problems, vocabulary should be taught with real objects, action words should be demonstrated, and they should be placed on the ground to know what looking up means. They may need to be helped to feel shapes and textures. In the interpretive activities, physically disabled children should be helped to use parts of their bodies that they cannot use by themselves (Love, 1978).

Many individuals with physical disabilities are unable to execute penmanship and writing skills at legible levels (Best, 1978). An inability to control both fine and gross motor movements, an inability to grasp and release writing implements, and problems in the control of the writing surface may all combine to produce less than a standard product. This limitation will affect any interpretive activity which involves drawing or painting. If writing is part of an activity, a typewriter may be used for the person who is capable of manipulating the keyboard, carriage return, and so on. It is an alternative to writing that can be both practical and personally rewarding. There are other techniques which may also be used to develop writing implements for individuals who have difficulty manipulating standard writing materials. These include the use of

hand splints or adapted pencils, pens, crayons, or felt markers (Compton and Bigge, 1977).

Painting pictures may be impossible for some physically disabled individuals who have poor coordination, no use of their hands or arms, or are paralyzed from the neck down (Haring, 1982). For some, a paintbrush may be an unsatisfactory tool for painting, much as a pencil may be an unacceptable writing implement (Best, 1978). Big brushes (3 or 4 inches wide) with big handles or paint rollers may spread paint effectively and offer a sense of accomplishment for the person with severe physical and gross motor impairment. Finger painting, as well as toe, elbow, arm, leg, and chin painting, can also be fun if just a bit messy (Alkema, 1967; Harper, 1966). Head pointers which are brushes attached to headbands, can also be used to allow individuals with limited hand and arm movements to express themselves through painting.

Self Awareness Limitations

Physical disabilities may handicap an individual, but the person's self-concept can be as crippling as the actual physical handicap (Love, 1978). How physically disabled children feel about themselves and their disabilities, will influence their behavior in the group and their level of involvement in the interpretive activities.

Nearly all individuals who are physically disabled experience feelings of anxiety, depression, aggression, and hostility. They have a fear of failure and are sometimes misunderstood. They may also lack motivation and confidence, feel inadequate, helpless, dependent, or exhibit exaggerated independency. For some, disability reduces personal satisfaction and self-esteem, and many have a negative self-image which tends to distort and threaten normal mental balance and lifestyle. (Baker et al, 1979).

The problems associated with disabilities which were present at birth and those that are acquired later in life give rise to different psychological and emotional problems (Haring, 1982). Individuals with congenital disabilities may have a sense of difference and of not being like other people, while those with acquired disabilities typically experience a sense of loss (Haring, 1982).

Physical conditions which cause an individual to be crippled frequently give rise to frustration and resentment (Love, 1978). Amputees or people who have recently experienced a spinal cord injury must go through a period of social and emotional adjustment (Haring, 1982). The sudden and drastic change from a life filled with activity to one of relative immobility is psychologically traumatic and can interfere substantially with learning and behavior (Haring, 1982). The psychological problems that are manifested in youngsters who are terminally ill are even more difficult to cope with.

Many disabled individuals are more strongly affected by the cosmetic appearance and reactions by others towards them than by their own physical inabilities. Consequently, many amputees are self-conscious and tend to withdraw from normal contact (Baker et al, 1979). Physically disabled children adjust to an acquired disability more quickly and successfully if they possessed a healthy self-concept prior to their disability (Love, 1978).

In the environmental education program, interpretive activities are modelled to suit the needs of groups of handicapped children. Individual differences and problems such as the different reactions which can arise due to the origin of a disability, or any other individual problems, will need to be addressed individually. Information in this program is provided to help interpreters understand where problems may arise, prepare them to respond to problems along the trail, and know when it will be necessary to adjust activities to suit individual needs.

Activities in the program are not overly challenging or heavily reliant on success; they are not achievement oriented, rather, they are based on discovery rather than knowledge. Competititon is at a minimum, and individual participants should not feel a need to be better than anyone else. In the interpretive activities, the physically disabled will experience the environment with their hearts rather than their minds, and group interaction with other handicapped individuals should encourage positive social behaviors in all groups.

A supportive environment within the interpretive group can relieve some feelings of anxiety, and a better understanding of related emotional and psychological problems will help guides manage behavior problems more effectively. During the activities,

interpretive guides can help draw these individuals out of their depressions, encourage participation, and help create independence. Through independence, many psychological problems (self-esteem and self-confidence) can be reduced (Haring, 1982).

The Hearing Disabled

We explore and understand our environment through our five senses: touch, smell, taste, vision, and hearing. Our perception of the world is based entirely on the information we derive from these senses. Of the five senses, hearing and vision alone allow us to perceive events occurring at a distance from ourselves. Hearing serves as a warning sense; we can hear in the dark, around corners, through closed doors, and above and below us. It is through hearing that we often receive the first indications of trouble in the environment.

Hearing has an additional vital function. It is the sense normally developing children use to learn language and speech, and to begin learning cause and effect (the baby cries, parent comes). Hearing also plays an important part in social interaction since it is primarily through verbal communication that we become socialized (Haring, 1982).

Types of Hearing Impairment

A hearing loss can occur from damage to any of the parts of the hearing apparatus, so that the sound waves or electrical impulses are not transmitted. There are two distinct categories of hearing impairment which are based on the time of hearing loss. The most frequent is congenital impairment and implies that the person was born deaf. Deafness can result if the mother contracts German measles during the first three months of pregnancy. Impairments may occur at or around the time of birth as a result of complications in the birth process such as prolonged labor, premature or abrupt birth (usually due to an accident), difficulties that necessitate the use of obstetric instruments, or failure to breath readily during or immediately after birth (Haring, 1982).

Deafness may be inherited as a dominant trait (14%), a recessive trait (84%), or a sex linked disorder (2%) (Haring, 1982). At the

present time, more than 50 genetic syndromes have been identified in which hearing loss may occur, and genetic causes are thought to account for around 50% of all cases of deafness in children (Nance, 1976). In schools for the deaf, it is not uncommon to find second and third generations of families in attendance (Haring, 1982).

The second category of hearing impairment is acquired loss. Hearing impairment may be caused after birth by certain childhood diseases such as mumps, measles, meningitis, encephalitis, and influenza (Peterson, 1978). Otitis media, the inflammation of the middle ear may produce a permanent loss if it is a chronic condition. Trauma, accidents, and high fevers are cited as factors in a small percentage of cases (Haring, 1982). Deafness can be caused by an infection, scarlet fever, whooping cough, a blow to the ear, skull fracture, tumors or aging (Peterson, 1978).

Characteristics of Hearing Impairments

Individuals with hearing disabilities may have difficulty hearing in one or both ears or may not hear at all. Impaired hearing may come on suddenly or gradually and may manifest itself in many ways. In addition, individual differences are probably greatest among those with hearing disabilities than with any other type of disability (Baker et al, 1979).

Hearing losses can range from mild to profound. The severity of a loss is described in the numbers of decibels required before sound can be detected. The larger the number, the more severe the loss. The impact on speech and language depends also on the frequencies involved. The greater the loss in the "speech frequencies," the more severe the impairment (Haring, 1982). A person with normal hearing can detect sound with an intensity of 0-25 decibels in the critical speech frequencies of 500, 1000, and 2000 cps (Beechel, 1975).

A person is considered hard of hearing if the intensity is between 25-55 decibels before it can be heard (Beechel, 1975). Sounds appear distorted for hard of hearing individuals, and they have difficulty interpreting sounds (Peterson, 1978). Hard of hearing persons are usually functional with a hearing aid (Peterson, 1978). Individuals are considered deaf if the intensity must be between 55-75 decibels, and they rely primarily on their eyes to receive communication. A person is considered profoundly deaf if the

intensity is greater than 75 decibels before detection (Beechel, 1975).

Hearing losses of varying degrees may be present in one ear (unilateral) or both ears (bilateral). Persons with unilateral hearing losses usually function normally and have problems only with locating the direction of sounds. Those with mild to moderate bilateral hearing losses (20 to 60 decibels) can usually benefit from amplification. The severely to profoundly hearing impaired - those who have bilateral losses of more than 60 decibels often derive some benefit from amplification but usually rely more on signing for communication (Haring, 1982).

There are two hard of hearing types: Conductive hearing loss occurs when the conduction of sound through the outer ear and middle ear is impaired. In conductive hearing loss, there is a decrease in sound intensity reaching the inner ear where the auditory nerve begins. The sequence of sound vibrations may be blocked by wax, malformations, or a perforated ear drum. Sometimes the movement of the bones in the middle ear is obstructed. Infrequently a child is born with missing or undeveloped external ear and auditory canals, and this also results in conductive hearing loss (Haring, 1982).

Another conductive disorder of the middle ear is otosclerosis, a body growth in the area of the oval window considered to be hereditary. Hearing loss due to otosclerosis is not usually noticed until adolescence or the early twenties, but it can reach a level of 50 or 60 decibels and necessitate the use of a hearing aid and, in some instances, surgery (Haring, 1982).

The second type is called sensorineural hearing loss. Impairment within the inner ear interferes with the conversion of sound waves to the neural impulses transmitted to the brain. Such losses not only reduce the intensity of the signal, but also distort the sound perceived (Peterson, 1978). Most children enrolled in special education programs for the hearing impaired have this type of hearing loss. Unlike conductive losses, sensorineural losses presently cannot be reversed surgically or medically (Haring, 1982).

Implications for Involvement in Interpretive Activities

Communication Limitations

Children with hearing disabilities are affected in their development in various ways, chiefly in speech and language (Baker et al, 1979). Hearing impairment is a handicap of communication. Hearing impaired children have limited communication in both sending and receiving messages and may sometimes appear frustrated due to attempts and failures at communication (Peterson, 1978). This is especially true if children are in a play or activity involvement situation that requires communication and direction (Baker et al, 1979).

In the environmental education program, instructional information will have to be written and activities will need to be patiently demonstrated for them to gain full benefit from the interpretive activities. Understanding will also be required on the parts of the interpretive guides if an individual is having a particularly frustrating day.

Hearing loss does not appear to affect intelligence as measured by intelligence tests. The results from these tests and others strongly support the fact that the hearing impaired have the potential for abstract thought and learning as long as no brain damage is involved (Best, 1978; Haring, 1982). Academically however, hearing impaired students are almost always behind their peers and they are at a lower level of conceptual development than unimpaired individuals (Haring, 1982). This should not affect their involvement in the interpretive activities since the participants work to their own ability in activities which are nonacademic in nature.

The age at which a hearing loss occurs is critical to communication (Haring, 1982). Children with a congenital hearing loss have lost their hearing prior to the development of oral language. Consequently, they have not had the opportunity to practice listening skills and develop speech and language skills. These individuals may rely on lip movements in speech, the printed word, sign language, or a combination of any or all of these to supplement auditory input and enable them to understand and learn language (Haring, 1982).

The type of communication used by individuals depends partly on their age at the time of onset of deafness (Beechel, 1975). As a consequence of the difficulties involved in learning to speak when deaf, few individuals who are deaf before language was developed, (95% of the school population) develop speech that can be understood in most social situations (Vernon, 1970). Most hearing impaired individuals will not use speech as a means of communicating if they did not have speech prior to becoming deaf.

A hearing loss that has occurred after a child has learned the spoken language, is less likely to cause severe educational problems than if the loss occurred before language was developed. Children who experience this type of loss have had an opportunity to use the auditory system and practice their listening, speech, and language skills (Haring, 1982). These individuals should possess a much larger and more understandable vocabulary of objects found in nature. To children who have been deaf since birth, a word is just a jumble of letters of which they have no idea of the sound it should make. It is almost impossible for a hearing person to understand the difficulty involved in recognizing words when all they are is a mixture of silent symbols.

Some hearing impaired persons are able to lip read but many English sounds look similar on the lips and this causes difficulty. In fact, the best lip readers in a one to one situation only understand 26% of a conversation. Many bright, otherwise capable deaf children grasp less than 5% (Vernon, 1970). Interpreters and guides must be sure that the individuals understand the interpretive activities they are encouraged to engage in.

Sign language and fingerspelling are used by the majority of deaf people (Beechel, 1975). Sign language refers to the use of the entire hand and arm (often both hands and arms) to relate ideas. Fingerspelling refers to the use of fingers to form letters with which words are formed. Interpreters are encouraged to learn and be familiar with these methods of communication so that there is an easy flow of ideas and questions. When possible, persons who are trained in the field of special needs groups should be hired as interpretive guides. This would prevent much frustration on the part of the disabled, and mishandling of potential problems along the trail.

Implications Regarding Psycho-social Characteristics

Hearing impaired individuals may exhibit unique psychosocial characteristics, but the extent of the problem is dependent upon intelligence, degree of hearing loss, age at onset of loss, and the attitude of society (Baker et al, 1979). Some hearing impaired individuals feel inadequate, and consequently may display anger and aggressiveness. These characteristics should not be detrimental to the environmental education program because the interpretive activities in it should be designed to be challenging yet fun. The activities should be simple enough that they do not encourage competition between individuals. The participants then, are free from anxiety and frustration.

Hard of hearing children are less attentive, more apt to have behavior problems, and less stable emotionally (Baker et al, 1979). Children who are inattentive are usually bored with their surroundings and their everyday activities. In an outdoors experience however, this level of behavior may change completely. Children have active imaginations and often become completely captivated by what seems to be a most insignificant thing. In an interpretive activity, hearing impaired children should exhibit much of the same curiosity and enthusiasm as normal children.

Abnormal social development in hearing impaired children is often manifested in poor control of impulses and a related lack of responsibility and independence. Frequently, children with hearing loss seem to disregard the feelings and misunderstand the actions of others (Haring, 1982). They typically exhibit a higher than usual degree of egocentricity and a low frustration level, which causes them to be demanding and "act up" if their demands are not met (Harris, 1978; Meadow, 1980). These behavioral characteristics may hinder involvement in the interpretive activities since the interpretive guide may occasionally lose some control of the group. As the children learn to be sensitive to the environment and the things within it, they may come to understand the need to be tolerant and understanding of the wishes and feelings of others.

Individuals who are hearing impaired may have difficulty with balance, the severity depending on what part of the ear is damaged. Individuals who have sustained damage to the semicircular canal may experience dizziness (Baker et al, 1979). The loss of

background sounds contributes to inaccuracy in the recognition of space and motion; consequently, movements are often vague, distorted, and purposeless (Baker et al, 1979). Individuals who have balance problems, will need to take precautions, or be supervised along the trail network in order to prevent accidental falls.

Generally, involvement in interpretive activities in the outdoors is a perfect opportunity for the hearing impaired to satisfy their need to express their own ideas and feelings about the natural world through gestures, signing, some type of art activity, or writing. Hearing impaired individuals need and are interested in the opportunity to develop in gross motor skills, physical fitness, sensory motor integration, perceptual motor skills, social interaction skills, conceptual skills, emotional responsiveness and language (Baker et al, 1979). Working with a group in a natural setting in the environmental education program should enable the hearing disabled to satisfy all these needs.

They also want to become familiar with visual aids and symbols. Learning about the outdoor environment will expand their vocabulary and improve language skills. When a new skill or game is to be performed, clear explanations and careful demonstration as well as the associated vocabulary, rules and playing strategy must be conveyed with greater care and exactness than for the non-hearing disabled (Baker et al, 1979).

Mention should be made of deaf-blind persons. While they involve only a small percentage in relation to the deaf and the blind respectively, designers must be sensitive to their needs. Outdoor environmental experiences provide a much-needed humanizing experience since the deaf-blind are so often dehumanized by family, friends, and society (Baker et al, 1979).

The Visually Impaired

With our eyes, we are able to perceive the world around us. We see an infinite variety of combinations and interactions of color and hue, light and shadow, and line and space. These visual perceptions provide us with information about size, shape, distance, and direction with an accuracy and comprehensiveness greater than any other single sense (Haring, 1982). Visually impaired individuals are

at an immediate disadvantage when trying to discriminate object forms, and will need to rely to a greater extent, on other senses to become more aware of their surroundings. In the environmental education program, interpretive activities will need to be suited to visually impaired individuals so that they will be able to benefit from the outdoor experience.

Individuals who are visually disabled have any number of difficulties seeing well under average circumstances (Haring, 1982). A visual disability may mean an individual's overall sight is affected, that only the peripheral or part of the visual field is obscured, or that there is no central vision, although side or peripheral vision still exists (Baker et al, 1979). Persons with a visual disability may have difficulty seeing learning materials without special lighting, or be unable to see distant objects unless the objects are moving, or they may need to wear prescriptive lenses or use optical aids and special materials to function visually (Barraga, 1976).

The terminology used to describe people with visual disabilities has changed over time. Formerly all individuals with defective vision were labeled blind, but new terms have now become popular, including visually impaired, visually handicapped, partially sighted and low vision.

Characteristics of Visual Impairments

There are three categories to distinguish visual disability; visually limited, low vision, and blind (Haring, 1982). A visually limited individual is one whose visual acuity is not at normal vision (20/20), but may be corrected to normal by wearing glasses or contact lenses (Peterson, 1978).

Individuals who are visually limited or have low vision may be legally blind if their limitation falls within two categories: if they have limited central visual acquity, or the inability to discriminate detail at the center of vision at 20/200 or less after correction (Haring, 1982); or if their peripheral vision is reduced to a total angle of 20 degrees or less in the better eye (Peterson, 1978).

A low vision person has limitations in distance vision but is able to see objects and materials when they are within a few inches or at a maximum of a few feet away (Barraga, 1976). Individuals with low

vision must frequently rely upon their other senses for obtaining information since their vision is useful for seeing only what is close at hand (Haring, 1982).

A blind person is an individual who is totally without vision or who has light perception only (Haring, 1982). In the definition adopted by the American Medical Association in 1934, "a person is said to be legally blind if they can see no more at a distance of 20 feet than a person with normal sight can see at a distance of 200 feet (20/200 corrected vision), or if the angular distance of the visual field is 20 degrees or less" (Beechel, 1975). (Normal vision takes in an angle of 60 to 70 degrees). Blind people generally use sighted guides, guide dogs, or a cane to assist in mobility (Baker et al, 1979). Only 5-10% of those who are blind can read braille (Beechel, 1975).

The most common visual problems are impairments of central vision that affect visual acuity such as myopia, hyperopia, cataracts, and astigmatism. (Haring, 1982). They are caused by malformation or malfunction of the eye, lens, or cornea. Myopia and hyperopia are problems of refraction. Myopia, or nearsightedness, results when light is focused on a point in front of the retina - rather than right on it - resulting in a blurred image. Hyperopia, or farsightedness, occurs when the image is focused at a point behind the retina. Central vision can be restricted by clouding caused by cataracts or as a result of astigmatism caused by imperfect curvature of the cornea.

Many of the major problems found in children and adolescents are due to optic nerve atrophy, retrolental fibroplasia, and congenital cataract (Hatfield, 1975). Influences before birth were a cause in approximately half of all cases in children (Haring, 1982). For individuals over the age of 45, the primary causes of severe visual impairments are diabetes, glaucoma, and cataracts (Haring, 1982; Peterson, 1979).

Implications For Involvement In Interpretive Activities

Individuals who are visually impaired are also restricted in their ability to move freely about in their environment. Detecting objects and avoiding potentially dangerous obstacles is a major challenge visually impaired individuals face on a daily basis (Seven, 1980).

The environmental education program should be sensitive to these problems since they will necessitate alteration and adaption in the design of the trail network and interpretive activities. At the end of chapter 3, there is a list of design alterations for the visually impaired.

An inability to see properly, limits a child's sensory experiences and impedes development. Consequently, a visually impaired child usually exhibits developmental delays in movement, conceptual understanding, and self-awareness (Haring, 1982). A visual disability does not improve or affect the other senses; it does however cause a visually impaired individual to rely to a greater extent on the body's other senses for information about the outside world (Haring, 1982).

If a person is blind, it does not cause hearing to be any better or worse than that of someone who sees well. This is also true of other sensory losses which may exist. Nor does blindness increase or decrease muscular coordination and strength. A blind person cannot sing, play musical instruments, recognize sounds, or perceive by touch any better or worse because of the impairment (Haring, 1982). A child who is born without sight does not develop a "sixth" sense, but has developed the other senses to a higher degree of acuity (Seven, 1980). This higher level of acuity in the other senses is probably due to a need to compensate for the loss of a sense in one area or another.

Opportunities for playful and interesting activities for young blind children are extremely important (Baker et al, 1979). Visually impaired children can engage in nearly all activities offered to normal individuals as long as safety measures are observed (Beechel, 1975). Activity areas should be free of nonessential equipment and unnecessary obstructions. Trails should be free of extraneous objects, and surface materials should indicate changes in grade, direction, or purpose. The interpretive trail should be as varied in diversity as possible (Seven, 1980). A highly diversified site provides the greatest possibility for the use of the olfactory, tactile, and auditory senses. Rivers, bogs, pine and aspen forests are just a few examples of the many diverse sites which can be included along a trail.

Visually disabled individuals need the opportunity to explore, to feel, to touch, and to smell. In other words, they need to develop

tactile and auditory perception as well as other kinesthetic senses. The key to adapting an environmental education program to the visually impaired, is to utilize the tactile and auditory senses to their fullest potential (Seven, 1980). On the interpretative trail, they will be able to use their other senses to explore the natural world. They will smell fragrant plants, flowers, and trees, and feel the texture, structure, and form of these objects. Through their tactile senses, they should enjoy a sense of appreciation of the size and shape of objects found in nature.

The choice of activities an individual can engage in depends to a great extent on the level of disability. Activities that require hand-eye coordination are obviously not possible for the visually impaired, and this will place limitations on the choice of interpretive activities they will be able to use (Peterson, 1978). Activities where the blind can follow the object (such as tracing the ridges on the trunk of a tree) by their senses of touch and pressure, are mastered by the visually impaired (Baker et al, 1979).

Blind people must have direct contact with objects for proper conceptionalisation to occur (Seven, 1980). Direct contact, however, can be achieved only with certain objects. Concepts such as clouds and colors or abstractions such as space do not lend themselves to direct contact. The result is that these concepts are poorly understood, if understood at all, and tend to restrict the range of knowledge for a blind person (Seven, 1980). An individual who cannot see to use a pencil or who has never seen a cloud is at a disadvantage when asked to draw a figure or describe the daytime sky. It is inappropriate to ask a child to draw a figure, name a color, or respond with reference to visual experiences. Sighted intepretive guides will need to be sensitive to the visually handicapped's absence of visual experiences when initiating interpretive activities. Activities which include modelling with clay and other three-dimensional materials will enable visually handicapped individuals to use their sense of touch. Drawing a picture is of little use to an individual who cannot see it, and only produces frustration and a feeling of inadequacy.

Movement Limitations

A critical problem for blind children is the movement from place to place in the natural and built environment (Haring, 1982). Detecting objects and avoiding obstacles constitute a major challenge. Fear of

injury and overprotection from parents often reduces interest in making large muscle movements. Consequently, they take smaller steps, reach out shorter distances with their arms and legs, and generally move about more hesitantly than their nonimpaired peers. Because of their reduced movement, visually impaired children are often in poor physical condition, and many exhibit posture defects (Baker et al, 1979).

Because of their physical handicap, the blind tend to pursue solitary and sedentary activities (Baker et al, 1979). Active involvement in the interpretive activities will influence social interaction, and encourage outside activity. It will create a better understanding of the outdoors and help reduce fears of the unknown. It is hoped involvement in the interpretive activities will draw these individuals out to explore their environment more freely, and with less fear. As mentioned previously, the environmental education program must ensure a safe yet stimulating trail system. It is the responsibility of the interpretive guides to reassure their visually impaired participants that there are no dangerous obstacles along the way.

Most visually handicapped persons can achieve some degree of mobility; how much, depends on a complex set of physical, emotional, and social factors unique to each individual (Baker et al, 1979). The body uses it's senses as a guidance system. Equilibrium and kinesthesis -- the feeling of movement of muscles, tendons, and joints in order to orient the body in space (Baker et al, 1979). When vision is impaired, balance may also be affected to some degree, but the individual can enjoy many of the activities the sighted enjoy if the interpretive guides will offer guidance and orientation to surroundings (Peterson, 1978).

An interpretive trail not only provides opportunities to increase knowledge and understanding of the environment, it will enable the visually impaired to participate in activities which involve large-muscle movements and balance. The interpretive guide should provide guidance and spotting in order to orientate these individuals to their surroundings and prevent accidents.

Visually handicapped children have a need for muscular movement but, as previously mentioned, they are apprehensive about moving about in space. Consequently they may develop noticeable mannerisms, called "blindisms", through which they seek to fulfill

the need for movement. Examples include rocking back and forth, twitching of the head, and jerking of limbs (Baker et al, 1979). Some of these undesirable mannerisms can become habitual and have serious consequences for interpersonal and social relationships if not eliminated (Haring, 1982). Active involvement in the outdoor interpretive activities will improve physical fitness, help satisfy the need for muscle movement, and help eliminate some undesirable mannerisms.

The visually impaired who engage in interpretive activities should already possess orientation and mobility skills. Orientation skills enable visually impaired individuals to locate themselves within their environment, while mobility skills are those they use to move about safely. Orientation training focuses on using available senses such as hearing, smell, touch, or remaining vision to identify one's position in the physical environment. Mobility training helps the individual learn to manoeuvre and use protective measures when travelling in the outdoors (Haring, 1982). Visually impaired children who have mastered these orientation skills will be at an advantage on the trail. Those who are not as confident will need greater encouragement and supervision along the trail.

Visually impaired children can physically move as well as seeing children, and motor development progresses the same. However, without the capacity to see and the subsequent lack of awareness of an object's existence, they are not motivated to reach out for, move toward, or interact with objects (Haring, 1982). Visually handicapped children first reach out to objects when they begin to reach out toward sounds (Fraiberg, Siegel, & Gibson, 1966). An interpretive guide can encourage investigation and help motivate movement toward object discovery in order to increase awareness of the many "soundless" treasures found in nature.

Individuals who suffer from full or partial retinal detachment should not be involved in situations which might produce a blow to the head. Also, those who wear glasses for correct vision present a safety problem in vigorous sport participation (Baker et al, 1979). Again, the main precautions when guiding the blind through the interpretive trail would be to ensure to orient the individuals to the surroundings and the inherent dangers (Peterson, 1978). If the trail design guidelines provided by this environmental education program in chapter 3 are followed, visually impaired participants should be

able to move about freely along the trail and during the interpretive activities.

Conceptual Understanding

Visual images provide us with more information than any other sense (Haring, 1982). Consequently, visually impaired children are at an immediate disadvantage in obtaining information about the world around them. They are also limited in their ability to perceive objects as wholes, or relationships between objects, particularly when the objects are large or a great distance away, or if they are moving. This handicap greatly interferes with children's perceptions of many objects and of their interrelationships and thus can retard their conceptual development (Haring, 1982). Interpretive activities should be sensitive to the disadvantages visual impairment places on an individual's ability to obtain information. Objects examined in nature should be of a manageable size so that they can be felt as a whole; and related objects in one community should be studied together before interrelationships are compared between objects from different communities.

Direct sensory experience is important for individuals who do not have vision. Listening and touching skills are particularly important; especially if visually impaired children are to develop meaningful language, they must come into direct contact with the object and events communicated (Haring, 1982). The environmental education program should include as many of the other senses in the design of interpretive activities as possible. Interpretive guides should also ensure the participants explore first-hand all objects found in nature in order to make the outdoor experience as rewarding and enjoyable as possible.

Self-Awareness Limitations

Visually handicapped individuals may develop low self-esteem and a sense of rejection as a result of the negative reactions of others towards their handicap. Children who are not included in games because they are not able to perform as well as others, are bound to have difficulty in building self-confidence and a feeling of self-worth (Haring, 1982). Visual problems may result in anxiety, loss of confidence, feelings of social inadequacy, emotional instability, self-centeredness, and lack of competitive drives (Baker et al, 1979).

Visually handicapped individuals experience some social interaction problems that are indirectly caused by their inability to see well (Haring, 1982). Social interaction is sometimes affected since eye contact cannot be made (Peterson, 1979).

Individuals who have crossed eyes, albinism, and drooping eyelids may be shy, introverted, embarrassed, and antisocial due to their visual imperfections (Baker et al, 1979). If the visually impaired cannot see, there is no reason for them to hold their heads erect. Consequently eye contact is not made, posture is poor, and many tend to slouch (Haring, 1982).

Inclusion in non-competitive interpretive activities which are based on discovery rather than performance, should improve self-confidence in the visually impaired. Focus will be turned on the environment, rather than the self, so that individuals may momentarily lose their sense of shyness.

Chapter 3

INTERPRETATION

This environmental education program for the physically disabled relies on sensory awareness activities to promote environmental awareness. These activities should help physically disabled individuals become more aware of the outdoors, more aware of objects and processes in nature, more interested in further exploration of unknown territory, and stimulated to further explore known interests.

Prior to discussing the function and process by which individuals increase awareness through interpretation, this chapter will discuss the history of interpretation, and its relationship with environmental education, and outdoor education.

The Origins of Interpretation

To trace the history of interpretation from its beginnings would be nearly impossible. Some writers have gone as far back as Socrates and Plato to describe how Greek and Roman philosophers related natural causes to supernatural phenomena. Socrates (469-399 BC) developed a method of questioning to seek out truth and form concepts, while Plato (429-348 BC) advocated the theory of unity and practice (the interrelationship of life and areas of learning, and learning by doing. Romans such as Cicero (106-43 BC), Horace (65-8 BC), and Quintilian (40-118 AD) influenced later educators by encouraging first-hand learning and sensory experience in learning (Sharp, 1976).

More than a thousand years elapsed before scientists dared teach natural phenomena (Sharp, 1976). One of the most notable nature and science educators was John Amos (Komensky) Comenius (1592-1670). Comenius supported and defended sensory experiences and sense perception in imparting knowledge to children and facilitating understanding (Keatinge, 1910). He urged the use of sight and touch, and the use of accurate models and pictures when actual objects were unavailable. He taught and practiced, as did others before him, the value of relating an object to the experiences of the student

(Tilden, 1957). Comenius also advocated a different approach when teaching children and adults (Keatinge, 1910).

One of the foremost early educators and methodologists of nature education was Johann Heinrich Pestalozzi (1746-1827) of Switzerland. Pestalozzi regarded sense perception as the supreme principle of instruction and the absolute foundation of knowledge. He taught object teaching, and his pupils learned to observe the environment, form ideas based on relationships, and express what they saw (Sharp, 1976).

Around the turn of the seventeenth century, European scientists attracted by the geology and fauna of North America, gravitated to the United States (Sharp, 1976). These European science educators, and in particular Edward Sheldon, strongly influenced nature education on the North American continent. Sheldon's method of object teaching spread to many parts of the United States. It reached its peak from 1860-1880, and became the forerunner of nature study and modern elementary science (Krusi, 1875).

At the turn of the twentieth century, the concept of outdoor education was beginning to develop in North America (Smith, 1968). A back-to-nature movement began, and this was paralleled by a vigorous nature study movement in the schools and elsewhere (Donaldson & Goering, 1972). In Canada, a nature trail had been established in Banff National Park in 1915, and in 1930, Park naturalist programs started in Canada's National Parks (Helmsley, 1971). Private school programs conducted "outing trips", and offered summer recreation programs; and nature recreation and children's summer camps were being instituted into parks and nature centers (Smith, 1970).

Throughout the twentieth century, outdoor education was influenced by many factors such as school curriculums, philosophers, innovative educators and special programs and events (G. Sharp, 1976). This period is characterized as one in which outdoor education had wide acceptance as a development in education; there were growing numbers of land areas and facilities for outdoor education, and many new leaders were emerging (Smith, 1970).

Perhaps no one influenced outdoor education more in the twentieth century than Lloyd B. Sharp. Outdoor education programing most often used today, reflects the dictum of this environmental educator

(Rillo, 1972). L. Sharp believed that all facets of education could be improved if there was a balance between two propositions. L. Sharp has written that: "those subjects, topics, and courses which could best be taught indoors should be taught there. And he had no objection to the conventionally organized and structured school for that purpose, but that those subjects, topics, and courses that could best be taught and learned outdoors, be taught and learned in the out-of-doors", (G. Sharp, 1976).

Outdoor Education and Interpretation

Interpretation of the natural environment is outdoor education. It is important to clarify that outdoor education is not a discipline; it claims no subject matter. Outdoor education is place, attitude, and method; it is not restricted to subject (Donaldson, 1972). This program for the physically disabled uses interpretive activities which reflect the attitudes, venues, and methods intrinsic to outdoor education. To better understand interpretation, it is helpful to first understand the evolution and meaning of outdoor education.

Historically there has been much confusion associated with the definition of the term outdoor education. In the first quarter of the twentieth century, the classic definition of outdoor education was "education in, about, and for the outdoors" (Donaldson and Donaldson, 1958). This definition has been applied in a number of different ways by teachers, conservationists, recreationists, environmentalists, and wilderness adventurers (Hammerman et al, 1985). Confusion arises from the varying perceptions each group holds of outdoor education, and this results in different definitions from each group (Priest, 1986).

In the latter part of the 1980's, outdoor education has been redefined. A common definition states that outdoor education is an experiential process of learning by doing, and takes place primarily through exposure to the outdoors. Emphasis is placed on relationships, relationships concerning people and natural resources (Priest, 1986). Outdoor education appeals more to the use of the senses for observation and perception, and children learn through the process (Mand, 1967; Lewis, 1975). This new definition is founded on six major points and is perhaps best outlined by Priest (Priest,1986). The six points are as follows:

Outdoor education:
1) is a method for learning;
2) is experiential;
3) takes place primarily in the outdoors;
4) requires the use of all senses and learning domains;
5) is based upon interdisciplinary curriculum matter;
6) is a matter of relationships involving people and natural resources.

There are two strands of outdoor education, each with a primary focus on a different pair of relationships (Priest, 1986). One strand is adventure education. Programs in adventure education involve outdoor pursuits, and concentrate on relationships between people and a persons concept of self. These programs have been successful in bringing about positive changes in individuals through overcoming wilderness challenges.

The second strand, and the one adopted by this program, is that of environmental education. Environmental education programs involve ecological studies which concentrate on the dynamics and interdependence of all parts of the ecosystem; and the interaction between people and their surroundings. As in the dictum of Aldo Leopold, participants develop a reverence for life through an ecological exploration of the interdependence of all living things and a sense of land ethic (Priest, 1986).

Environmental education and interpretation are similar in many ways, yet significantly different in other aspects (Hammerman, 1973). One of the ways they differ is in the approach, and process, by which educating occurs. Environmental education often involves a formal approach to educating; it addresses students in a classroom and builds cognitive models of environmental information over a planned sequence of experiences (Hammitt, 1984).

Environmental interpretation is almost always informal and opportunistic, almost always occurs outdoors, and generally addresses itself to first-time visitors and environmental encounters. Interpretation attempts to educate through a "familiarization" process. Visitors become familiar with facilities and opportunities through orientation, and with camp resources through enrichment (Hammitt, 1984).

Interpretation is the art of communicating information about our natural, cultural, human and scientific heritage in a thought provoking and informal manner. Interpretation increases visitor awareness of a particular site, and serves to explain the interrelationships found in nature, and the place of a person in the environment (Sharp, 1976). Interpretation should be the beginning of a shift in values for people, a springboard to future thinking, debate and change.

Interpretation is a process which enriches an individual's experience in the outdoors and awakens a desire to contribute to environmental conservation (Beechel, 1975). It strives to create in the participant sensitivity, awareness, understanding, enthusiasm, and commitment (Seven, 1980).

In interpretation, the language of nature is turned into a language the participants can understand. Interpretation goes beyond a mere statement of fact and routine explanation; the process of interpretation often provokes rather than instructs the individual to learn more about the meaning and relationships of objects in the environment (Hammitt, 1981). Interpreters provoke participants by means such as asking questions which stimulate thought and help them derive their own conclusions.

The subject matter is made to come alive, to affect the participant so that the process of developing a richer relationship between the external environment and internal knowledge is a preferred situation. This is usually done by first hand experience, and by available media rather than simply communicating factual information (Tilden, 1967).

There must be an element of excitement, a feeling of expectancy, of surprise around the corner. It must have "snap, crackle, and pop." This presents the interpreter with a real challenge - that of educating and enlightening in a way that is entertaining. Entertainment is not the primary objective of interpretive presentations, but good interpretation can and should be entertaining (Sharp, 1976). The interpreter encourages the participant to become involved, and to participate both mentally and physically in the interpretive process (Hammitt, 1981).

Tilden has developed six principles which have for many interpreters, served as a philosophical basis of environmental

interpretation (Tilden, 1967). The purpose of these principles was to serve as a basic philosophy, a framework for guiding interpreters when practicing the art of interpretation (Hammitt, 1981). They are as follows:

1) For interpretation to be productive, it must relate what is being displayed or described to something within the personality or experience of the visitor.

2) Information, as such, is not interpretation; Interpretation is revelation based upon information.

3) Interpretation is an art which combines many arts.

4) The chief aim of interpretation is not instruction but provocation.

5) Interpretation should aim to present the whole rather than a part.

6) Interpretation addressed to children should not be a dilution of the presentation to adults, . . . to be at its best it will require a separate program. (Tilden, 1967).

Interpreting to the Physically Disabled

For many disabled individuals, being involved in interpretive activities in the outdoors continues to be a luxury pursuit rather than an opportunity available to any interested citizen (Bialeschki, 1981). Programs and facilities have traditionally been designed for physically able people, and have for the most part ignored the fact that a segment of the population is handicapped in some way (James, 1982).

Limited research has been done in environmental education for special populations, but a study done by Bialeschki (1981), showed individuals from special populations are very interested in environmentally related activities. Environmental education programs provide physically disabled children with the opportunity to broaden their outdoor experiences (Kaherl, 1978)

Since the mid-sixties, more attention has been directed toward making environmental education facilities accessible to all people (Bialeschki, 1981). However, environmental education programs, have failed to meet the needs of physically disabled individuals (Beechel, 1975). Even at the present time, design flaws persist in recreational facilities which prevent disabled people from enjoying full access to the outdoors (Hirl, 1988).

Physically disabled individuals have a need for, and can benefit from outdoor environmental activities (Beechel, 1975). But while the benefits are the same as those for non-handicapped persons, the ways of achieving them are necessarily different. The design of the built trail and the interpretive activities must reflect the abilities and limitations of those individuals who will use the program.

Trails should always be designed to be accessible to persons with all types of physical handicaps. Problems in design compatibility arise due to the surfacing and terrain requirements of non-ambulatory users. Individuals who are wheelchair-bound are for the most part limited to trails which are smooth and have a slope of no greater than 5 percent. An alteration of this kind is displeasing to other users and particularly to blind users. A trail containing both a short loop designed to meet the requirements of those with ambulatory limitations along with a longer extension designed for individuals who do not use wheelchairs, provides a solution acceptable to all. Design guidelines for constructing an appropriate interpretive trail are stated at the end of the chapter. If physically disabled individuals are to be able to experience the natural environment to the fullest extent possible, these guidelines will need to be followed.

When developing an environmental education program for physically disabled persons, it is also important that the interpretive activities be adapted to diminish existing physical limitations of the participants. For example, if an individual has difficulty holding the slender handle of a magnifying glass, the handle can be enlarged or attached to a glove.

When interpreting to visually impaired individuals, trail safety is paramount. This does not mean the trail becomes sterile. On the contrary, the trail must be richly stimulating to the body's other senses (Seven, 1980). Information about the activities or site will

need to be presented to this group by way of sound, either from the vocal efforts of the interpreter, or cassette recorder.

For hearing impaired individuals, the primary requirement is to ensure the participants have understood the meaning of the activities or concepts which are presented by the guide. Reading as well as sign language or finger spelling will be the medium for information transfer. Guides for hearing impaired individuals should be fluent in finger signing to satisfy questions which may arise regarding a particular activity or concept presented along the trail. If this poses too heavy a burden on manpower, participants and guides can rely on the written word to present activities and clarify questions.

Perceiving and Understanding Environmental Stimuli

The implementation of interpretive activities in an environmental education program will provide the physically disabled with an opportunity to perceive and experience an environmental resource that they might otherwise not experience. In order to develop appropriate interpretive activities, it is necessary to understand how people mentally experience the on-site environment (natural, cultural, historical, etc.), and how they acquire an understanding during environmental encounters.

Interpretation involves a familiarization and recognition approach to education. Familiarity is known to be an important component of environmental perception and cognition (Seven, 1980). The way people perceive and think and the way they take in and process information from the environment, are a consequence of past experiences and familiarity (Kaplan & Kaplan, 1978). Through past experiences, people develop cognitive models of their environment, which in turn, aid in their "familiarization" for future environmental encounters (Kaplan, 1976).

Individuals perceive environmental situations and relate to them based on previous information they have stored and organized about that environment (Hammitt, 1981). When an individual receives information, it is first organized into simplified units and then stored in relation to other information in the brain. These information units are grouped into cognitive models. These mental

models are the result of past experiences, which can involve social as well as physical encounters.

Past experiences determine the internal models or perceptions one has of the external environment. The internal models, in turn, determine the basis of environmental perception (Boulanger, & Smith, 1973). When an encounter occurs, an internal model which best matches the external stimuli is triggered. Without internal models, based on past experience, perception is difficult. The greater the number of internal models, the more an individual can relate to environmental stimuli (Hammitt, 1981).

Each individual's past experiences vary, as well as the way experiences are acquired and organized. Consequently, different stimuli may be necessary to activate similar or related cognitive models in various individuals. If information an interpreter is presenting does not trigger a cognitive model from within the experience realm of the participant, there is little chance for interpretation to occur.

Participants ultimately are perceiving things through their own senses, not those of the interpreter, and they are forever and finally translating the interpreters words as best as possible into their own references, to their own intimate knowledge and experience (Tilden, 1967). Interpreters should be sensitive to related experiences of the participants. When the participants' experiences are not similar to those of the interpreter, the interpreter may need to use comparisons, contrasts, an analogy, or metaphor to reach the visitors. The stimulus presented must have a pathway of reaching and relating to a person's internal models (Hammitt, 1981). This is particularly important for physically disabled individuals who may not have had the same outdoor experiences as the interpreter from which to relate new information and experiences.

Interpretation addressed to children must, therefore, be more than a simplified form of information presented to adults, and as such, must involve an entirely different approach (Hammitt, 1981). Physically disabled children obtain fewer outdoor experiences than their nonhandicapped peers, partly because of their handicap, and partly because of an environment that has not been designed for them (Beechel, 1975). Consequently, the mental models of children are less developed than those of adults, since children have had fewer experiences to code into memory (Hammitt, 1981).

Interpretation must relate to the child who is in the process of building cognitive models, not to an adult who has models in place with which to manipulate. The activities in the interpretive program must relate to the inquisitive and exploratory nature which is typical of most children when seeking new information (Tilden, 1967). Interpreters to physically disabled children should be even more keenly aware of the importance in understanding the past experiences of their group. Interpretation to physically disabled children should therefore be adapted to suit children who are currently building cognitive models.

It is interesting to note that when an adult is introduced into a new environment or foreign country, he spends considerable time exploring his new environment in an inquisitive fashion. This demonstrates that a base is necessary for any cognitive model (Hammitt, 1981). The interpretive activities designed in this program will provide a base upon which physically disabled children can perceive and learn about the environment, and build cognitive models for future use.

Using the Senses to Increase Environmental Awareness

Interpretation can accomplish more than providing individuals with knowledge of the natural environment; it can actually put those individuals 'in touch' with their surroundings by increasing overall awareness through the use of everyday senses. Interpretation is opening the eyes of people; it is sharpening the noses of people; it is tuning the ears of people; and it is sensitizing the touch of people (Van Matre, 1974).

Participants who go about with all their senses open, will be potential learners in every waking hour in the outdoors (Conrad, 1972). The key to the whole process is alertness, the practice of noticing everything; not merely what can be seen, but also what can be smelled and felt and heard and even tasted. Indoors, we customarily wait until our attention is drawn to something; outdoors, we only have to be alert, and a myriad of interests intrude themselves upon our attention.

It is highly desirable to bring as many senses as possible into play in developing an initial awareness to the outdoors. The first step in increasing awareness is to notice; and in the outdoors the practice is most rewarding, because there, the participants are in direct contact with what is being perceived; not reading or hearing about it, but seeing it, hearing it, and sometimes touching and tasting it. Learning is improved in children who have the opportunity to experience first hand, and knowledge which is learned in this fashion is ordinarily retained far longer than that which is merely read about (Hammerman, & Hammerman, 1964).

Sight and hearing are the senses most often used when something draws our attention. The sense of hearing is not often used to the fullest when exploring the environment. The processing of auditory stimuli involves duration, frequency or tone, intensity, and sequence of sound. The auditory system has also evolved from the vestibular system, suggesting a close relationship between hearing and balance (Wehman, 1979).

Stopping absolutely still to listen for a whole minute is a new experience for many children. The challenge is to discover how many different sounds can be tuned in during one listening minute. It is not necessary to name the names of the sounds, the important point is that sounds are distinguished one from the other. Children can then follow the sounds until the source is located.

After an object has been observed, individuals should reflect upon it. They should think about what has been seen and heard; wonder about it; turn it over and over in the hand or mind; relate it to everything previously known and thought about which might relate to it. It is this process of thinking of the new thing with delight and relishing it, that turns it into knowledge (Conrad, 1972).

Another sense perception which can be used along the trail to increase awareness of the surroundings, is the sense of touch. Children can grope and feel their way along a trail while blindfolded. They can be asked to think about whether the bark of a particular tree is smoother or rougher than the last, and what word would they choose to describe it's feel or texture. The same exploratory approach can be applied to leaves, rocks, pine cones, and moss etc. Questions can be asked like: What does it feel like to you?, and How would you describe what you are examining so that another person could recognize it from your description? 'Touches' can be

collected, grouped, and compared by the participants, and then replaced to the natural world when the activity has been completed.

The tactile functions are primitive. They serve as a source of protection, or discrimination for the individual. The protective system is sensitive to light or unexpected touch, it acts to warn the individual of impending danger and manifests itself in a fight or flight response (Wehman, 1979).

When some disabled individuals are touched, they exhibit tactile defensiveness or other related responses because they interpret this stimulation as offensive or harmful. The individual may respond by withdrawing or fleeing from the situation. The individual may exhibit responses like scratching, wishing to get away, facial grimaces, somatic complaints, bodily movements, anxiety, and aggressive behaviors. They may also demonstrate hyperactive behavior, a short attention span, and distractibility (Wehman, 1979).

Individuals who are tactile defensive find learning through touch unpleasant; consequently they are generally slower at developing communication skills because they must wait for visual and auditory recognition and reception to develop (Wehman, 1979). Interpreters will need to be sensitive to this defense mechanism and should use comparisons, contrasts or other methods when explaining activities to the participant.

Objects found in nature may be rubbed on the skin. Tactile stimulation should first be attempted on the back of the hands and the forarms since they are reported to be the least defensive areas of the body. The most responsive areas to stimulation are the stomach, chest, face, and feet (Geldard, 1972).

The interpreter should always be aware of the individual's response for information on the effect of the stimulation. An avoidance response does not mean the tactile stimulation should be abandoned altogether; it may simply need to be modified or given at a different frequency, or for a shorter or longer period (Wehman, 1979).

A sense which is often forgotten in the outdoors is the sense of smell. Participants can smell their way along a trail. They can hold crushed leaves to their noses, as well as small handfulls of moist forest earth, and moss clumps. The sense of taste can be used in combination with the sense of smell when investigating objects

found in nature. The more senses participants can involve as they explore the outdoors, the more vivid will be their perceptions and the greater awareness gained of the environment (Hammerman, & Hammerman, 1964).

The sense of taste is closely related to the tactile system because the cranial nerve for taste innervates the tongue. Taste patterns are also innate, whereas odor patterns result from experience and training. Therefore, the sense of smell (olfactory) often changes one's responses to taste (Wehman, 1979).

Raising Awareness Levels - The Fundamentals

In this environmental education program, there is an emphasis on learning to use the heart rather than the head to observe and receive signals from the natural surroundings. The human body is a complex storehouse of feelings and sensitivities, and actions and exploration should not always be dictated by the conscious intellectual reasoning and thought patterns of the human brain. Van Matre in his writings on acclimatization states that the body was not designed as a vehicle for the head to ride around on, and care must be taken not to let the head lead every inch of the way. In a nature game, a person might in one instance be called upon to 'think' like a coyote, while in another, to 'feel' like a tree. Words after all are only symbols, and not the things themselves.

Participants should be encouraged to relax and encouraged to listen to their feelings and their whole bodies. They should be comfortable, and, if they want to loosen or remove an article of clothing, let them. They can remove their shoes and socks and bury their feet in the earth, or stretch their arms wide to the sun and reach up on their tip-toes if possible, or they can hunch their shoulders and let their arms dangle. Breathing should be slow and deep and tension in the muscles of their arms and legs can be released by giving them a good shake and letting them fall limp. Once they learn to feel their whole bodies, they will be better able to let natural sounds and impressions flow through them (Van Matre, 1974).

Participants should be encouraged to listen to the world around them without placing a label on the sounds they hear. Everything has its own sound - even silence. In order to sense and perceive the

environment, it is necessary to be out there. They should go outside and away from the buildings and other obstacles and distractions and where they will be better able to tune into the natural channels.

Individuals should be encouraged to feel with their whole bodies in order to sharpen their senses. Hands are designed for more than grasping objects. For example, when participants touch an object with their hands, they should feel with their whole body. They should feel the texture, the shape and size, feel it on their faces, smell it and wonder how the object feels about being touched by them. This type of exercise places the entire hand in contact with the object and provides a good example of a multi-sensory way of comparing different things.

The same exercise can be done with taste; taste is multi-sensory and influenced by other factors such as color, texture, smell, sight and touch. Participants should be invited to play with an object from nature such as a wild strawberry and encouraged to use all their senses when they taste it. They can start by examining its shape, looking at the different shades of red, and maybe putting it under a magnifying glass to examine the 'terrain', and smelling it.

Activities in this environmental education program will help physically disabled children learn to follow their sense of smell. It should be emphasized that they need not only smell an object placed under their noses - they can smell a whole room, or a forest community, or a bog. They can smell a tree, its bark and needles, or a nest. They can take their noses for a walk after it rains or during a wind storm. They can seek out a particular smell and follow it to its source. Participants can collect tiny smells in winter to garnish make believe ice cream cocktails. Objects can be moistened and their juices squeezed to enhance their smell. Questions can be asked such as: "What does today smell like?".

Observation can be a powerful awareness tool if individuals learn to 'see' what they are looking at. Visual awareness will be heightened by engaging in such exercises as focusing on near, then far objects to enable participants to see a distribution of layers and spacing of shapes within a scene. They may also wish to frame a small area for closer examination. This can be done using a coathanger bent into a circle to resemble a giant magnifying glass. The object could be a section of the forest floor, the trunk of a tree or a point on the horizon. An object within a frame is easier to analyze because it is

confined within certain boundaries. The frame narrows perception and subsequently sharpens existing patterns.

Once participants have learned the fundamentals in using their senses to increase awareness, they should be more receptive to the different textures, colors, and patterns found in nature. This increased awareness of the natural world can lead to a life-long adventure in discovery. Individuals can use their senses to help discover and observe these different elements. The awareness activities individuals will engage in along the trail will sharpen their senses, and help the physically disabled understand that there are many finite and interesting things to be found in nature.

Presenting the Interpretive Activities

Awareness of the environment does not occur because of a person's sense organs; Individuals must learn to use their senses more fully. Many look but do not see. Children must be given the opportunity to carefully observe the environment if they are to become more aware of the finite things within it.

An approach based on exploration and discovery is the most appropriate means of learning in the outdoors (Hammerman & Hammerman, 1964). Using this approach, the participants are led to explore unknown objects and processes in the natural environment. Through skillful questioning the participants are guided to explore for themselves and to see or feel, to think about what has been observed and formulate a concept of 'what is happening'.

It is necessary for the interpreter to decide what the group is to discover or learn before a learning situation can be created. Good interpreters do not teach; they create exciting learning situations. Before embarking on a walk or trail, interpreters should try to determine what the participants hope to find out or accomplish from the experience. A good way to generate enthusiasm from the start is to inform them about the route, the general theme, how long it will take, and how to look for things along the way. It might also be useful to define any rules or procedures carefully beforehand.

Good planning and preparation are fundamental to a set of activities that presents a well-rounded, unified story rather than a disjointed

catalogue of facts. Define the area that is to be covered and learn the route thoroughly. Interpreters should be alert to possible hazards along with other trail characteristics such as steepness, slipperyness, rockiness, etc. Required medications and a first aid kit should be packed, and interpreters should be versed on first aid procedures in case of emergency.

Some persons may assume that a child needs no assistance in actively getting involved in the interpretive activities. Many physically handicapped children, who have had long periods of immobility may have become quiet and withdrawn as a means of coping with their restricted environment. If they are stimulated to participate, they will become more interested and lively children (Russell, 1978).

Children in wheelchairs will need a good deal of encouragement and reassurance when they first engage in the interpretive activities. They have to acquire the confidence to explore their natural environment. Physically handicapped children will need to be encouraged to get out of wheelchairs and crawl around on the ground. The camp may wish to provide protective clothes for 'dirty' activities, for campfires and cooking. Some handicapped children do not like messy activities and are frightened of playing with sand, finger paints, paper mache or dough (Russell, 1978). They may need gentle encouragement to feel, touch, mould and investigate in the outdoors.

The interpreter should use a good introduction to set the stage and generate interest. The theme could include props, suspense, climax, rhetorical questioning, illustrations, or any other devices needed to get across its points. Natural things that relate to each other can be illustrated - trees to soil exposure, air to plant life, and animals. Instead of simply naming names, they should be woven into concepts.

Participants should not feel hurried along an interpretive trail, and should not be pressured to cover all the sites in order to gain as many experiences as possible. Rather, there should be ample time for natural observation and personal expression; Each participant should be allowed to uncover personal feelings and instill a natural openness for unitive and reflective growth.

If there is a great distance from one site to the other, an activity should be added in between to make the transition more fluid. And

the activities should be arranged so that one leads into the other. A discussion recapturing the highlights of the trail should conclude the trail experience.

The interpretive activities may not suit every handicapped user; some activities may seem simple and uninspiring for participants while others may prove unattainable for even the most courageous. Interpreters should be sensitive to the abilities and limitations of the individuals in their group and be ready to adjust the series of activities to suit them, to the changing surroundings, and even to their own personality.

It is important for those individuals who have severe physical handicaps to be positioned in the most advantageous position to receive the stimuli (Wehman, 1979). The individual should be placed in a comfortable, semi-seated position; the legs should be bent slightly at the knees and hips, and the arms brought into the body and stabilized. The head should be flexed and secured to enable the eyes to fix and follow a moving object. Stimuli should be presented at the midline position in order to reduce the possibility of abnormal reflexive behaviors (Wehman, 1979).

If the severely handicapped person is spastic and stiff, stimuli should be given in a calm and gentle manner since quick movements could arouse the individual resulting in a possible increase in muscle contraction. Conversely if the individual is floppy and has little or no muscle tone, and if there is some head control, he or she can straddle their companions or guides, or lie on either side to help increase muscle tone (Wehman, 1979).

Interest should be kept up with games. Participants can feel trees blindfolded or act out animals they have seen for the others to guess. They can intensely listen for sounds in two distinctly different habitats. Make "food chains" of the plants and animals observed, and select different leaf shapes and objects at their feet.

Children generally try to do their best in learning situations so it is important not to talk down to them. Clarification without ridicule should be offered if there is a question. Unexpected events such as animal sightings should be capitalized on and made a part of the story.

If the activities are presented in an entertaining and enthusiastic manner that absorbs the participant, or has a spiritual flavor that can be identified with, the information presented will be processed more effectively (Hammitt, 1981). When responding to questions, it is important that interpreters encourage the positive; there should be no such thing as a wrong answer. Look for personal responses and find a way to make each of them a contributing factor to the conversation.

There are always individuals who consciously or otherwise dominate group activities or conversations. While they should not be discouraged from participating, it is important to allow everyone an opportunity to contribute, even if gentle coaxing is necessary. Once the shy or withdrawn realize they won't be ridiculed for wrong answers, they should feel more comfortable about joining in. If they aren't feeling well however, they should not be forced to participate because they won't feel like getting involved.

To prevent restlessness, there should be no more than five or six activities chosen for each session, and the entire length should not exceed an hour and fifteen minutes. A discussion and summary should follow at the end of the trail, and the interpreter should try to emphasize the relationship of what they encountered to what the participants are familiar with or are studying at school.

Any trail experience presents a good opportunity to help individuals realize their responsibilities in conserving plants, animals, soil, air and water. The interpreter should try to be nondestructive of the natural surroundings, vandalism and littering should be discouraged, and attempts should be made to photograph flowers, plants and insects instead of collecting them. If collection is part of an activity, effort should be made to return as many of the items as possible to the natural environment when finished.

Interpreters should realize that it may take longer than one trip around the trail to understand a concept. A child might confuse a flower with a type of grass because they haven't distinguished between various kinds of plants, but as that child collects new data, their conceptual framework will change. So it is with the concept of a habitat, a community, or a cycle. At best, each activity that is set up is a concept builder. Eventually these segments will be linked together like a long chain and the child will secure a fair grasp of the concept.

Many disabled children live at home with their families. The interpretive activities should include family members on occasion in order to involve them with their disabled children. Family members should be encouraged to visit in order to observe, and to participate in the activities if they desire. Providing these opportunities would enhance family interaction and impress upon the minds of the parents and siblings the importance of recreation activities for disabled children (Wehman, 1979).

When engaging in interpretive activities, it is important to understand that neither the guide nor participants need be artists or have any particular talent in artistic pursuits to have a rewarding experience in an interpretive activity. Neither the guide nor the individuals need be musicians or have any particular talent in music to have a good musical experience in an interpretive activity. And neither the guide nor the participants need be physical education or recreational specialists to have a good physical education or recreational experience in an interpretive activity (Best, 1978).

One of the best ways to help individuals who participate in the program maintain their newly acquired skills, is to ensure their experiences are as enjoyable as possible. In this way they will be eager to engage in these activities without external prompting or encouragement. Emphasis should always be placed on having fun rather than performing a task. Regardless of skill level, criticism should be avoided and reinforcement and encouragement should be given at every opportunity (Wehman, 1979). If the learning process is fun, individuals usually are more successful at learning the material (Russell, 1978).

Design Guidelines For An Interpretive Trail For the Physically Disabled

Individuals with ambulatory limitations may encounter few problems on a properly designed interpretive trail. Some areas however, can be completely restrictive if careful consideration is not taken in the design of a trail system. Physically disabled people need to be able to get to and move within an interpretive area in a wheelchair, leg braces, crutches, or with a walker or cane.

Trail Surface Treatments

There are many types of surface treatments for nature trails and the treatment chosen determines the trail's accessibility. The smooth surface created by concrete or asphalt is very accessible to wheelchairs, yet it creates an unnatural surface upon which to transport oneself. Conversely, unbound wood chips creates a more difficult, but more natural trail surface, but is almost inaccessible by wheelchair. Wood planking is very accessible as long as the planks are closely spaced to prevent crutch tips from becoming stuck, and crushed rock is accessible as long as it is firmly packed. If surfaces are treated with coarse gravel, sand, or unbound wood chips, assistance will usually be required for those individuals confined to wheelchairs.

A primary loop or trail, and interpretive site locations can be constructed with a relatively smooth surface treatment that will be accessible to wheelchair users. The material can be packed, crushed rock and wood planking, with some stone or brick. Individuals should be able to manoeuvre their apparatus unassisted on this trail surface. Adjoining loops and interpretive sites can have a more natural surface treatment, or no treatment at all, however wheelchair users may require some assistance. Treatments for the interpretive sites shall be natural, or include coarse gravel, sand, or unbound wood chips.

In some instances, topography will dictate the surface treatment of the trail; a challenging topography can be treated with a smooth trail surface, in order to make manouvering easier, and level gradients can be treated with a more natural, rough surface.

The lineal slope should not exceed 5% (Bunin, 1980). A trail with a 5% gradient shall have a minimum 1.5m level rest area every 30m. Physical abilities vary between individuals, and gradients should be designed for individuals who have the most limited mobility. A gradient of 3% or less is preferable and should be used when feasible (Baker, 1979). If a trail is near maximum grade and of considerable length, there should be level areas at frequent intervals for purposes of rest and safety (Beechel, 1975).

A trail should be no longer than 1.6kms., and rest areas or interpretive sites shall be spaced every 60m-90m (Bunin, 1980).

The trail should be wide enough to accommodate a wheelchair or the various spreads of crutches. The average width of a wheelchair is .6m to .7m, and the length is .98m to 1m. The average distance between crutch tips ranges from .76m to .84m depending on the height of the person (N R C of Canada, 1970).

The trail shall be a minimum 1.5m wide to provide space for two wheelchairs to pass each other, and space for the average wheelchair to make a 180 degree turn (N R C of Canada, 1970). The shoulder of the trail shall have a gradual slope in either direction and vegetated with natural understory brush to .3m from the trail (Bunin, 1980).

Curbs or wheel stops shall be placed near hazardous areas. Dimensions shall be 51mm to 76mm high, 152mm wide, and there shall be breaks every 1.5m to 3m to allow for drainage (Baker, 1979).

Separate textural and color cues shall be used to indicate high risk areas such as steep embankments, level change, steps or intersections and functional changes such as seating areas, and interpretive sites (Bunin, 1980). Tactile cues alert the blind as well as the sighted who are approaching an area of concern or interest.

Materials or colors of surfaces should be different at level changes to prevent the visually impaired from overlooking ramps, or steps.

Tree branches which overhang the trail should be pruned to a height of 2.6m to prevent eye injury.

The majority of present day vegetation stands should remain.

Visual experiences from numerous vantage points should be provided.

Wooden walkways should be constructed part way around fragile environments such as sloughs, and pedestrian traffic should be restricted to these walkways.

Bridges should be constructed for pedestrian circulation across gullies and streams. The bridges should be located at areas which provide the shortest distances between ridges for a continuation of the trail and at areas which will provide the least amount of ecological damage. Bridges should have hard surfaces, be 1.8m wide, and have railings along both sides.

Ramps and Steps

The maximum gradient of ramps used shall satisfy the needs of the least mobile and be no greater then 5%; with a 1 - 3% grade preferable. (Baker, 1979).

The maximum length of ramps should be 9m with a minimum level distance of 1.5m preceding the ramp (Baker, 1979).

If ramping or switchbacks are needed, steps should be provided as an alternate and more direct route (Bunin, 1980). Steps should have rounded nosings. Treads shall be between 28cm and 37cm, and risers shall be between 10cm to 15cm (Bunin, 1980).

A textural warning should be placed prior to a ramp or steps, on the top and on the bottom (Baker, 1979).

It is preferable to use double handrails on ramps and steps. A 5cm to 10cm lower rail and a .9m top rail shall be used and provided on both sides of the ramp and step, and be extended a minimum of 46cm across the landing. All handrails shall be 38mm to 51mm in diameter; they will be provided to prevent people from entering dangerous areas and shall be able to support a minimum of 250 pounds (Baker, 1979).

The minimum width for steps shall be .9m and adopted accordingly to handle traffic requirements (Baker, 1979).

For every 1.2m rise in steps, there should be a 1.5m landing (Baker, 1979).

Surfaces on steps should be pitched 10mm per meter to drain water and be of non-slip surface (Baker, 1979).

If wood planking is used, the boards should run perpendicular to the direction of travel and the boards must be close enough together to prevent tips of crutches from becoming lodged in the cracks (Beechel, 1975).

Interpretive Sites and Rest Stops

Interpretive and rest stops should be together and approximately every 60m to 90m (Bunin, 1980).

The more coarse materials such as pea gravel, coarse gravel, sand and unbound wood chips, shall be used for the surfaces of the interpretive and rest sites.

Seating shall be provided adjacent to the trail, near the tops and bottoms of major ramps and steps, and at some interpretive sites. Seating shall not be located within a travelled way where it would create an obstruction (Baker,
1979).

Seating shall be 31cm to 46cm high, 31cm to 46cm wide, and set back 25cm from the pathway (Baker, 1979).

A person's sitting height and body posture should be considered in the design of the interpretive activities (Beechel, 1975). The average height of the seat from the floor is 48cm to 52cm, and the upward reach with one arm from the floor ranges from 137cm to 198cm; the average reach is 152cm (N R C of Canada, 1970).

Items that are meant to be handled must be within reach of an individual in a wheelchair (Beechel, 1975).

Individuals in wheelchairs expend a considerable amount of energy powering their vehicles and must drink a lot of liquid, therefore restrooms and drinking facilities should be conveniently located and

designed to accommodate a wheelchair (pit toilets are acceptable as long as the floor is level with the path and the interior is properly designed). For a 1.6km loop trail that is fairly level, one restroom and one drinking fountain at the start of the trail would suffice (Beechel, 1975).

Signage

Signs shall be 'readable' by the senses of vision and touch. Lettering and symbols will be raised, and perhaps colored in order to easily convey information to people reading with either their eyes or hands.

All signs shall be placed within easy range of vision and reach.

Consistent mounting height and location will be used and signs will be placed at a height comfortable for children and seated or standing adults.

Greatest readability is achieved through the use of light-colored characters or symbols on a dark background (Bunin, 1980).

A clear and precise message shall be written, and raised characters shall be the standard alphabet and Arabic numerals.

Raised characters should be at least 16mm high, but no higher than 51mm and raised at least .79mm off the background to be 'legible' to blind or partially sighted persons. Symbols or pictographs on signs should be raised at least .79mm as well (Bunin, 1980).

Some parts of the trail may contain a small geographical sign to indicate trail accessibility or a particular activity.

Design Alterations For The Visually Impaired

Criteria for site selection for a trail for the visually impaired, should include accessibility, ease of maintenance, and above all the incorporation of the most diversified eco-system possible. A highly diversified site provides the greatest possibility for use of the tactile and auditory senses.

A trail for the visually impaired should strive to maintain a natural environment to the greatest extent safety considerations will allow (Seven, 1980). This can be achieved in a number of ways - from the use of guide ropes to no alterations but rather a reliance on a

sighted partner. Minimum trail guidelines for the visually impaired are outlined in Seven's paper (1980). They are as follows:

1) 1 - 5 % desired grade,
2) .9m to 1.2m tread width, minimum
3) clearing of .6m each side of trail and 3m overhead,
4) stable, well-drained soil.

Further alterations might include removal of stumps and roots which could cause the user to trip, installation of railings made with natural on-site materials, or a warning provided in the text at the previous stop.

Interpretation for the visually impaired should utilize the tactile and auditory senses to their fullest potential (Seven, 1980). Designing a trail through the most varied terrain provides the widest possible spectrum of sensory stimulation. The visually impaired can use "feel stations" for physical contact with that which is being discussed. They can be taken into the Aspen forest to hear the sounds; they can listen to recorded sounds for all seasons. Above all, the visually impaired should be allowed to handle items whenever possible since most blind people are extremely adept and careful with their hands.

The interpretive message must be communicated to blind visitors if they are to gain value from the information. Braille is of little use since only 5-10 % of the blind can read braille (Beechel, 1975; CNIB, 1989). Furthermore, the signs are susceptible to vandalism; the raised dots may be hammered down, dots may be added, or entire sheets ripped off (Seven, 1980).

Large print material or recorded messages can be used. It is however unlikely that a blind person will use the trail without a sighted guide so perhaps no special provisions are required; the sighted guide will simply explain the activities to the blind person.

Provisions for an unguided trail for the blind could include sign posts with large raised numbers (18 points or larger) that partially sighted persons could read and completely blind individuals could feel (Seven, 1980). Raised characters should be at least 16mm high, but no higher than 51mm and raised at least .79mm off the background to be legible to blind or partially sighted persons. Symbols or pictographs on signs should be raised at least .79mm as well (Bunin, 1980).

Cassette players may be carried by the blind person, and the message played at each stop. The stops and numbered posts will be perceptible to those without sight by incorporating a different trail surface treatment when they occur. With a cassette recorder, blind persons can travel at their own pace and repeat messages if desired. The messages might also include information on the next section of trail, warn of any particular hazards, or encourage stopping along the way to listen to a particular sound found in nature.

Part II

CHAPTER 4

KINSMEN CAMP HORIZON: IT'S FACILITIES, PROGRAM STRUCTURE AND ENVIRONMENT

Introduction

Kinsmen Camp Horizon is an outdoor pursuits centre located in the foothills region 55 kilometres southwest of Calgary, Alberta, Canada. Camp Horizon was founded by the Kinsmen Club of Calgary in 1965 and is owned and operated by the Alberta Rehabilitation Council for the Disabled. The camp has been the forerunner in Alberta in establishing a residential outdoor pursuits program designed to accommodate physically disabled, mentally handicapped, and many others of all ages with special needs. It is the largest organization in the Calgary area to provide outdoor experiences for the handicapped.

The camp also provides services for the nonhandicapped, and is visited by children and adults from neighbouring schools and various social organizations who wish to participate in outdoor pursuits and recreational activities. Camp Horizon organizes seminars, conferences, and workshops for camp leaders, teachers, and professionals alike who wish to learn about the services the Camp provides.

Visitors to Camp Horizon

Camp Horizon is in full operation year-round. During the months of June, July and August, separate groups of between 35-45 individuals attend specific camps for a duration of 6 days. These camps include either a group of geriatrics, physically disabled, adult mentally handicapped, diet-restricted allergy sufferers, children up to the age of 15 years with learning disabilities, children between the ages of 6 and 18 who have cerebral palsy, junior and senior diabetics, and children under the age of 18 who are mentally handicapped. During the months September to the end of May, Camp Horizon is visited by school groups comprised predominantly of able-bodied individuals.

There is also an integrated special needs camp period which is a mixture of all the above. This camp includes the hearing impaired since there is no separate hearing impaired camp, enterostomo patients who have had bowel or bladder operations, and able-bodied individuals. The integrated special needs camp serves a dual purpose: it is comprised of a mixture of users for individuals who prefer a more varied group, and helps satisfy the needs of individuals who are unable to attend a specific camp because of individual scheduling conflicts, or if the camp is full.

As mentioned previously, not all visitors to Camp Horizon are disabled; neither is it the norm to have an even distribution between the numbers of persons who are physically disabled and the numbers of persons who are mentally retarded. For example, in the summer of 1986, there was a relatively even mixture of mentally handicapped and physically disabled users, but in the same period of 1987, the majority of visitors were either able-bodied, physically disabled or had some disability in which they were not mentally impaired. In short, there were more individuals of normal intelligence than were there persons who were mentally handicapped.

In the summer of 1987, only 20% of the visitors were mentally handicapped (adults approximately 18%, children approximately 2%). Approximately 50% of the visitors were physically disabled, this figure includes diabetics and cerebral palsy victims with average intelligence. Approximately 20% of the visitors were seniors, 5% were children with learning disabilities and of average IQ, and the remaining 5% included the individuals who enrolled in the integrated special needs camp (pers. comm. Doreen Waugh, Program Director, Camp Horizon, 1987).

The visitors are from various age groups but by and large the majority of camp time is consumed by children. For the purposes of this study, the environmental education program has been designed for physically disabled children between the ages of 6 and 12.

The Facilities and Program Structure at Camp Horizon

The facilities at Camp Horizon consist of three separate sleeping dormitories for 110 people. There is one dining hall and large fireplace, plus a modern kitchen which can cater up to 140 persons. Adjoining the dining room are meeting rooms, a medical centre, laundry facilities and office space. Outside there is a small, seasonal swimming pool and a hot tub. There is also a small farm operation with goats, pigs, chickens, ducks, rabbits, and geese.

The camp offers outdoor pursuits programs, outdoor recreation, professional development, outdoor skill development and general interest camping. There is a low and high ropes course, teepee site, basketball field, campfire circle, climbing wall, children's playground, and skating rink. There are also very good cross country ski and hiking trails throughout the property. The existing trails are made of dirt or crushed red shale and attempts have been made to make some of them barrier-free.

As mentioned in chapter 3 on Interpretation, there are two distinct strands of outdoor education: adventure education, and environmental education. Existing programs at Camp Horizon concentrate on the strand of outdoor education known as adventure education. The outdoor experiences presented by the camp relate to outdoor pursuits-type activities. Outdoor pursuits in adventure education concentrate on relationships between people and a person's concept of self. Adventure education activities provide the handicapped with recreation, and a change of environment while attempting to stimulate interest in particular sports or activities. These programs have traditionally been successful in bringing about positive changes in individuals through overcoming wilderness challenges (Priest, 1986).

The strand of outdoor education adopted by this program however, is that of environmental education. Environmental education programs involve ecological studies which generally concentrate on the dynamics and interdependence of all parts of the ecosystem, and the interaction between people and their surroundings. This does not imply that all environmental education activities rely on intellectual, rational thought in the exploration of the environment. Activities in environmental education can be performed at various

levels, including the sensory level. Regardless of level of involvement, the main thrust of environmental education activities is that participants develop a reverence for life through an ecological exploration of all living things, and increased environmental awareness is achieved.

Presently , Camp Horizon has no environmental education programs in place which promote awareness and understanding of the natural environment to visiting physically disabled children. It is hoped this program "Interpreting The Natural Environment To Physically Disabled Children; A Sensory Approach To Enhanching Environmental Awareness", will provide the camp with a more complete and well-rounded program of outdoor education activities. It is also hoped implementation of the environmental education program will enhance environmental awareness amongst those individuals who participate in the camping experience at Camp Horizon.

The Environment of Camp Horizon

This section of the project provides a description of the physical and natural components found on the site. Most of the information goes beyond the level necessary to deliver this environmental education program, however it is necessary to gather sufficient background information in order to better determine potential interpretive sites. Background information on the area will also assist individuals or guides who accompany the handicapped on the trail and through the awareness activities.

Much of the information presented in this chapter has been extracted and adapted from a series of information booklets from Alberta Parks and Recreation. They are available through Kananaskis Country under The Kananaskis Country Environmental Education Library. These booklets provided extensive geographical information on Kananaskis Country, and one describes the non-living and living resources at Camp Horizon.

General Site Characteristics

Camp Horizon is situated within the Boreal Foothills Ecoregion. This ecoregion lies parallel to the Rocky Mountains and extends north-northwest from Turner Valley to Grande Prairie (Alberta Parks and Rec., #1, 1985). The climate is continental; the cold but not very cold winters show the influence of the higher elevation. Precipitation occurs most in summer (an influence of the Boreal climate), but approximately 1/3 occurs in winter (Cordilleran influence) (Alberta Parks and Rec, #2, 1985).

There are distinct wetland and dryland communities at Camp Horizon. The wetlands consist of two acidic bogs, a slough, and a fen adjacent to a calcareous spring. Drylands are represented by Lodgepole Pine, Trembling Aspen, White Spruce, Balsam Poplar, and Willow.

Camp Horizon has been disturbed by fire and human activity. The forest communities, predominantly pine, burned over in 1909, and in 1919, and the northeast corner of the site was salvage logged shortly afterwards. Some White Spruce on the south side of the camp, and Lodgepole Pine on Pine Island were not burned (Alberta Parks and Rec, #2, 1985). The successional sequence typical of the Boreal forest can be seen on this site, and if there is no further disturbance from fire, White Spruce will become the dominant tree species. Spruce is shade-tolerant while other tree species of the Boreal forest are light-requiring. Without disturbance, Spruce will continue to grow, and eventually the larger trees will almost completely shade the forest floor. This in turn will reduce growing conditions for the light-requiring species of the Boreal forest, they will decline, and the Spruce will dominate the landscape.

Human disturbance is evident in the areas around the barns, the clearcut area near what is known as Pine Island, the island cutline, and disturbed trails and fields which are used by 4-wheel drive, off-highway vehicles. A clearcut from the 1970's is located on the northeast corner of the Camp and demonstrates logging practices and natural regeneration. The Island Cutline extends from the Clearcut south-southwest across a narrow part of the slough towards Pine Island. These areas are located on Figure 4.3.

Geologic History

During most of Alberta's geologic history, the land was covered by vast seas. The Clearwater Sea to the northwest had advanced and retreated on several occasions. Another sea, the Colorado Sea situated to the southeast, was behaving in much the same way. At times the two joined but eventually, about 90 million years ago, the seas began to recede. Most marine sediments were fine clays, now seen as shales. During the two sea advances and three retreates in late Cretaceous times, rocks of both marine and continental origin were deposited in southern and central Alberta. Marine shales represented advances of the seas while the terrestrial sandstones represented the retreats (Alberta Parks and Rec., #4, 1985).

As the seas retreated, conditions in Alberta changed dramatically; Dinosaurs died out, the land was rising and the Rocky Mountains were beginning to form. Rivers flowed (once again) across the land. As the Rocky Mountains were uplifting, new rivers were created that paralled the structure of the mountains. The Elbow is believed to have formed prior to the uplift of the mountains because it's incised channel is perpendicular to the structure of the mountains.

Plant life was also experiencing a drastic change; angiosperms were appearing and beginning to flourish in a land which once was dominated by conifers. The appearance of angiosperms was most significant because these deciduous trees, shrubs, herbs, and grasses, provided more nourishment than conifers for the numerous birds and mammals which were to evolve in the following Tertiary period.

As the Rockies continued to uplift, erosion of the mountain valleys increased. During Pleistocene times (2 million to 10,000 years B.P.), the climate changed and thick glacial ice sheets covered the Rocky Mountains, ending the flow of rivers. A trunk glacier occupied the Elbow Valley during the Bow Valley Advance of Wisconsin times. It was fed by numerous tributary glaciers from the Opal and Fisher Ranges in particular. It also received ice from Moose Mountain and Bow Valley to the north. A lobe of Bow Valley ice is known to have spread south, crossing the Jumpingpound Creek area, to join the Elbow ice at Silvester Creek. The Bow Valley ice eroded a distinct, U-shaped valley which can be seen when looking southwest from the camp. This valley is bordered by truncated spurs and benches (Alberta Parks and Rec., #4, 1985).

Ice action and running water have had considerable impact on the gently folded terrain of Camp Horizon. As the ice melted, it left behind an extensive blanket of ground moraine, or till as it is commonly called. The result is a region of undulating terrain, made up of gently-crested ridges and summits. The entire site lies on an abandoned river terrace, at an altitude of 1400m and 1430m above sea level (Alberta Parks and Rec., #2, 1985). To the south-southeast the land rises to 1700m in McLean Hill while the floor of the Elbow Valley just to the north is approximately 1370m.

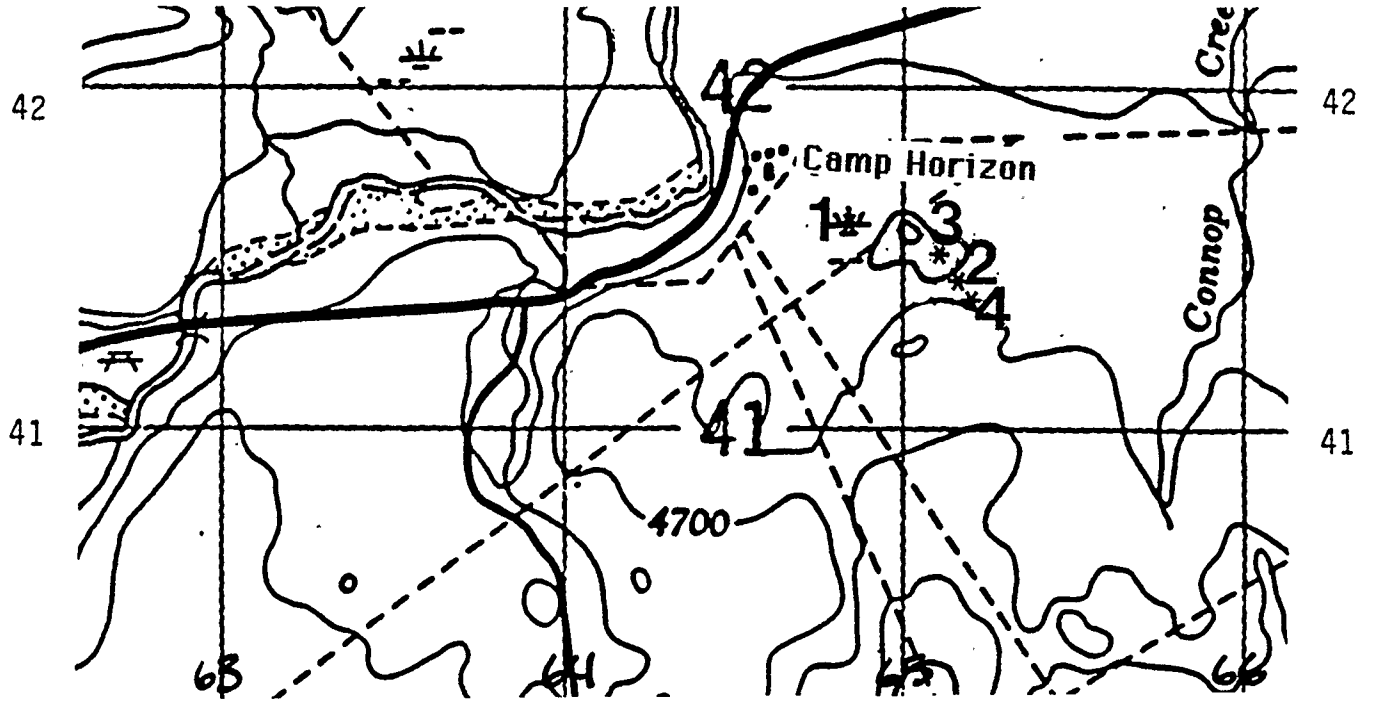

Fig. 4.1 Topographical map sheet Series A741, Map 82/J/15,

The till, particularly where it overlies shales, has greatly affected surface run-off and drainage. On the southeast side of the property, a spring has occurred where the water table has intersected the surface of the ground. This small spring flows from the hillside and feeds a poorly-drained depression in the till. Only 20cm beneath the surface is a layer of cohesive clay through which water seepage is very slow (Alberta Parks and Rec., #2, 1985).

The Wetland Areas

The Slough

The major hydrologic feature of the Camp Horizon site is a slough bordered by a bog. The slough is underlain, first by 10-15 cm of silt and organic matter, then by a slight iron pan, and finally by at least 100 cm of very dense, plastic, blue-grey clay (Alberta Parks and Rec., #2, 1985). This clay reduces the rate at which meltwater drains from this depression.

The amount of water in the slough fluctuates seasonally, but is usually less than 2 meters deep and covers approximately 1 hectare. In the spring, it can be covered in 1.75m of water, while in late summer, this depression is often parched and the surface cracked into dry clay polygons 10 centimeters deep.

There are five communities found in the slough, all are flood-adapted species and their patterns of distribution seem to be governed by the length of time they are inundated. Almost all have a large percentage of their stem and upper root filled with air spaces; Swamp Horsetail's stem is over 65% airspace (Alberta Parks and Rec., #2, 1985). This facilitates the diffusion of oxygen from above the flood waters to the oxygen-deficient roots. The Spike-rush community dominates the lowspot and is flooded for the longest period of time. Other vegetation communities which inhabit the slough area are the Water Parsnip-Swamp Horsetail, Sedge-Spike-rush, Swamp Horsetail, and the Beaked Sedge communities (Alberta Parks and Rec., #2, 1985).

There are two organisms in particular which can be studied here; a small snail (Lymneaea) and the Creeping Spearwort (Ranunculus flammula). The snail is late-summer aestivating which means that during the summer months when climatic conditions are hot and dry, it moves deeper into the clay to avoid the summer drought.

The Creeping Spearwort, is a small, creeping, bright yellow buttercup. It tolerates the drying effects of summer in a number of ways. It can store water in fleshy-leaves and can reach subsurface water with its deep roots which penetrate the clay for up to 7 centimeters. It also has one single, large terminal flower which can shade it's leaves to reduce evapotranspiration in the shaded part of the plant.

The southern edge of the slough is bordered by a Balsam Poplar community, and Willow is found on the east edge and lower banks of Pine Island. On the north side of the slough is an Aspen community, and on the south boundary is White Spruce.

The North and South Bogs

On the site there is a north and south bog. Generally, bogs are basins which have become filled and covered with peat. The surface peat and surface water is usually acidic (pH 5.2-5.6). Both bogs are situated on a poorly-drained depression in the till. The north bog is approximately 4.5 hectares in size and is the larger of the two (Alberta Parks and Rec., #2, 1985).

Bogs can be treed or untreed. The bogs at Camp Horizon are for the most part untreed, however they are in the process of bog-infilling. Bog-infilling can be seen especially well on the north bog. There is open water in the center which is ringed successively by a quaking moss, sedge and herb carpet, a band of low willows and herbs, Sphagnum hummocks and acid-loving plants, tall willows and finally White Spruce. Each community moves slowly inward as the bog dries and is infilled with peat. The north bog is not very accessible, and dangerous near the centre.

The south bog has a less distinct pattern but is safer. This bog is colonized by Sphagnum hummocks. Hummocks are simply growing piles of mosses, each composed of progressively more drought tolerant zones with elevation. The hummocks in the south bog are heavily dissected by game trails.

The Spring

As previously mentioned, a spring has occurred on the property where the water table has intersected the surface of the ground. The spring is located on the southeast corner of the site and can be reached via the Spruce Trail. The water temperature is about 4oC, and is rich in calcium (+80 ppm) and bicarbonate (HCO_3, 120 ppm) (Alberta Parks and Rec., #2, 1985). The bicarbonate is simply carbon dioxide dissolved in water. Calcium is dissolved from the bedrock as groundwater moves through it.

Very few vascular plants grow around the spring. However, four mosses and a common liverwort flourish here. The four mosses are Distichium capillacium, Geocalyx graveolans, Plagiomnium cuspidatum, and Pohlia cruda; the liverwort is Marchantia polymorpha (Alberta Parks and Rec., #2, 1985).

The Fen

The spring drains into a calcarious fen which is also located on the southeast section of the site. A fen is a site in which calcium carbonate-rich waters have flowed from a spring and precipitated out as the calcium carbonate as porous, soft soapy-feeling marl. The Fen in the South Bog is thought to have formed after the bog established. The highly basic waters from the spring are destructive to the acid-loving inhabitants of the bog (Alberta Parks, and Rec., #2, 1985).

The environment of the fen is warmer, and when the spring water emerges into it the calcium is precipitated as calcium carbonate ($CACO_3$), or marl. The pH of the water is basic, and in the range of 8.2 - 8.5 (Alberta Parks and Rec., #2, 1985).

The marl-rich waters from the spring flow outward and east-northeast. They form a deep clear-water trench through what was once sphagnum hummocks and sphagnum peat. Further away from the source, the waters spread out fan-like on top of a sedge carpet. The soft, chalky, unconsolidated marl is at least one meter deep (Alberta Parks and Rec., #2, 1985). On either side of the "creek", Sedges, Buck Bean, Common Butterwort, and Narrow-leaved Cotton-grass are growing.

Figure 4.2 Wetland and Dryland Communities at Camp Horizon.

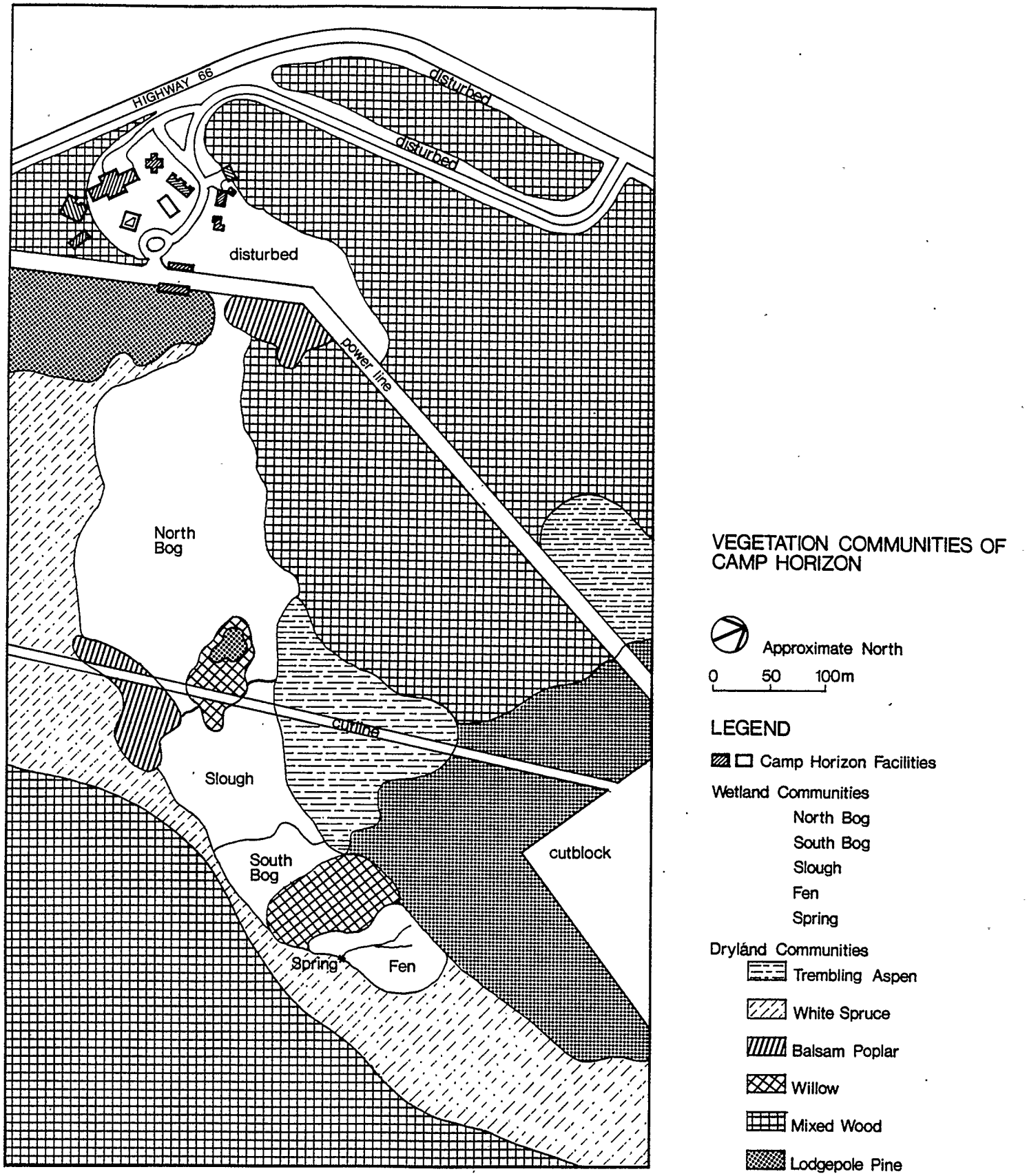

Figure 4.2

The Dryland Areas

As previously mentioned, Camp Horizon and surrounding area is situated in the Boreal Foothills Ecoregion. This ecoregion is dominated by Lodgepole Pine, Trembling Aspen, White Spruce and Balsam Poplar. All four tree species can be examined at the Camp, either in their respective communities or together in a Mixed Wood forest.

Underlying topography greatly influences the pattern of vegetation in the Boreal Foothills Ecoregion, and these influences can be seen at Camp Horizon. The varying moisture regime available on a particular site dictates the type of vegetation which will grow there. White Spruce and Balsam Poplar are moisture requiring and would tend to dominate the wetter, more poorly drained and shady sites. A depression or gully in a drier, open Aspen-Lodgepole Pine forest, might have a sufficiently increased moisture regime to support the growth of White Spruce. Consequently, on a slightly undulating slope in a Mixed Wood forest, Lodgepole Pine, Trembling Aspen, White Spruce and Balsam Poplar might easily be found in close proximity to each other.

Mixed Wood Forest

At Camp Horizon, there is a whole continuum of Mixed Wood forest types from dry, open, Aspen-Lodgepole dominated forests to moist, cool, successionally advanced White Spruce-Balsam Poplar Mixed forests (Alberta Parks and Rec., #2, 1985). Generally, Mixed wood forest is found on the southwest slopes where tree growth is restricted by the dryness of the site.

The Mixed Wood forest is generally dominated by Trembling Aspen, White Spruce, Lodgepole Pine, and Balsam Poplar. This forest type has a greater diversity of plant species because it is influenced by both the Alpine and the Continental climates. As a result, it contains species typical of the subalpine coniferous forest as well as the Aspen Poplar forest (Alberta Parks and Rec., #10, 1985).

Understory vegetation which might be found in the Mixed Wood forest communities at Camp Horizon include shrubs such as Saskatoonberry, Common Juniper, Shrubby Cinquefoil, Prickly Rose, and Buffaloberry. One might also find common herbacious and woody ground covers such as Yarrow, Bearberry, various Asters, Tall Larkspur, Northern Bedstraw, Hedysarum, Northern Twinflower and Wintergreen. There could also be a number of herbs and grasses such as Hairy Wild Rye and Solomon's Seal and Round-leaved Orchid, as well as various lichens such as Black and Green Old Man's Beard, Pixie Cups and dog lichen.

The Lodgepole Pine Forest

There are different Lodgepole Pine associations on the site and all are fire subclimaxes. That is, their development into a climatic climax stage has been arrested by fire which has caused them to remain stabilized at a less than climax stage. The associations vary from the very dry and open Lodgepole Pine-Bearberry association near the head of Spruce Trail to the moister, Lodgepole Pine-Sitka Mountain Alder association that lies adjacent to the logged cutblock northeast along the Island Cutline (Alberta Parks and Rec., #2, 1985).

The Lodgepole Pine-Bearberry association can be found at the head of Spruce Trail. This association normally grows on dry and open, steep to moderate slopes with a S, SW, or SE aspect. Common plants in addition to the dominant vegetation which is normally found on these dry, xeric sites is Common Juniper, Prickly Rose, Wild Strawberry, Hairy Wild Rye, and Spike-like Goldenrod.

The Lodgepole Pine-Sitka Mountain Alder association can be seen at the Clearcut. This association is usually found on moist slopes of varying steepness, and N, NE, or NW aspects. In addition to the same plant species found on the xeric sites, there is vegetation here which is more moisture requiring such as Buffaloberry, Twin flower, Pink and One-sided Pyrola, and High Bush Cranberry. Feather Mosses which are absent in the drier sites are found in this community. There will also be young White Spruce succeeding into the site.

The common plants found in each Lodgepole Pine community reflect the environmental conditions present at each site, with available moisture being the dominating factor. All the communities are on undulating terrain with flat to gentle slopes. They are usually south-facing with moderate exposure and drainage. The water table is low to moderate and the trees are growing on coarse till-covered terrain (Alberta Parks and Rec., #2, 1985).

The Trembling Aspen Forest

On the northeast side of Camp Horizon is an Aspen site with large, mature white-barked Aspen. This mature Aspen stand is a typical Aspen-Peavine association which is very common in the Foothills. It consists of a lush herbaceous understory beneath well-spaced Aspen. It is one of the most productive, nutritious (high protein), forage-producing associations, much appreciated by cattle and wildlife. It is on a moderately steep, well drained south-facing slope. It is underlain by at least 1m of sand and gravel which gives it a slightly dry to moist, moisture regime (Alberta Parks and Rec., #2, 1985). Common plants which vegetate the Aspen site include the occasional Pine, White Spruce, Prickly Rose, Buffaloberry, American Vetch, Northern Bedstraw, Yarrow, and Richardson's Crane's-bill.

Aspen poplar has a wide range of tolerance and is a strong competitor. It can spread rapidly and produces many light wind-born seeds which can dispurse the distance of three tree lengths from the parent (Alberta Parks and Rec., #10, 1985). Seedlings establish almost anywhere there is sufficient light and moisture for germination to take place. Once the proper conditions for seedling development are met, Aspen will grow rapidly and establish in the area. It also propagates vegetatively by suckering and any destruction of the apical growing tip of the Aspen will stimulate growth of the suckers. If the canopy is open to allow more light penetration, growth of the Aspen will be further speeded up.

White Spruce Forest

White Spruce grows taller and lives longer than any of its competitors in the Boreal forest (Alberta Parks and Rec., #10, 1985). In mesic sites, it will usually succeed and become the dominant tree species. White Spruce requires a moderately moist, mesic site for good seed germination. In these environments, vegetation is more widely spaced and there is less competition and shading. Although the White Spruce is shade tolerant, it will experience more rapid germination and lateral root development in areas where more light is available.

At Camp Horizon, there are various near-climax White Spruce communities but the most common is the White Spruce/Sitka Mountain Alder-Showy Aster association. This community runs along the south side of the property above the North and South Bogs on a moderately steep north-facing slope. Behind the Spring, the site is moist and cool and a variety of shade-tolerant plant species can be found there. Other vegetation which can be found in addition to the dominants includes Lodgepole Pine, Trembling Aspen, Canadian Bunchberry, Wild Strawberry, Twinflower, and Tall Mertensia.

Balsam Poplar Forest

A Balsam Poplar association is present on the southern boundary of the Slough. Balsam Poplar grows on this site because of the higher moisture regime. Balsam Poplar is a poor competitor, and is limited to damper lacustrine and depressional sites which would be too wet for Trembling Aspen. This site is a cool, north-facing, protected, gentle slope with a high water table. The Balsam Poplar association is much less productive for wildlife than Trembling Aspen; it has less diversity, more shrubs and fewer herbaceous plants in the understory. The forest floor is generally covered with many layers of leaves which fall from the deciduous Balsam Poplar trees. Common plants which can be found in addition to the dominant include White Spruce, Tall Mertensia, Currants, Gooseberries, Fireweed, Northern Bedstraw, and Wild Strawberry.

Willow Communities

There are several areas on camp which are vegetated by tall, vigorous, maroon or yellow-stemmed Willows. Taxanomically, Willows are difficult to identify accurately. The most common willow on the site is the whippy-branched Basket Willow (used by Indians for that purpose) with yellowish or reddish bark, flattened 2 colored buds and long, thin, sharp toothed, slightly curved areas. The Basket Willow can be found on the margins of Pine Island, and grows in association with White Spruce, Balsam Poplar, or Glandular Bog Birch. Other Willows on the site include the Maccall's Willow, Tea-leaved Willow, and Mountain Willow (Alberta Parks and Rec., #2, 1985).

Willows are dioecious, that is the male plants have male catkins, and the female plants have female catkins. Some flower before leaves come out and some flower after. Most contain an analgesic substance called salicin in their bark. This painkiller is a possible source of acetylsalicylic acid (aspirin), and can be extracted in solution after boiling the twigs.

Wildlife Habitat

Camp Horizon is situated on a Mixed Forest-Shrub-Bunchgrass Edge Habitat (Alberta Parks and Rec., #2, 1985). This edge between forest, grassland and shrub is of prime importance to the maintenance of a number of animal species in the study area.

As mentioned earlier, the Boreal Foothills Ecoregion is an ecotone or transition zone between the conifer-dominated vegetation of the Subalpine and Boreal Uplands Ecoregions, and the deciduous, Aspen-dominated vegetation of the Aspen Parkland (Alberta Parks and Rec., #1, 1985). As a result of the blending of ecoregions, vegetation diversity is higher than is normally found in a Subalpine Ecoregion (Alberta Parks and Rec., #12, 1985). In response to the increased numbers and kinds of vegetation in this ecoregion, there is more habitat potential and subsequently a larger number and more varied wildlife in the area surrounding Camp Horizon (Alberta Parks and Rec., #2, 1985).

At Camp Horizon there are five habitat types and they are described below.

The Willow-Glandular Bog Birch Type Habitat

Willow habitat is characterized by its high water table, low available root oxygen, great seasonal variation in the water table and large amounts of organic matter in the substrate. The tall willows that surround the Bogs, the Slough and the Pine Island, and which are concentrated between the Slough and the Fen, are fairly heavily used by Moose. In this habitat, one should notice browsed willow branches, and be able to find scats, prints, antler rubs, bones and hair. There are also a number of small herbivores which come to this habitat for food and cover throughout the year. They are the Gapper's Red-backed vole, Varying Hare, and Meadow Vole (Alberta Parks and Rec., #2, 1985). These mammals are preyed upon by Coyotes, Red-tailed Hawks, weasels, and owls.

The Wetlands Habitat

The Wetlands habitat covers the spring and fen area only. This spring flows year round and the creek it produces remains open most of the winter. The area is visited year round by Moose, White and Mule Deer, Porcupine, Weasel, and Red Squirrels. In the summer, the calcareous flats of the fen support a fairly large population of Wood Frogs and Common Garter Snakes (Alberta Parks and Rec., #2, 1985).

The Mixed Forest Habitat

This habitat includes a whole continuum of mixed forest types from dense White Spruce-Balsam Poplar forests growing in the moist, protected sites to the south of the Slough, to open Aspen-Lodgepole Pine forests growing on the dry, exposed sites on the north side of the Slough. Despite this diversity, these forests have a number of common features. They are in successional transition, on their way to a White Spruce climax forest for the same reasons explained previously under general site characteristics. They also form an enriched wildlife habitat containing features characteristic of both deciduous and coniferous forests.

In mixed forests, floral diversity and seasonal, physical diversity lead to faunal diversity. Three animals typify this habitat: the Mule Deer, Ruffed Grouse and the Porcupine (Alberta Parks and Rec., #12, 1985). All require the feed and physical diversity provided by this habitat. For example, in summer, Mule Deer will eat herbs and grasses, in fall leaves, in winter, twigs of conifers, deciduous trees and shrubs, and in spring, lush grasses. These are provided within the bounds of the Mixed forest habitat. Ruffed Grouse seek protection from the elements, good visibility of immediate terrain, direct sunlight, proximity to edges, and lack of obstruction in the way of quick escape. They are usually found at the base of a large tree, on a moderate slope facing a relatively open forest with a stand of conifers, or a dense Mixed forest nearby.

The three animals which typify Mixed forests rely on the seasonally varied diet they would otherwise not obtain from either a true deciduous forest or a coniferous forest. Porcupines also depend on a variety of food types: unfolding leaves in spring, lush leaves of a number of herbs, trees and shrubs in summer and in winter, twigs, buds and the cambium and inner bark of a number of deciduous and coniferous trees. Porcupines are nomadic, they will rest by day at the top of a willow branch, and move and feed at night.

White Spruce Forest Habitat

There are a number of White Spruce associations which make up this wildlife habitat and all are structurally very similar. The trees are spaced approximately every 2.5-5 meters. There is a low, woody shrub or herbaceous perennial understory of Feather Mosses and leathery-leaved groundcovers, Horsetails, and fallen needles (Alberta Parks and Rec., #2, 1985).

These sites are cool, moist, windless, shady, visually protected from the air and very quiet. Because of their lack of floristic diversity and the concentration of biomass productivity by the trees, these near-climax forests are notoriously barren of wildlife. The most common animals found in this forest are Red Squirrel, Varying Hare, Grey Jay, Boreal Chickadee and either Three Toed-Northern Woodpecker of Hairy Woodpecker (Alberta Parks and Rec., #12, 1985).

The most common animal in the White Spruce forest habitat at Camp Horizon is the Red Squirrel (Alberta Parks and Rec., #2, 1985). The presence of the Red Squirrel is made obvious by noisy chick-tcherrr sounds and caches of spruce cones. These animals selectively cut green seed-containing cones in the spring and hide them in underground chambers, or in piles at the base of a trunk. Red Squirrels don't hibernate, they rely on the thermal protection afforded them by the dense Spruce canopy. In the dead of winter they remain inactive and only emerge from their underground needle-lined tunnels on warm sunny afternoons. Their predators include marten and Fisher, ground-stalking Coyote, Least and Short-tailed Weasels, and Great Horned and Boreal Owls.

The Lodgepole Pine Forest Habitats

The Lodgepole Pine forest habitats of this camp are generally young (under 65 years), even-aged and surprisingly uniform in height, depth of canopy and degree of closure within each stand (Alberta Parks and Rec., #2, 1985). The habitat characteristics of a Lodgepole Pine forest can change dramatically in accordance with the different densities, successional stages, and different plant communities found in each of the Lodgepole Pine associations. For example an open stand of pine will have quite different characteristics than a closed stand. Consequently, the wildlife will be attracted to which ever habitat suits it's needs best. The most common animals encountered in Lodgepole Pine forests are: Least Chipmunks, Red Squirrels, Varying Hares, Grey Jays and Boreal Chickadees.

CHAPTER 5

Environmental Interpretation Activities To Use On The Trail

Introduction

To see a World in a Grain of Sand
And a Heaven in a Wild Flower,
Hold Infinity in the palm of your hand
And Eternity in an hour.

(Auguries of Innocence, Blake)

Along the trail, participants will use all their senses to experience the environment. They will listen to the sounds of nature, use their powers of perception, smell and taste natural objects, and involve themselves physically with their natural surroundings. Figure 5.1 illustrates the trail and various s ite locations. Sites #1, 2, and 3 concentrate primarily on activities to enhance the senses of hearing, sight, sound, taste and touch, and sites # 4 and 5 engage physically disabled individuals in activities to help them discover different patterns found in nature, and learn to "read" the environment.

Site #1 is situated just past the ropes course in the Mixed forest. It is a good starting point because it is very diverse in nature and offers a good environment for enhancing the senses. At site # 1, participants will engage in sensory activities to sharpen their senses of hearing and sight. They will listen intently to sounds, match similar sounds, and play a hearing and sighted game. Participants will detect different colors, play a camouflage game, and use their sense of perception at this site.

Site #1 will also be the site for the visually impaired. Consequently, this site should be constructed according to the trail design guidelines for the visually impaired which were set out in Chapter 3. Activities for use at this site can be taken from the activities in the program which would be appropriate for individuals with vision limitations. Sighted participants could also sharpen their senses at this site while blindfolded. This would give them the opportunity to explore a forest community with all their senses except sight.

Site #2 is situated in the Aspen community. In the Aspen community, individuals will exercise their senses of smell and taste. They will construct a scent pomander and a scratch-and-sniff post card, draw from a memory of taste, and prepare rose hip tea.

Following these activities, the participants will cross a wooden bridge at Pine Island and into site #3, the Bog. Here, participants will sharpen their sense of touch, and engage in activities and examine different textures found in nature. They will compare different textures, experience the bog on all fours as an animal would, and collect a free passage toll for a boardwalk troll.

Participants will then travel into the Spruce forest and Spring area for site #4. At this site, they will discover different patterns found in nature and sense the characteristics of a forest environment. They will draw reflective images, construct an artist's palette from colors found in nature, make bark rubbings, examine a dead tree, and take a 100 cm. hike.

A proposed wooden bridge will then be used to cross back over the wetland area and into site #5, the Pine forest. In the Pine forest, the participants will use all their senses to "read" the environment and engage in activities which should help promote conservation of the natural environment. They will pretend to be human sponges which absorb sensory input from the environment. They will examine tree rings, prepare their own 'sense test', and create a poem.

Figure 5.1 The Trail Network and Interpretive Site Locations

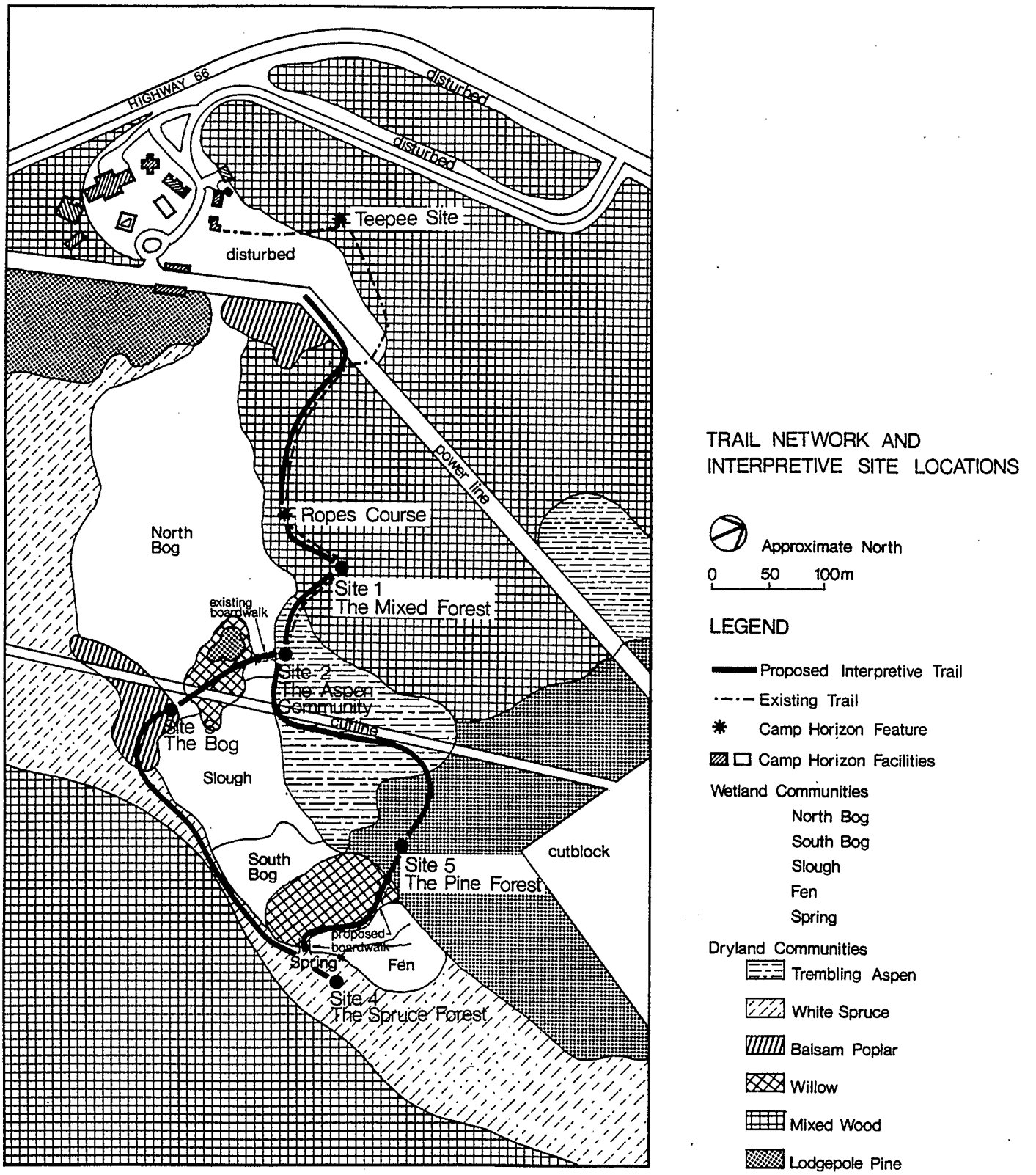

Figure 5.1

Site # 1
The Mixed Forest

Activities to Stimulate the Senses of Hearing and Sight

This first site is comprised of activities which will involve the senses of hearing and sight. Also included are activities to discover different colors in nature, to examine camouflage as a role in animal and plant adaptation, and to use our imagination and perceptions when looking at a particular scene.

At this first site, it is important to get the participants into the proper spirit of participation, let them know what will be expected of them during the outing. Explain to them that: "On this trail, we are going to sharpen all our senses". Ask them to tell you what some of the senses are, and give an example of each. Hearing: "Sometimes we will be completely quiet and listen to the sounds around us. Sight: We are going to look at things real close and see things that we normally don't look at. Smell and Taste: We will use our noses and even taste a few things found in nature. Touch: We will feel some things that have very unique characteristics for our sense of touch. Let's start by using our sense of hearing".

A lot of us hear but do not listen. Many exciting sounds can be discovered by alert senses. We will listen for sounds in the environment, such as the song of native birds, the fluttering of tree leaves, and the chatter of squirrels. When we hear these sounds we will try to locate the source. Often we hear a sound before we know what it is or where it is coming from. This exercise should help us increase our awareness of what we hear, rather than what we see. We don't have to know the name of the sound, we just have to hear it, and try to find where it is coming from. Try to remember the sounds you heard so we can talk about them later.

1.1 Listen to the Quiet

The guide should speak with a lowered voice and soft tone in order to help quiet and compose the participants. "The forest environment may seem quiet compared to the hustle and bustle of the city. If you listen really carefully, I am sure you will hear sounds that you have never heard before. I would like you to move to a quiet spot in the

woods, close your eyes, and listen to the sounds of nature. You will have to listen very carefully because some sounds are not as easy to hear as others. The sound you hear might be a quick scurry in the grass, a lazy buzz by your ear, a faint chirp from a distance, or the sound of a tiny object falling to the ground".

"When you find your quiet spot, get comfortable, relax, breathe deeply, close your eyes and be silently still. If you want to lie on the ground, feel free to do so. Listen. Don't name the sounds, it isn't important to know what the sounds are or where they are coming from. Just experience the sounds and let your body absorb them. Your ears are the receptors for picking up the sounds, but let your whole body soak up the same sound waves as well".

"Let your body become absorbed in the sounds you hear; describe them to yourself. Sounds such as chuk chuk cherrrr, sssssst, bzzz, dzzzzz might be heard, or you can make up your own descriptions. When the time is up, I will signal for us to gather together again so we can demonstrate the different sounds we heard to each other".

Guidelines for Listen to the Quiet

Make sure the participants are relaxed and do not feel rushed or distracted. It is important that everyone be spread out enough that each feels secluded. Individuals in wheelchairs may need assistance settling into their quiet spot. Suggest individuals sit or lie on the ground if they prefer. Encourage everyone to be quiet. Gather the participants quietly, and then initiate open discussion on all the sound descriptions which were heard.

1.2 Common Cans

"Before we listen to sounds heard in nature, we're going to play a game in which we match sounds together. These cans may look alike, but they all contain objects which have previously been collected along the trail. When you rattle and shake these cans, you may first think they all sound different, but in fact similar sounds can be found in pairs of cans. Can you organize these cans together in pairs by matching the sounds they make? Each of you will take your turn at shaking the cans and placing the ones that sound the same together. When you think you have them all paired up, shake and listen one more time very carefully to make sure each can in the

set makes the same sound as it's partner. It isn't important to know what is in the cans - only that there are pairs that have the same sound".

Guidelines for Common Cans

Collect 14 same sized cans, you may wish to have more than one set. Divide them into pairs or sets. Put in each the same quality and quantity of items, for example:
in #'s 1 and 2, place the same size and amount of pine cones
in #'s 3 and 4 small stones
#'s 5 and 6 small, dry berries
#'s 7 and 8 sticks and twigs
#'s 9 and 10 water
#'s 11 and 12 soil
#'s 13 and 14 moss or old man's beard (found hanging from Pine trees)

Mix up the cans. Have one child at a time try to match by sound, cans that have the same objects. For ready identification, place coded labels on the cans. At the end of the activity, the guide may reveal to the participants the nature of the objects found in the cans and discuss them. The guide can use fewer cans if desired. All the cans should be the same color in order to reduce distraction. This game serves to enhance judgment as well as auditory discrimination. (adapted from Bachert, Hundreds of Ideas for Outdoor Education, 1979)

1.3 The Bushy-tailed Woodrat's Shiny Treasures (This is a hearing game.

The guide will blindfold one participant, and sit that person along with a cache of shiny objects in a spot in the forest. If possible, place big round greyish ears on the pack rat's head, and give it a bushy tail. Explain to the others in the group that "this is a Bushy-tailed Woodrat, otherwise known as a Mountain Pack Rat". Tell the story of the pack rat.

"This animal is the original pack rat, the species that collects and hides away shiny objects such as keys, coins, or spoons. This pack rat lives in the rocky, coniferous forests of southwestern Alberta, and often builds its house high up in a tree, where it can safely hide all it's shiny treasures. Some treasure caches become quite large

over time since young pack rats re-inhabit old abandoned homes, and naturally inherit all the treasures left behind".

"The pack rat living in this old house is very rich and has a tremendous collection of shiny objects. The pack rat is careful not to let anyone too near for fear they might try to snatch away one of the pieces of treasure. The pack rat must also be careful not to be eaten by bobcats or spotted owls. When the pack rat is alarmed, it will stomp it's hind feet to tell the intruder to go away".

"You are going to pretend to be other pack rats wanting to steal away the treasure from the rich pack rat. A small group of you will try to sneak up on the pack rat without being heard. If the pack rat hears the sound of a thief approaching, it has only to stomp it's feet and point in the direction of the perceived noise, and the potential thief is out of the game. If a thief is successful, and manages to snatch a shiny object from the pack rat, then the thief is promoted to a predator. The predator can be either a bobcat or spotted owl, and again must approach unheard to claim its victim. If the predator can approach and then grab the pack rat without being heard, the predator assumes the role of the rich pack rat".

Guidelines for the Bushy-Tailed Woodrat's Shiny Treasures

Try to keep everyone reasonably quiet while the group is sneaking up on the pack rat. Thieving pack rats can take only one shiny object at a time. If the group is quiet and the thieves successful at sneaking up on the rich pack rat, the rich pack rat may become captured by a predator without even knowing any of it's shiny treasures had been stolen.

1.4 Conki's Guessing Game

"Conki the Computer always sat in the front window of a small downtown office building. As people walked by the office, he would entertain them by playing guessing games on his video display screen. He played with anyone who seemed interested, but he always had the most fun with children. In particular, there was one group of children who lived in the tall apartment building next to Conki's office. Every day on the way home from school, they would stop in front of Conki's window and play guessing games. Conki would show them pictures of objects on his video screen, then he would make the

screen go blank and the children would try to guess all the objects they saw on Conki's display screen. They all had so much fun."

"Then one day, the children saw a sign on the window which said the office was going to move to a much bigger building. The new office was also nicer than the present one; it had air conditioning and a good view of the mountains, and Conki was going to get a new paper feeder. Unfortunately however, the school children wouldn't be able to play guessing games with Conki anymore, and this made them very sad. Conki felt badly too, so in order to cheer everyone up, he showed them how to make up their own guessing game. Since that day, they have been playing Conki's Guessing Game anytime they wanted. I know how to play this game, and if you like, we can play together. Would anyone like to play Conki's Guessing Game ?"

Lay out on the ground or a picnic table various objects found in nature - a pine cone, rock, mushroom, spruce branch, moss, etc. etc. - and cover the objects with a large cloth or sheet of paper. Remove the cover for a few seconds while the children look at the objects. Replace the cover and say: "Tell me one thing you saw" . This continues until they have named all the objects or as many as they can. An alternative to this is to let the participants observe all the objects, then remove one or two and let them determine which one is missing. Or add an item or two and ask the participants to note the newcomers to the objects.

1.5 Camouflage Game

"Camouflage plays an important role in adaptation because everything grows to fit where and how it lives. Many plants and animals have adapted to their environment in the protective coloration which hides them from predators. Predators might also have their own system of camouflage so that they can sneak up on an unwary victim."

"We are going to play a game in which we pretend we're hunters going into the forest in search of food. You may want to drape some branches or leaves over yourself so that you will blend in better with the forest. We don't want to pick the forest clean so look around and see if you can find some branches which have fallen to the ground. Throughout this small area we are going to look for morsels of food. You will have to look closely because every piece is

very well camouflaged. When you find something, bring it back to the group to show everyone."

Guidelines for the Camouflage Game

Food which is used for the camouflage game should be placed out just before the activity begins or it risks being eaten by birds and insects. Items should be placed on or near something of similar color(s). Have the participants search the site for the object(s) which you have camouflaged. Some items which could be used include strings of popcorn hanging off the Aspen, sticks of red or black licorice on shrubs of similar colors, suckers sticking out amongst clumps of flowers, and gummy spiders and worms etc. on branches and on the forest floor. If the guide prefers non-edible items, a variety of other colored objects such as colored toothpicks can be scattered about.

1.6 Picture Windows (This can be a linking activity when travelling from the Mixed forest to the Aspen forest)

On the way from the Mixed forest to the Aspen site, the children can participate in an activity involving imagination and perception. Just before arriving at a "picture window", the guide will stop the group and inform them that "just around the corner is a truly awesome sight. It is a sight that not too many people have had the opportunity to behold. This sight however is far different from what you will imagine. "

The guide can ask: "do you really see things as they are? How many times have you travelled past an object without really noticing it? On our way to the Aspen site, we are going to come across a totally awesome scene. This incredible scene can be seen through a picture window. You will start out by seeing this scene a little differently, in fact, in the beginning you won't see it at all because you are going to be blindfolded. I will then describe the scene to you and I want you to picture it in your mind. After you have imagined the scene, you may remove the blindfolds and compare your mental image with the real scene."

The participants are blindfolded and guided along a rope a short distance to where a picture frame is outlining an object such as a lichen-covered boulder, the trunk of a diseased tree, a rotting log, a clump of grass beside the trail, or anything that stimulates the

imagination of the guide. When the participants arrive at the prearranged site, they are seated, blindfolded in front of the picture frame. The guide begins to elaborate on a site of a lichen-covered boulder in a tone which stimulates the imagination of the participants.

"Wow! wait until you see this scene. There is a broad smooth hill and it's under attack. It appears as though the aggressors have invaded every point, hollow and gulley on the hill. There are different troups because their uniforms are different colors; some troops look like black velvet spots, while others are dressed in pale olive-green fatigues with rich brown hats. Some combatants are camouflaged with what looks like bits of branches. It looks as though they should be fighting in a forest, but there is no forest on this hill, just barren ground. Another group is in ghostly white, a small group in light green and a large scattered group that looks like a sprinkling of scarlet snow on the hill."

"The hill is a very inhospitable place; the sun beats down on it and the wind whips over it's surface. The combatants have established in the gullies of the hill, where they can find shelter, shade and moisture. From these gullies they come forward to do battle. Slowly they spread over the surface, and, from a distance look like great living rugs of strange textures and oriental tones: broad carpets of gray and green; and long luxurious lanes of orange, with lilac trimmings. Down between a large troupe of attackers, a bronze-green troup runs over even the slightest dip and down the ravines like rivers of molten brass. The hill, which is now reduced to pitted surfaces and piles of crumbled rock, displays the scars of battle. "

When the guide is certain that the participants have established their own vision of the scene, they are told to remove their blindfolds. Some may vocalize disappointment at being deceived. They wanted to see a battle zone. But the guide assures them that they were not fooled. "This lichen-covered boulder is a truly awesome sight, and one that you probably wouldn't notice every day. Come closer and try to see the scene which I described to you."

The participants will surround the rock and try to remember the description of the site and relate it to the image they made in their minds. It shouldn't take them long to see the same image that was described to them once they start looking on a small scale instead of

a large one. The guide can ask them to describe some of the colors of the various lichens, and to feel the rock surface under a lichen. Point out the white streaks and ask the participants if they are crumbly or pitted. The grittiness and the streaked weaker areas are most apparent. This activity not only utilizes the imagination, it demonstrates the function of lichens in breaking down rock and making soil.

1.7 Candid Camera (This can be another linking activity when moving from the Mixed forest to the Aspen forest. Adapted from Van Matre.)

"The human eye is like a camera with one of the most amazing lenses in the world. Our eyes can focus on objects at different distances and angles, they can look away, and then return to focus again. We're going to use our "eye cameras" to look into the forest. We're also going to add different lenses to help us change the focus of what we see."

"A wide-Angle lens is used for viewing large areas such as scenic vistas and group photos. Let's put our wide-angle lens on our cameras. To do this we need to look forward and hold our arms out at eye level. Now bring your arms toward the front of your face and stop just when you can see the thumbs of your hand. That is your widest range of vision. Pan the horizon with your wide-angle lens. Let's take photos of each other."

"A telephoto lens is used for viewing objects which are far away. We use a telephoto lens to zero in on a very small part of the scene. I'm going to hand you these telephoto lenses so you can scan the horizon for something of interest. You may see a bird in a distant tree or another person walking in the forest. Tell everyone what you see."

"A macro lens allows us to look closely at something without losing focus of it. Squeeze your hand together into a fist and peer at something close up. You may want to get down on your hands and knees for this shot. Look at the pattern and texture of the object you are looking at."

" We can also look through colored lenses. Hold strips of colored cellophane up to your eyes and see how different everything is when

viewed through a color filter." (adapted from Van matre, Acclimatization, 1974)

Guidelines for Candid Camera

The telephoto lens can be constructed from the tube of a paper towel roll, or from something more durable such as 2" diameter PVC pipe. The guide may want to use parts of this activity when travelling from the Mixed forest to the Aspen site. They can use their wide angle lenses to take group photos in the treed areas, and use their telephoto lenses to look up and down the length of the cutline.

Site # 2
The Aspen Community

Activities to Stimulate the Senses of Smell and Taste

"We have already listened quietly to all the sounds of the forest and used our sense of vision to explore our surroundings. Now we are going to explore the forest using our senses of smell and taste. Most of us believe that we taste with our tongues and smell with our noses, and do not realize that we commonly confuse taste and smell. Indeed, we often think we are identifying a flavor by taste, when actually smell may be more important. It is a biological fact that the sense of smell affects the sense of taste. One reason is that the smell of food stimulates the taste buds."

"In the forest, many odors are clean and mild smelling, and often go unnoticed, but in this site, we are going to discover all kinds of smells and tastes that we wouldn't normally notice. I am sure a lot of you have smelled a flower, but how many have ever smelled dried leaves, a rotting log, a fungus, or a handful of soil? Has anyone tasted a rose hip or a dandelion leaf? Let's go sniffing and tasting our way through the Aspen site."

"To begin, we are going to practice deep breathing. Normal breathing occurs all the time and the action is usually subconscious. In deep breathing, we bring more odors in contact with our olfactories and that way we can enhance our sense of smell. Breathe deeply. Slowly breathe in until your lungs are full and then sniff a little more inside your nasal passages. When you pick up an odour, try to follow it to its source. By following smells we can prolong our sensory sharpness. To fully smell an object that you have found, hold it up to

your nose. If you moisten the object or slightly crush it, it will release more of its odour."

2.1 It All Makes Scents - Construct a Scent Pomander

Construct a scent pomander and fill it with various scents found in the Aspen forest. The pomanders will all be different one from the other. Scents could include fresh and dried tree leaves, flowers, or other scents which might be found. Or place natural objects from nature into empty containers (with lids). It may be necessary to provide dowel-handled lids so the child can take them off more easily. Encourage the child to reach into the containers to feel, smell and taste the pieces of nature.

2.2 Scratch and Sniff Postcard For Home

"Many people don't realize just how many wonderful smells there are in the Aspen forest. People who visit the Aspen forest can sniff in all the smells when they are there; but what about people who don't have the opportunity to visit the Aspen forest and smell it for themselves? It would be nice if we could send a smell of the Aspen forest to our families. I know a way in which we can let our families and friends sample what the Aspen forest smells like. We can send them a scratch and sniff postcard. We will glue some smells onto a postcard, write a note and send it to our friends."

"Scratch and sniff postcards are fun to make because there are so many different smells to choose from. We must hunt around to find the smells that remind us most of the Aspen forest. Some smells are more difficult to detect than others but you will find that if you scratch the object before smelling it, it will release more of it's smell. Also, if you moisten it before scratching, then it will have an even stronger smell. You can start collecting one or two smelly objects while I set up the postcards, glue and pens."

Guidelines for Scratch and Sniff Postcards for Home

The postcards should be a large enough size to accommodate large printing and strong enough to endure outdoor handling. They can be cut from heavy weight material such as white posterboard. If the postcards are being sent in the mail, they should be inserted into envelopes or the scented objects could be knocked off.

2.3 Spirit of the Apple.

Begin with an apple, a real apple. Make a simple drawing of the apple - its shape and color. When you have finished your drawing take a big bite out of your apple and then make another picture. Show a piece of it missing. Then take another bite and make a new picture. Continue doing this until you have only the core left. Make your drawing of the core.

Next, think for a minute of the whole apple, its good taste, pretty shape, and lovely color. Think of the experience of eating the apple. Looking at the bare apple core, try to remember the whole apple and draw a big picture of the "Spirit of the Apple". Think about shapes and colors and crunching and tasting. If you can make a picture of the apples "spirit", then you are a real artist. (Adapted from Bachert, Hundreds of Ideas for Outdoor Education, 1979)

Guidelines for Spirit of the Apple
This can be done using a mixture or variety of objects found in nature: pine cones, flowers, spruce branch etc. but is good with something the participants can eat. Maybe do just after lunch while children are digesting their food.

2.4 Rose Hip Tea Time

The understory of the Aspen forest is full of a variety of different kinds of plants. The plants attract many birds and animals because of the food and shelter they provide. The twigs and foliage are browsed by deer, elk, moose, as well as by sheep and goats. Beavers, rabbits, and other mammals eat the bark, foliage, and buds, and grouse and quail feed on the winter buds. Our native Indians used many plants in the Aspen forest, in particular, those belonging to the Rose Family. The flowers, hips, and shoots were part of their regular diet. The hips contain 10 to 100 times more vitamin C than any other food. They also contain calcium, iron, vitamin A and phosphorus and make a delicious tea. Young rose buds make a good tea and so do the petals, although you will need quite a few of them to get a full flavour. The prickly shrubs have pink, showy, fragrant flowers. After the flowers have bloomed and the petals dropped, the hips are left. When the hips first come out they are green, and by fall become fat and red. Many hips stay on the bush year round; the dried ones are still very nutritious and good to use for teas.

"All this exploring and playing in the forest I am sure has made everyone thirsty, I know I am. Right at this moment there wouldn't be anything better than a nice cup of rose hip tea. While I get the water ready, each of you collect a handful of rose hips. If there are flowers on the rose bushes, collect a few petals as well."

Guidelines for Rose Hip Tea
Use fresh or dried hips, about a dozen per cup. The seeds can be eaten, but they distract from the looks of the tea. It may be preferable to cut the hips and scrape the seeds out, or crush but do not split the hips open. Steep for a couple of minutes in boiling water, pour and garnish with rose petals if available. Your tea will be a lovely, bright orange-red color.

Site # 3
The Bog

Activities and Textures to Stimulate the Sense of Touch

At this site, participants will sharpen their sense of touch, and engage in activities to discover the many textures found in nature. They will compare different textures, experience the bog on all fours as an animal would, and collect a free passage toll for a boardwalk troll.

Our tactile senses can be sharpened by discovering objects relating to texture. Texture is created by the surface structure of things, and the tactile sense allows individuals to perceive these textural differences. Objects can be described as slippery, hard, rough, soft, slimy, velvety, coarse, bumpy, lumpy, furry, hairy, waxy, spongy, etc. In nature there are many different touches. For example, soft touches can be found everywhere in nature. The fur of a small rabbit is as soft as a pussywillow. The flowers of the showy locoweed form on a soft hairy dense spike. Often combinations of textures exist. For example, some mushrooms are smooth and slimy while others may be smooth and velvety.

Rough, sharp, and hard touches can be found everywhere in the outdoors. Twigs of a white spruce feel rough to the touch and the needles are sharp-pointed. Rough can be seen in an old tree stump. Sharp thorns on a wild rose bush serve to protect the rose hips on

this plant from being eaten. A hard texture is found in rocks, in blocks of ice and on solid ground. Some textures are scaley. Tree buds, cones, plant stems, butterfly wings, some mosses, and tree bark are a few things which look and feel scaley. at this site, individuals are going to investigate and discover objects with similar and different textures.

3.1 The Troll Toll (before passing over boardwalk to the Bog Site)

"This boardwalk has a very interesting and unique feature, and before we attempt to cross it, I should explain to you what it is. This boardwalk is guarded by a troll. Now normally trolls patrol bridges, but when there is a shortage of bridges, they have been known to guard boardwalks. This troll, like most, is a shy but mischievous dwarf. He is a personable type of fellow, but like most trolls he demands a toll to pass across his boardwalk. If we don't oblige, he becomes very angry. If this were a bridge, we would have to give the troll a gold coin, but since it is a much smaller boardwalk, all this troll asks is for something to help decorate his home by the bog. Trolls love smelly things and I think that if we work together to collect a few "decorations" from the bog, he just might let us pass. Remember, the smellier the better so each of us find one very smelly thing with which to decorate the boardwalk. We can hang our objects on, under, and around the boardwalk. Or we can leave our bog presents on the boardwalk itself, or hanging from nearby bushes. If the troll doesn't like our decorations he will let out a mighty grumble".

Guidelines for The Troll Toll

This is relatively simple. Simply collect what smells most from the bog area and drape or place around the boardwalk. After everyone has added one smelly object "test" the value of the toll by timidly stepping on the boardwalk. If there are no loud grumbles to be heard, signal to the rest of the group that it seems alright to cross.

3.2 Making a Touchwork Quilt

"We are going to arrange ourselves in groups of four. Each group will be divided into two teams. Each team will have a list of different touches and find as many touches as they can, and the other team will find touches which are opposite in texture. For example, one team will find something soft, and the other team will look for something hard. Then one team will look for an object which is

smooth and the other will search for something rough. At the end of this activity, each team will get together and choose which touches to add to the touchwork quilt. When you are satisfied with your choice in touches, lay them onto the touchwork quilt where the description of the texture is written. Check with the other groups, they may have touches you need, and you may have extras to trade. You may even want to invent some textures of your own."

rough - smooth	lumpy - uniform
sticky - slippery	soft - hard
slimy - velvety	prickly - tender
coarse - silky	spongy - solid
knobby - uniform	hairy - hairless
furry - bare	

Guidelines for a Touchwork Quilt

Each team has a sheet of grid paper. A small sheet is used to discourage overcollecting, and collecting very large objects. Each square has the name of a different texture and should be filled in by the team. An alternative to gluing contrasting textures onto a sheet of paper would be to set them into egg carton containers.

3.3 A Mind-Boggling Experience

This activity will allow us to explore a squishy, soggy mat of strange plants and animals during this mind-boggling experience. It will give us an opportunity to get the feeling of the bog ecosystem and to observe its unique plants and animals - from an animal's perspective.

"Today, we are going to experience the Bog much as an animal might - down on all fours". (This should set the tone and generate interest). Most animals do not have thumbs, so I am going to tie your thumbs securely across your palms with waterproof tape; I am going to tape my thumbs down as well." (It is interesting to experience what it is like to be thumbless - it is hard to grasp objects). Then comes the bog ceremony. Everyone stands in a circle holding hands. Reach down and pick up a handful of wet, decaying sphagnum moss and smear it on each individual's face. It's an initiation rite so tell them it is to become a 'part of the bog'. Once the participants have managed to get a little wet and covered their faces with moss - the

barrier will be broken. "Now we have the bog on us, we're part of this habitat now, we're one with the bog."

"I would like each of you to reach into the moss at different depths: the wrist, elbow, and shoulder depth. What are the different moss colors? What do they smell like at different levels?" This demonstrates the composition of the bog mat - from new sphagnum growth to peat. If possible, each participant should scoop up a handful of water from the deepest portion and taste it. They should note that it tastes acidic. Ask: why?

"Now, everyone crawl forward on all fours." This way the group can stay focussed on the bog mat. "Move forward and line up at the edge of the bog. When we get to within a meter, I want us to hold hands and bounce gently up and down. Why do you think the bog is moving?"

"Dry your hands on your clothes and place them just on the surface of the water, so that the palms only are wet. Just let the hands glide slowly over the surface of the water. How does it feel? Submerge the hand until the tops of the fingers are underwater too. What does water really feel like? How does wet feel? There is a difference in temperature as you go down. At the bottom, there is a definite temperature change. Can you feel the difference?"

"Reach down to the bottom and pick-up a handful of the mud and dead plants and roots. Close your eyes and squeeze it." This shows the absorbency of the plant material - the participants can feel the water gooshing out. "Smell it. Look at it and ask yourself, what's there? Where does the smell come from?" This provides a sensory realization of the ecological concept of decomposition.

Crawl away from the bog and ask the participants to explain the changes in the ground and the plants. Are there zones? The succession is obvious as the ground becomes firmer and plant life changes. (this activity is adapted from Van Matre's The Bog, in Acclimatization, 1972)

Guidelines for A Mind-Boggling Experience

Some individuals may have difficulty getting involved with this experience because it is smelly, slimy, and involves thrusting their hands into an unfamiliar medium. It is important to get everyone

thoroughly involved in the bog ceremony. If a participant is still uncomfortable about digging into the unknown, let them experience the bog to their own comfort level while encouraging them to participate fully with the other members in the group.

Take advantage of every opportunity to reward them for their reactions to the sensory experience. The first child who says "Phew" can be rewarded and encouraged by saying: that's using the senses!

Site # 4
The Spruce Forest

At this site, individuals will discover different patterns found in nature and sense the characteristics of a forest environment. They will discover different types of leaf art, construct an artist's palette from colors found in nature, make bark rubbings, examine a dead tree, and take a 100 cm. hike.

4.1 Patterns Found In Nature

Nature abounds with patterns. Simple line patterns and geometric shapes, wavy lines, circles, and squares and rectangles can be discovered by looking and/or feeling our way through nature. Knowing about natural patterns is the first step toward being able to distinguish between different trees, rocks, and other natural objects. "Let's look for different patterns in the environment, starting with lines, and glue a small sample on this white posterboard. There may be some patterns that are impossible to collect. In that case, I'll be on hand with these pencils. You can draw the pattern on the posterboard to help you remember. For instance, I'd like to represent the vertical lines of the trees in the forest. I'll just draw some lines in this spot on the posterboard. When you're looking for patterns, try to stay in one area. Some patterns are so small that you have to look very carefully in order to see them. When your posterboards are full, we'll compare all of our patterns. Now, let's think about different patterns and where we might find them. "

"Lines are everywhere. Growing trees make up a group of vertical lines. The curved lines of a decaying tree trunk resembles many-stranded rope. And horizontal lines can be seen in shale which was formed by sedimentation and pressure from overlaying rocks. Discover objects which are patterned by lines and glue them onto your posterboard."

"Circles are common shapes in nature. The sun and moon are perhaps the most obvious large circles. Shiny circles make up the yellow eyes of the great horned owl. And the tiny red fruits of the forest bearberry often persist into the next season. Can you find a circle pattern in nature?"

"Triangles can be found in the form of bent and overlapping branches and grass stems, and in the pattern of a spider web. Star shapes can be found in the radiating flowers of the aster. Rectanglar and square patterns can be found in the bark of wood and in sedimentary rocks. Hexagonal patterns are mimicked by snowflakes, and the cells of a wasps nest. Find an object that represents the pattern of a star, a rectangle, a square, and a hexagon."

Guidelines for Patterns Found In Nature

The posterboard should be heavyweight and only large enough that individuals with manual dexterity limitations can use it comfortably. If the posterboard is relatively small (20 cms. square), the participants will be inclined to collect a smaller pattern sample and there will be less environmental damage. Write the different pattern names on the posterboards and outline spaces where the objects are to be glued.

4.2 Sensing The Forest

"There are more than trees in a forest. We can imagine the Spruce forest to be like a big house. The soil is the root cellar, the forest floor is the ground floor, the herb and shrub layer is the 2nd. floor and the canopy of the trees forms the ceiling. Let's explore this big house with all our senses."

"The "root cellar" of the forest is where trees begin to grow. A tiny seed falls from the tree to the forest floor where it germinates and

sprouts into a young seedling. As the seedling grows, it's tiny root hairs penetrate the soil to seek out moisture and nutrients from which to grow, and a place to set down a sturdy foundation. Right now we're going to experience what it feels like to "root" in the forest. Everybody gather closely together in a tight circle. Pretend we are no longer human beings. Instead, we are a giant seed which has fallen from a big tree in the forest. We're going to grow, but if we are to survive, we need to send our roots into the soil in search of food and water." Ask everybody to lie face down in a big circle with their feet in the middle and continue to describe the activity. "Our arms have now become the young roots which penetrate the forest floor into the soil. Our fingers become the tiny root hairs probing for moisture. Now slowly reach into the forest floor with your hands and arms, probing and growing. Dig deep down and move your fingers around under the surface. Feel the cool, damp soil. Smell and taste the soil. Does this seem like a good place for a tree to grow? Would it find enough food and water here, and be able to set down solid footing? Now that the tree has found a good spot to grow and set a firm foundation in the forest basement, demonstrate how this tree will grow up to the ceiling as it matures." The participants should now 'do their own thing', playing roots and pretending to grow up to the light. After a few minutes, repeat the exercise only pretend to be a small plant. Proceed as follows.

"We've felt what it might be like to grow into a large tree, and we have used our whole bodies in the experience. But what if we were the smallest of small plants growing on the floor of the forest, could we use a smaller part of our body? (Suggest they use one hand). Look around you for a very small plant. Imagine the tip of one of your fingers has become a seed from that plant, and that seed has settled on the forest floor. Explore the forest floor with your "roots" until you feel ready to grow into the mother plant. Many small plants grow quickly, and you may want to try growing into more than one plant."

Guidelines for Sensing the Forest

Leave the children to have fun with this for a few minutes. It doesn't really matter that they "grow" into trees and plants. The most important is that they come into contact with the soil and use their tactile sense to feel and explore the forest floor.

4.3 Leaf Art

a. Leaf Printing:
Some very interesting designs can be made by leaf printing. Use poster paint to color the undersides of several types of leaves. Then place the leaves on top of the paper to be printed. Put a sheet of scrap paper such as newspaper, over the top of the leaves and roll or rub the surface until a print is made.

b. Leaf Rubbings:
A leaf rubbing can be make by laying a piece of paper over a leaf and gently rubbing with charcoal, crayon or soft pencil. Outline different leaf shapes such as palmate (as our Maple leaf), heart shaped, oval, lance shaped, or linear.

c. Leaf Reflections:
Hold a piece of paper under a leaf in such a way that it catches a shadow of the leaf. With a crayon or pencil, outline the shape of the leaf. Maybe draw some insects, birds, or animals hidden in the leaves. Leaf reflections make nice additions to writing paper or home made postcards, and are always fun to color and display.

d. A Leaf Collage:
An excellent collage can be make by glueing fallen leaves on paper to make a pattern. Unfortunately, the leaves usually shrivel up after a day or so. To avoid this, press the leaves in an old book before the collage is made. You can iron gently at low heat between wax paper, then press to dry.

e. Making Leaf Skeletons
Making leaf skeletons is a good way to examine leaf veins. Remove the soft parts of the leaf by placing the leaf on a piece of soft felt and tapping the leaf repeatedly with a brush. Soon the soft parts will break away leaving the skeleton. What is left behind is the network of veins which supply the leaves with water and nutrients and move manufactured food and waste products to other parts of the plant. Examine with a hand-held magnifying glass. With care and patience, a good leaf skeleton can be made. Leaf skeletons can be suspended from thin thread and hung in front of windows for decoration. (Some activities adopted from Veep, Seeing Through The Trees, 1977).

4.4 An Artist's Palette

"The understory of the Spruce forest is made of different shrubs, herbs, and flowers. When you first look at the vegetation in the understory, it may look green and uniform, but if you look closely you will find that not everything is the same color. In fact, there are many different colors - some are just easier to spot than others. The colors of some plants are so bright that they stand out right away when you look at them. Other plants have such subtle colors that you have to get right up close in order to notice them."

"Colors are everywhere in nature. In the forest, we can become aware of the colors simply by looking around. Look at the colors in the sky during the day, at sunrise and sunset. The forest floor is littered with colored berries or mushrooms. And wild animals use colors to hide from predators, to attract a mate, or to warn other creatures of danger. Look all around you in the forest. What colors do you see?"

"Red is found in many different forms in nature. Bright red feathers on birds helps to attract a mate, and fleshy red rose-hips were the Indians' natural source of Vitamin C. Yellow is often seen in plant life, and dandelions and other yellow flowers cover roadsides and ditches with golden patches. Orange often is a "summer" color. We can see this color in the Monarch butterfly as it cheerfully travels from flower to flower in search of nectar."

"Green is a common color of nature. Green insects blend into the grasses, unseen by birds and other predators. Blues can be found almost everywhere in nature. A Spruce tree stands against a clear blue sky, and the Harebell with it's clusters of bell-like flowers can be found in open sunny areas. White reflects all the rays of the color spectrum. In the winter, hoar frost coats the trees in the forest, and a blanket of snow reveals the travels of tiny animals."

"If you were an artist getting ready to paint a picture of the understory, what colors would you use? I'm going to give you each an artist's palette; on the palette, we are going to paste different colors which you would use if you were the artist. We only need a small sample for our palette so just tear off little bits of colors you find in the forest. We're also going to need a small brush to paint our picture. Can you find anything in the forest that you think might

make a good paintbrush? I have some tape and glue if anyone needs it for their palette or paintbrush. Let's build our palettes of color."

The participants start looking around for bits of color to add to their palettes. When they are all complete, start painting an imaginary scene. The guide initiates this. "I'm going to start by painting the forest floor." The guide can pretend to be a great artist examining a subject, delicately dabbing the brush into the bits of color and laying imaginary paint strokes over the vegetation. Be enthusiastic and expressive: "A little green here, a touch of red there, perfect!" Soon everyone will be joining in on the fun. Take the palettes back to camp and hang them up with other art displays. They'll remind everyone that there are more colors than green in the natural world.

Guidelines for An Artist's Palette

The palettes should look reasonably authentic in shape and should have a hole for the thumb to go. They should be made from sturdy, white cardboard. Draw small circles around the perimeter where the participants will paste their color samples. And cut two slits in it to hold the paintbrush. (Adapted from Van Matre, Acclimatizing, 1974).

4.5 Taking A Tree's Finger Print- Making Bark Rubbings

"As the tops of all the trees grow together, they form a canopy and become like a ceiling over the forest's understory. This forest is called a Spruce forest because Spruce trees make up the majority of the canopy. Let's examine the forest canopy for a minute. Everyone lie face up around one of the trees in the forest with your feet close to the trunk. Look way up to the top. Is the canopy continuous or are there gaps? What happens to the understory when the canopy is open? Are some trees in the canopy bigger and wider than others? Are there many different trees growing in this forest?"

"It is a challenge telling one from the other when there are different trees in the forest. How can you tell them apart? One way to distinguish one tree from another is to look at the differences in bark. Bark rubbings can help us notice the differences in trees because each different tree type produces a distinctively different pattern. Let's examine the bark from the Spruce tree in this forest. When you examine the bark, ask yourself the following questions:

What is the color of the bark? Is the bark rough or smooth? Are there any cracks in the bark, and how wide are they? How thick is the bark? Is the bark the same on opposite sides of the tree? How does the bark from an old Spruce differ from the bark of a young Spruce? Do you think the bark from this type of tree would feel and smell differently than the bark of another type of tree? If you see a different type of tree, take it's fingerprint. After you have taken the finger prints of your trees, we will lay them out together so we can see how different the tree types are."

Guidelines for a Tree's Fingerprint

Tape or pin a sheet of paper to a Spruce trunk and rub with a crayon, charcoal, or a soft pencil. You may also want to try using colorless candle wax to rub over the paper. When the rubbing is finished, you can brush poster paint over the paper to produce a negative picture of the bark. This emphasizes the gaps between the ridges instead of the ridges themselves.

If there are other trees such as Pine and perhaps Aspen nearby, rubbings can be made of them as well, and all three can be compared. Noting bark differences stimulates the child to observe shape, size, smell and even growing site differences among trees. This exercise may take a while particularly if the participants start painting their bark rubbings or hunting around for different types of trees. If time is limited, the guide may suggest that each child examine only one tree. Different techniques may be used throughout the group as well, and the different effects examined together at the end of the activity. (techniques for bark rubbings taken from Veep, Seeing Through The Trees, 1977)

4.6 Life In A Dead Tree

"When a tree dies and falls to the ground, it rots and provides important nutrients to the soil. It also provides food and shelter for a variety of animal life, as well as a life-support system for plants which grow on top of its trunk. As the tree goes through continuing states of decay, it becomes a perfect habitat for a continually changing group of plants and animals."

"We are going to examine a rotting log with all our senses. Feel the different textures on the log. How many different plants can you find? If you find a fungus, lightly touch and rub your fingers across

the top, then the undersides without crushing it. Pinch off a piece of the log and smell and taste it. You will be able to get a closer look by using a magnifying glass, or you can use a dental mirror to examine the sides of objects that you wouldn't normally see. Do you see any insects living on or under the log? Why do you think they have made this log their home? Do you think it would hurt the forest if we took this rotting log away? How important is this old log to the forest?"

Site # 5
The Pine Forest

5.1 100 cm 2 Field Trip

"What Nature Says To You Depends On Your Receivers. Reading the natural environment is a special kind of reading. You read the environment not only with your eyes but with all your senses. These are your receivers. They receive the signals from your environment. In the past, pioneers would find their way by reading the stars. Indians read their natural surroundings for the presence of game and enemies. Footprints on the ground, a broken twig, animal droppings and pieces of fur told them a lot. Let's go on a small 100 cm2 field trip and read the environment in that space."

"String off a small 100cm2 section in the Pine forest for our field trip. In each small plot of land, I would like you to turn on your receivers and try to read what is or was there. Use your fingers and eyes to walk through your small space. Look for clues to activities of the past in your section of the forest. A number of activities take place right before our eyes. Why, right at my feet I see a small bird print so I know a bird has been scratching around on the ground. And here is a depression where a rock used to be; I wonder how it was moved? There's a cache of pine nuts so we know a squirrel has been busy collecting food. And a spider has made a small web between two small plants. Find a small area for your mini field, and I will help you string out your boundaries. You may want to use a magnifying glass or dental mirror to see the really fine details. I will give you some markers so when you find something of interest, you can pinpoint it's location."

Guidelines for the 100 cm 2 Field Trip

This is a field trip for crawling and peering. Collect 4 sticks 6-12" long and tag them with surveyors tape, use 5 meters of cord to mark off the mini site. Also prepare swatches of tape which have been penetrated by nails to mark individual spots within the mini field. Individuals have to use their fingers to crawl slowly through the mini field in order to examine it in every detail.

5.2 Human Sponges

"We are going to move to a quiet place where we can soak up our surroundings like human sponges. Each of us will move to a location where we will be alone for a few minutes. There, we will feel our surroundings with all our senses. We are going to absorb the whole place into our bodies. We are going to take in giant breaths of air, and smell it's fragrance. Chew on a blade of grass or a leaf, feel the warm sun on our faces, and listen to the quiet. You can reach your arms up to the sky, slump down to the ground in a loose bundle, or lie flat with your arms and legs stretched out to your sides. Take your shoes and socks off if you wish, stretch your toes, and bury your fingers into the forest floor. Roll around and use your whole body to feel the space you are in. Soak up every sight, sound, feel, smell and taste in the environment as if you were each a human sponge."

5.3 Tree Cookies

The growth of trees changes in response to their environment. If we can learn to read tree rings, we will be better able to understand a tree's life history. There are many factors which have an effect on the growth of a tree. Examine the stump of a tree and make a rub of the tree rings.

Before it decomposes, a stump can offer clues about its past. Every year a tree adds a growth ring to the wood. When the tree is cut down, the rings are seen as concentric circles on the stump. Rings vary in size depending on many environmental factors including weather, injuries, competition, etc. Studying a stump can be an interesting way to combine history and biology. Examine this stump. Can you tell how old it was when it was cut down? Why are some rings closer together than others? Can you imagine what the growing conditions were like when the tree was 10 years old, 20 years old, or 50 years old? Make a crayon rubbing of the stump.

5.4 A Sense Test

"What was the most wondrous thing you recall seeing on the trail? Try to communicate what that thing is to me and fellow nature seekers. But don't tell or show anyone what it is. First think of what it felt like to see that thing. Find something that feels like the beautiful object you are thinking about. It might be cool, the texture of coarse soil, water, grass etc. Next think about the color. Find or mix a color that suggests the color of your object. If you prefer, find something else with the same color."

"Smell is next. This is difficult, but it is important to try. Be imaginative. Try to find something with an odor that reminds you of your object."

"Next on the list is sound, a little experimentation may be necessary. You may want to create your own sound effects."

"After touch, color, odor, and sound, you have one more category, taste. Your object need not have been a food in order for you to be reminded of some taste, perhaps just dry or salty or sour or bitter. Find something that will hint at the taste of your object. Now you are ready to puzzle your friends. Try out your sense test on them. Can they guess what object you are thinking?" (idea adapted from Bachert, Hundreds of Ideas For Outdoor Education, 1979)

5.5 Write a Poem - Don't Use Rhyme

Sunlight shimmering
Glittering off the water
An orange hue -- dusk.

Dew drops glistening
In the sun, will soon be gone
Until another day

"The reason for the haiku was just because I felt like it." Quoted from Van Matre, Acclimatizing, 1974.

Haiku is a short, descriptive nature poem, often with inner meanings and significances. It is a form of poetry through which you can

express your impressions of the natural world. One way to write a haiku poem is to first name the scene, and then describe it. In the second paragraph, name the setting, and then describe the setting. Then describe the feelings you have about this scene. Go back to the beginning now and underline all the key words that really make up the essence of what you are trying to write. Rearrange these words until there are only 17 syllables in each paragraph: one line of five, one of seven, and another line of five.

You can keep it really simple. The important thing is that you get close to the object of your writing and use your poem to express that feeling.

You may find it easier to write if you pick out something in the air, earth or water around you that interests and excites you, and imagine that you've turned into that thing. Write a haiku poem about what it's like.

Imagine what it is like to feel or be something else.
-drape objects over yourself.
-how does it feel to be a flower?
-write a poem about how a mountain feels - being so big, so solid, with trees growing out of it. (Stick little spruce and pine branches on yourself). With the sun shining on it and rain falling on it, and snow.

There are other mystereous things a mountain would feel. Every person who imagines to be a mountain will probably imagine something different. You can write the same kind of poem about the slough, a tree, the sunlight, a hill, a rock or anything else around you where you are now.

One of the great things about poetry is that it helps you feel a lot of things that you don't feel most of the time. It is usually easier to know how it feels to 'be' something than it is to describe something. It makes better poetry too. Don't worry about spelling for the time being, changes can be made after the poem is completed. Don't worry about whether the poem makes sense. You don't need a fully developed idea in advance to write a good line or a good poem. Just start writing and feelings and ideas will come to you as you go along. Don't use rhyme. Rhyme can often turn a poem into a jingle-jangle and sing-song. Many poets don't use rhyme. You will be able to move more fully from one feeling and idea to another if you don't

use it (Adapted from Man Matre, Acclimatizing, 1974; and Bachert, Hundreds of Ideas for Outdoor Education, 1979).

CONCLUDING REMARKS

> When analytic thought. . . is applied to experience, something is always killed in the process. That is fairly well understood, at least in the arts. Mark Twain's experience comes in mind, in which, after he had mastered the analytic knowledge needed to pilot the Mississippi River, he discovered the river had lost it's beauty. (Pirsig, 1974, p. 77)

There are a number of different approaches and techniques which can be taken when designing an Environmental Education program. A common approach is to develop a program which is science based, and which interprets the natural environment from a biological or resource management perspective. Scientific programs are generally analytical, and involve calculating, measuring, and analyzing components of the environment. Scientific-based programs sometimes depend on "show-and-tell" techniques using videos and documentaries. In these approaches, students are taught about the environment from the confines of the four walls of their classroom. With luck, they may experience the occasional interpretive trip around the schoolyard.

Writers and teachers of scientific-based programs may philosophize that in order to appreciate the environment and perceive it as a whole, it is necessary to first know the facts. While this concept may be relevant for an Environmental Scientist in environmental studies, it misses a potentially large audience which may believe that "all learning is self-learning, and all discovery is self-discovery". Environmental Education is certainly indebted to biology and to all the sciences that relate to resource management, and while these two approaches are helpful and informative, they often have a tendency to be overly scientific, uninspiring, and relevant to individuals who have already experienced a romantic appreciation toward their environment.

A scientific approach would be inappropriate for individuals who are attempting to familiarize themselves with the natural world, or for individuals who have yet to become attracted to nature. The approach adopted in this environmental education program is dissimilar to the biological or resource management approaches.

The proposed environmental education program takes a romantic approach rather than a scientific approach when interpreting the natural environment to visiting physically handicapped children. The proposed environmental education program will allow individuals to explore, discover, and become attracted to the unfamiliar natural surroundings at Camp Horizon.

The purpose of this environmental education program is not to dwell on scientific analysis, nor is it to make little scientists out of the camp participants. This program does not "teach science in the outdoors". Many environmental education programs overemphasize analysis to the detriment of appreciation. Analysis is only valuable if it increases appreciation. It is easy to make analysis an end in itself, to make cataloguing and identifying the goal, rather than the means to increased appreciation. After individuals have become attracted to their environment through involvement in the proposed program, a change may occur. They may develop a desire to become more precise about the object of their attraction. They may want to take exact measurements, observations, and make predictions. It is this stage at which individuals become scientists, and is the stage in learning where an environmental education program based on the biological or resource management approach rather than the romantic approach, would better satisfy their needs.

This program is designed for fledgling young naturalists with disabilities who may have little or no experience in the outdoors. The activities within the program are designed to sharpen the body's senses in order to enhance awareness of the environment. It is hoped that through this increased awareness, individuals will become increasingly attracted to the outdoors and gain a sense of appreciation for the natural environment. This attraction and appreciation towards the environment, would naturally lead to learning, since learning usually begins when the imagination falls in love with something - when an object of contemplation causes enough delight that the learner is drawn again and again to dwell upon that object (Whitehead, 1950).

The love of learning is the basis of all education: that need to put oneself in the midst of the unknown. It is human nature to be attracted to the unknown, the mysterious, and the provocative. The element of attraction, allure, and of dealing with the mysteriousness of nature in all her vagaries, is intrinsic to the

design of the interpretive activities in the environmental education program for Camp Horizon.

Educationally, I think we digress when we are too narrowly scientific. It seems, for many of us that the movement into the scientific world has caused us to leave behind the gushiness or emotionality of the arts generally. But science is only one means of coming to grips with reality. Emotion, romance, and intuition are also ways of finding ourselves at home in the real world.

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