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A cultural ethic in tribal forest management and self-determination: The human dimension of silviculture

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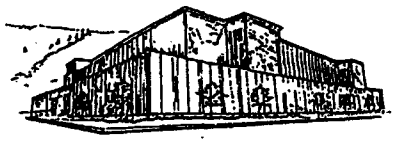

A CULTURAL ETHIC IN TRIBAL FOREST MANAGEMENT AND SELF-DETERMINATION: THE HUMAN DIMENSION OF SILVICULTURE

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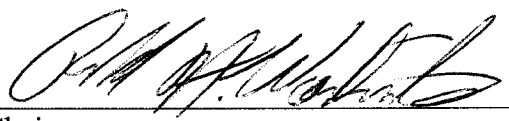

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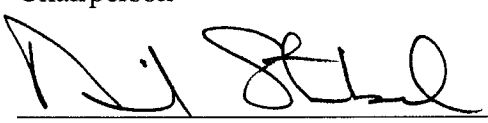

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A Cultural Ethic in Tribal Forest Management and Self-Determination: The Human Dimension of Silviculture

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The goal of this dissertation is to provide a contemporary perspective of Native American cultural/traditional values and attitudes toward harvest treatments on the Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Indian Reservation in western Montana. It is the premise of this paper that cultural/traditional Native American people hold a strong connectiveness to their environment and exhibit strong opinion on harvest treatments affecting traditional use and their impression of caring for the land. Often forest management decisions are made without firmly determining tribal membership values and attitudes about harvest treatments thus fostering discontent and mistrust about tribal forest management intentions. Tribal policies and laws often focus on quantitative measurements when determining tribal membership cultural values. These laws and polices focus on cultural uses and resources as primary in judging values.

This paper presents a method for understanding and evaluating the cultural acceptability of harvest treatments through quantitative social science research technique. An example of a survey used to determine the acceptability range of past seed tree harvest, present seed tree harvest, and past un-even aged harvest treatments along with two different clearcut techniques. The purpose was to determine which harvest treatment came closer to a cultural ethic (traditional use, belief in 'Mother Earth' and caring for the land) of the CSKT membership.

Tribal membership values and attitudes toward their environment are vital to shaping forest management practices as well as incorporating these values into tribal policies and laws. Through the National Environmental Policy Act, Indian Self-Determination Act, and Tribal Self-Governance Act, tribal members can actively change forest management practices to tailor harvest treatments that are more inline with cultural values. These laws also allow for tribal forestry professionals to integrate and incorporate tribal values of land sacredness into forest resource management while embracing and defining tribal and cultural self-determination.

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To everyone, Ahéhee' (translation—thank you, in Navajo).

CHAPTER 1

INTRODUCTION

Identifying people's values about forest resources is important, but it is not enough in today's complex struggle for sustainable forest solutions. Improving our understanding of both the scientific basis and societal effects of complex environmental problems can also lead to better description of cause and effect relationships that are more relevant to people. This means that resource managers and politicians will have to learn to frame alternatives more openly and more clearly in order to decide among the difficult but necessary trade-offs. Public meetings are good places to debate more meaningful forest policies and programs that address the problems of incomplete information. Change is more meaningful when it is translated into recognizable problems, such as deciding how much to harvest, what type of harvest treatment is socially (culturally) acceptable, and protecting sacred places, for Indian people, and more importantly, incorporating the cultural values associated with traditional cultural land ethics. These cultural values may recognize genuine concerns because they affect people's livelihood and their quality of life. Understanding public concerns along with carrying on integrative dialog with resource professionals about forest management will turn problems into a shared responsibility for wide scale, multi-generational forest management opportunities.

Bengston (1994) summarizes the usefulness of changes in the value structure associated with natural resource management by asserting that managers, policy makers, and scientists can benefit from a better understanding of public values for forests ecosystems in these ways: 1) "establishing appropriate goals for ecosystem management by shedding light on normative and ethical questions, 2) predicting how people will react to proposed forest practices, and 3) dealing with inevitable conflicts over forest management." From the natural resources' perspective, learning about people's values implies understanding the nature of value, how these values change over time, and what these changes imply for forest resource management. Kimmerer and Lake (2001) stress the point of indigenous place based knowledge as a basis for land management since the landscape reflects the history and culture of the people who live in it. More especially, advocating environmental values based on a place orientation is a feature of culturally traditional people's experience with their environment (Berkes et al. 2000; Moller et al. 2004).

This dissertation is an attempt to understand how best to manage natural resources on Tribal forest lands, based on a of solid knowledge of the congressional laws and tribal policies that govern forest resource management, while at the same time recognizing the factors that affect a cultural ethic—land values, cultural rights, and cultural knowledge. I hope to describe a cultural ethic that will best elucidate Native American care and sustenance for the land in a way that technical forestry managers comprehend. This information then can be useful to determine where natural resource managers may focus management programs for planning, protecting, and conserving cultural resources. More specifically, how tribal resource managers might integrate cultural values of land

sacredness into on ground forest management with emphasis on tribe's own cultural values and pursue its own destiny. It may also provide information useful for developing Tribal forest policy that may benefit the Tribes economically and culturally. Including a cultural ethic as an equal factor in ecological forest management may also be useful for appropriately designing computer simulation models used for forest planning.

OBJECTIVES

Major objectives:

The major objectives of this research are to develop basic knowledge of (1) the congressional laws and tribal policy that determine Tribal forest management, as case study the Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation, (2) the factors affecting a cultural ethic and (3) an approach to implementing silvicultural strategies that best emulate a cultural ethic. Such knowledge may be useful in determining a reference point for management and where management of forested lands should focus.

Specific objectives:

Objective 1: To determine the laws and policy that establishes Tribal forest management on the Confederated Salish and Kootenai Tribes of the Flathead Reservation in western Montana.

Objective 2: To determine what factors define a cultural ethic—the human dimension of natural resource management. An example of such a factor would be that Salish and Kootenai tribal members possess connectivity to the natural environment due to use, knowledge, and values of land sacredness.

Objective 3: To examine the interaction between harvest approaches and a cultural ethic. An example of such an interaction would be whether Salish and Kootenai tribal members have preference toward multiple cohorts and open stand structure or assume no management poses the greatest threat to the forest environment.

Examples of interactions between laws and policy, cultural ethics, and silvicultural practices:

1. When federal Indian congressional land (i.e., timber) laws and policies are designed inconsistently with tribal membership concerns, these laws and policies tend to be less culturally acceptable.
2. Older Salish and Kootenai tribal members (60+ years) may be more concerned about forest resource management (silviculture treatments) than younger tribal members.
3. Salish and Kootenai tribal members who participate in cultural use could be more opposed to intense silvicultural strategies than tribal members who do not.
4. Silvicultural practices with even-aged management may tend to be less favored than silvicultural practices using uneven-aged management.
5. Salish and Kootenai tribal members that exhibit a cultural ethic tend to be more in favor of silvicultural treatments that leave more trees per acre, have large diameters, and resemble older stand structures.

The process of forest management has evolved to depend on many types of inputs to decision making with emphasis placed on scientifically based information. Scientific information has long been sought by managers to improve their predictive ability regarding biological and ecological outcomes of various management practices. Within

these past few years, resource managers realize that effectiveness requires a rich information base about a variety of recipients in management of tribal- and public-lands. The laws affecting tribal forest resource management more often focus on economic development reasons, not on cultural values of the tribal membership (Trosper 1976; Davis 1993). Forest resources (i.e., commercial forest products) are a vital source of tribal revenue, adding significantly to the tribal treasury, increasing tribal employment, and offering some tribes exceptional economic opportunities. As a result the possibility for over-utilization of timber resources as a means to meet economic incentives are great (Trosper 1976; Davis 1993).

In relation to utilitarian (over-utilization of resources) motives, Caughley and Sinclair (1994) suggest two phases to reducing wildlife game cropping: first, the population must be reduced below its unharvested density (capital reduction, and then it must be harvested at precisely the rate it seeks to bounce back—sustained yield harvesting). The authors suggest that biologist tend not to think too much about the capital reduction phase because they look forward to the prospect of a yield sustainable into the indefinite future. The economics of harvesting timber now often outweighs the money gained in the future. For example, if offered a choice between $1000 now or $1000 in 10 years time, most people would take the money now. But if offered $400 now as against $1000 in 10 years the decision is no longer clear. Against money in the hand is offered a guarantee of sure but unquantifed future benefit. The question then becomes, how much is $1000 in 10 years actually worth? A simple answer is that it is worth a present sum which, when prudently invested, yields $1000 10 years hence. If capital expands at about 10% per year, then $1000 in 10 years is worth $385 now, or even less if

the currency is inflating. Hence, the answer to $400 now or $1000 in 10 years would be simple. Take the $400 now; it is worth more.

Caughley and Sinclair (1994) elaborate by reasoning a game animal harvested in 10 years is worth considerably less than an animal harvested now. All future earnings must be discounted by the time it takes to receive the money, and the economics of the harvesting operation are thus dictated by the ratio of present to future earnings.

Biologically, the rational scheme for harvesting is to reduce the population to a density allowing sustained yield and then to take the appropriate yield year after year. But it transpires that the "obvious" biological strategy is not necessarily that leading to maximum economic gain. Clark's (1976) book on the economics of harvesting natural resources shows unambiguously that the best biological strategy and the best economic strategy coincide only when a population's maximum rate of increase is relatively high. When the maximum rate of increase is somewhat lower, the real money is made by capital reduction rather than by sustained yield. Discounted net revenue is maximized for the total operation when the population is taken by capital reduction to a level below that generating sustained yield (Caughley and Sinclair 1994). A lower sustained yield in the future is thereby traded off advantageously against a higher immediate gain. When the maximum rate of increase is lower, still it may be economically clear sighted to make total tradeoffs, taking all revenue by capital reduction and sacrificing all future sustained yield (Caughley and Sinclair 1994). This strategy maximizes net revenue, discounted to present value, when the population's maximum rate of increase is below the rate of return on alternative investment. This provides an economic justification for the extinction of a population or even a species.

Trosper (1976) indicates that tribal forest resources can be over utilized to meet economic incentives, increasing and sustaining tribal employment, and adding to the tribal revenue. To summarize, free market trading in a privately owned renewable resource can result in resource depletion, or unsustainable harvesting for a forest, particularly (and perhaps paradoxically) when the participants in the market have perfect knowledge (Caughley and Sinclair 1994). That happens less often for a tribally owned resource because the tribe's discount rate is lower. However, tribally owned resources take on the character of privately owned resources when the persons managing the resources and the persons harvesting the resource imagine that they, and not the persons as a whole, own the resource (Caughley and Sinclair 1994).

Tribal timber assets should be administered by the tribal forest managing entity and the tribal government to achieve uniform tribal goals such as balancing the demand for maximized income and long-term conservation of cultural and social preservation values. Thus, greater public involvement in management of natural resources may enhance sustainable resource use (Berkes et al. 2000; Folke 2004). Heightened tribal interest in natural resources has resulted in more tribal members wanting say in how their resources are managed (Durglo 2003). Widespread tribal membership desire for greater involvement or at least input into forest management decision making has led to greater expectations for government responsiveness to such input (Caughley and Sinclair 1994; Moller et al. 2004; Garibaldi and Turner 2004). Subsequently, the need of natural resource managers to join scientifically based information with membership concerns has increased the desire for more collaborative environmental management in Indian country. This collaborative partnership enhances consistency with cultural values of the tribal

membership and empowers the tribal membership while adding legitimacy to tribal forestry department and tribal governments as they move toward self-determination goals.

STUDY AREA

The tribe participating in this study is the Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Reservation in west central Montana. A number of considerations influenced the choice of tribe to study in this research. The Tribal Forest Department (TFD) has forested land that serves as a major economic and commercial base for Tribal economic development, and has a published Tribal natural resource vision for the long-term (Confederated Salish and Kootenai Tribe 1996). Foremost is the Tribal Forestry Department's willingness to participate in this study—to increase understanding of the requests of their tribal membership concerns over forest management. In addition to having a developed forest resource land base, and tribal forest policy and management, there is a strong concern for long-term sustainability of forest resources (i.e. timber cultural sites). The Confederated Salish and Kootenai Tribe possess a thorough knowledge and respect for the natural environment as important issues.

The Confederated Salish and Kootenai Tribes of the Flathead Reservation

The Tribes of Flathead Reservation consists of three culturally unique groups, the Salish, the Kootenai, and the Pend d'Orielle. The tribal membership are modern representatives of several Salish, Kootenai, and Pend d'Orielle bands who lived in western Montana, northern Idaho, and eastern Washington in the early 1800s. In 1855, the tribes surrendered their claim to western Montana and northern Idaho, but reserved the Bitterroot Valley as their homeland. However, within the same year, the Salish,

Kootenai, and the Pend d'Orielle gave up their lands in the Bitterroot Valley. Through negotiated treaty under the Hellgate Treaty of July 16, 1855, the Bitterroot Salish, Kootenai and Pend d'Orielle people were reassigned to the Lower Flathead River Basin, now called the Flathead Indian Reservation.

Flathead Reservation encompasses 1.3 million acres. The reservation includes the southern half of Flathead Lake, forested mountains, and sheltered valleys just west of the Continental Divide in Montana. Roughly, one third of it—459,408 acres —is tribal commercial forested lands. In 1979, the Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation designated for exclusive tribal member use only, the South Fork Primitive Area (Confederated Salish and Kootenai Tribes 1994; 2005). In 1982, the CSKT was the first tribe in the United States to designate 92,000 acres of the Mission Mountains, a tribal wilderness area (Confederated Salish and Kootenai Tribes 1994; 2005). Most of these timbered acres are on the hills and mountains along the perimeter of the central portions of the reservation and represent the bulk of the Tribal land base (Figure1). The forests of the reservation are typical of the northern Rocky Mountain region. Ponderosa pine *(Pinus ponderosa)*, Douglas-fir *(Pseudotsuga menziesii)*, western larch *(Larix occidentalis)*, lodgepole pine *(Pinus contorta)*, grand fir *(Abies grandis)*, Engelmann spruce *(Picea engelmannii)*, subalpine fir *(Abies lasciocarpa)*, whitebark pine *(Pinus albicaulis)*, and alpine larch *(Larix lyallii)* are the most common trees, ordered by ascending elevation range for the species. Other species of trees are western white pine *(Pinus monticola)* and western redcedar *(Thuja plicata)*. Common shrubs include snowberry *(Symphoricarpos albus)*, spiraea *(Spiraea betulifolia)* and ninebark *(Physocarpus malvaceus)* with some understory grasses such as wheat grasses

(Agropyron spp.), fescues *(Festuca spp.)*, pine grass *(Calamagrostis rubenscens)*, and introduced bluegrasses *(Poa spp.)*. River flood plains support ponderosa pine *(Pinus ponderosa)*, Rocky Mountain juniper *(Juniperus scopulorum)*, Douglas-fir *(Pseudotsuga menziesii)*, black cottonwood *(Populus trichocarpa)*, paper birch *(Betula papyrifera)*, willow *(Salix spp.)*, alder *(Alnus incana)*, dogwood *(Cornus sericea)*, rose *(Rosa woodsii)*, and snowberry *(Symphoricarpos albus)*. Willows *(Salix spp.)*, cattails *(Typha latifolia)*, meadow grasses *(Poaceae spp.)*, and sedges *Carix spp.)* dominate wetland areas.

Today, there are approximately 6,952 enrolled tribal members (Confederated Salish and Kootenai Tribal Enrollment 2000). Of these members 3,143 (45%) are eighteen years and older and live on the Reservation and 2,158 (31%) are eighteen and older members and live off the Flathead Reservation. The remaining 24% make up the population under the age of eighteen years (Confederated Salish and Kootenai Tribal Enrollment 2000). These distinct tribal groups share, like all Native people in the Americas, the same epistemological perspective toward the environment— that of the earth as member of a unit family, i.e., Mother Earth. In general, a profound respect, moral edict, thanksgiving, and sacredness epitomizes the attitude and behavior toward the land and all of creation (Incashola 2000). Another similarity these distinct groups share is the long-term association with the Flathead basin region as ancestral territory. The Salish, Kootenai, and Pend d'Oreille have lived in the Flathead basin, sustaining themselves without severely degrading their environment (Confederated Salish and Kootenai Tribes 2005), for thousands of years before Europe introduced the market economy.

The landscape of the Flathead Indian Reservation is divided into six landscapes based on physical land features and administrative priorities based on management strategies outlined in the Final Environmental Impact Statement (Confederated Salish and Kootenai Tribe 2000). The majority of forested lands are on the exterior edge of the reservation— the North Mission, Missions, West, Southwest, and Jocko sections (Figure 1). Currently, the reservation has a greater than 80% non-Indian population (ratio of 4:1) living within the exterior boundaries and the land ownership is checkerboard. The reservation is divided into political districts: Dixon, Arlee, Elmo/Dayton, Hotsprings, Mission, Pablo, Polson and Ronan.

Forested lands are a vital part of the daily life in rural communities that depend upon forest resources for cultural oriented resource use such as hunting, fishing, berry/mushroom gathering, post and pole harvesting, livestock grazing, medical plant gathering, and spiritual fortification (to name a few). Therefore, it is a major thesis of this paper to investigate the ecological, political, and sociocultural dimensions associated with the forests of the Confederated Salish and Kootenai Tribes of Flathead Indians. Indian people draw their cultures and livelihood from their lands. Every community is unique and every forest planning strategy should be tailored to the unique dimensions that make up the local community affected by forest resource planning (Yazzie-Durglo 1998).

The current forest management plan purports to take an interdisciplinary ecosystem management approach with emphasis placed on fire regime behavior (Confederated Salish and Kootenai Tribe FEIS 2000); thus, silvicultural strategies are to mimic or to restore these natural processes across the landscape. Historically in western Montana, Indian ignited fires had widespread influences in lower elevation ponderosa

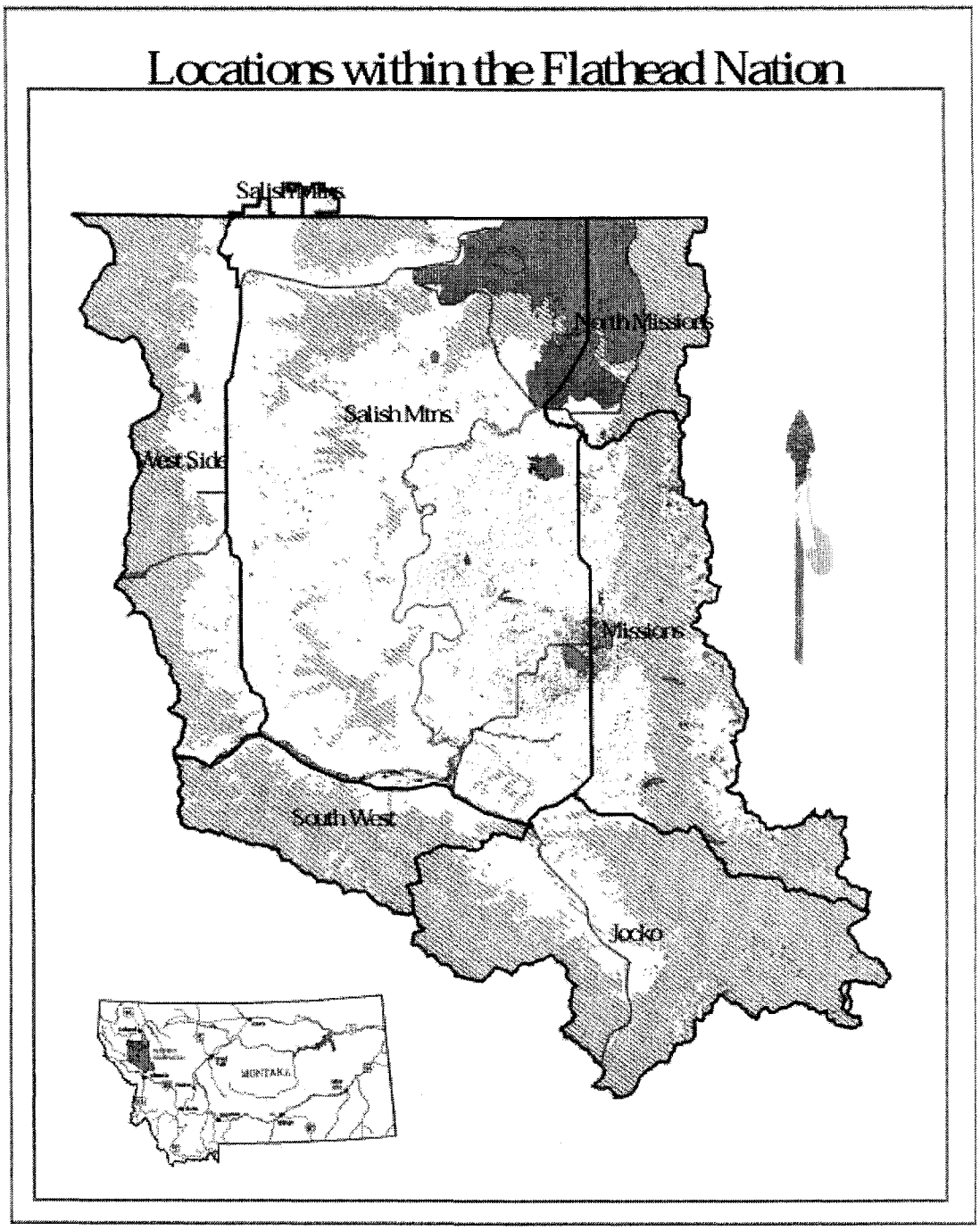

Figure1. Tribal and trust lands and forested acres on the Confederated Salish and Kootenai Tribes of the Flathead Reservation within the State of Montana. Forests occur primarily on Tribal and trust land. The forests are divided into management sections. The green area represents the forested areas while the region in the middle is valley and basin (Confederated Salish and Kootenai Tribe 2000).

pine/Douglas-fir forests *(Pinus ponderosa/Pseudotsuga menziesii)* (Barrett 1980; Barrett and Arno 1982). The Confederated Salish and Kootenai Tribal (CSKT) Forest

Management Plan (2000) takes an adaptive ecosystem-centered approach, whereby societal concerns and constraints play an equal role in forest management. The CSKT Forest Management Plan tracks the historic accounts of Indian fires important to many activities that may meet cultural and traditional needs (CSKT FEIS 2000).

The following chapters are divided into five aspects on the Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation—the human dimension or the sociocultural human dimension; the silviculture or ecological dimension; and tribal law and policy or a political dimension.

CHAPTER 2

LITERATURE REVIEW

This chapter investigates the issues of historic and current natural resource management paradigms associated with the Flathead Indian Reservation by exploring the human dimensions—or the social-cultural dimension— and the indicators of a cultural ethic. The social-cultural dimension section is essential to understanding how Native people view their landscapes, as well as to investigating current forest management paradigms and harvesting methods used and to understanding the political components, laws, and policies that affect forest management on the Flathead Reservation.

Historically, resource extraction has been the result of most natural resource policy and management decisions, despite multiple-use objectives. However, since the 1960s the passage of the Multiple-Use and Sustained Yield Act, the National Environmental Policy Act, and the Endangered Species Act have given multiple use a broader scope in natural resource administration (Getches et al. 1993). Other resource values, such as wildlife, fish, wilderness and recreation, share an equal footing alongside resource extraction (Getches et al. 1993). Differing value orientations for the environment and for human interaction with natural systems (Dunlap 1992; Berkes et al. 2000) are at the core of conflicts natural resource decision-makers face.

According to Cable and Cable (1995; Berkes et al. 2000; Folke 2004), cultural values and attitudes toward the environment, social class (Colding and Folke 2001), and our relationship to others reach decisions on environmental use. Values and attitudes shape the issues people see as important. The theory of reasoned action suggests that more subjective societal norms and social pressure (Cable and Cable 1995) influence behaviors. In combination, Norton and Hannon (1997) support place orientation as cultivating a concept of sustainability based on local commitment of cultural and natural heritage, which may provide collaboration between managers, policy makers, and the local tribal membership (Yazzie-Durglo 1998). It is within this human dimension aspect that natural resource managers may find a sense of duty for decision making that express societal concerns more directly (Yazzie-Durglo 1998).

Sociocultural Human Dimension

Human dimensions is a generic term that examines how human characteristics (i.e., perceptions, values, and beliefs) and actions affect and are affected by other entities or systems, as well as application of that knowledge toward contemporary issues (Ditton 1997; Ewert 1996; Berkes et al. 2000 et al. 2000; Turner et al. 2003). The major tenet of this field is that human perception and behavior play a primary role in development, management, and evaluation of local and global systems (Bengston 1994; Ewert 1996; Manning et al. 1999). Therefore, social science perspectives play a prominent role in any analysis or future modification of these systems (Bengston 1994; Ewert 1996).

Within the natural resources management arena, the human dimension has been defined as "the scientific investigation of the physical, biological, sociological, psychological, cultural, and economic aspects of utilization at the individual and

community levels" (Ewert 1996). In addition, Ditton (1997) suggests human dimension is "an area of investigation that attempts to describe, predict, understand, and affect human thought toward natural environments and to acquire such understanding for the primary purpose of improving stewardship of natural resources." Values and attitudes consciously and unconsciously shape preferences for landscapes, resource policies, and management techniques. As a result, finding common ground between western scientific knowledge and the social and spiritual knowledge of place-based cultures may help resource-management science unravel complex ecological interactions (Garibaldi and Turner 2004) and develop sustainable management of forest resources (Donovan and Puri 2004).

The major aspects of ecosystem management integrate ecological principles, ecological processes (Jenson and Everett 1994; Kaufman et al. 1994) and more importantly, societal concerns (Grumbine 1994). Yet quantification of societal concerns such as spiritual orientation, cultural views of land sacredness, and etiological knowledge tends to conflict with measurable forest resource values in agency decision-making (Yazzie-Durglo 1998).

Norton and Hannon (1997) suggest that beyond values, environmental valuation based on a commitment to place or place-based knowledge underlies consensus enhancement. The authors suggest that "a multiscalar structure of valuation and policy formation are based democratically in many local perspectives, and yet capable of embracing the imperative that local behavior be understood in relation to longer-term and larger-scale environmental problems" (Norton and Hannon 1997: p. 228). In general, a sense of place involves both expressing preferences in the short term and, for multi-generation choices, conveying desires for future generations. Although most

environmental decisions are political, Norton and Hannon (1997) postulate that political actions must be contextualized with a multiple level approach with local determinations as central in the political process.

Rittel and Webber (1973) recognize the more pervasive nature of values as problems in environmental decision making:

> Diverse values are held by differing groups of individuals—that what satisfies one may be abhorrent to another, that what comprises problem-solution for one is a problem-generation for another. Under such circumstances, and in the absence of overriding social theory or overriding social ethic, there is no determining which group is right and which should have its ends served.

Local values are associated with a particular place. Local values are forged out of an intimate relationship with the biotic communities in a region (Kimmerer 2000; Kimmerer and Lake 2001), and local inhabitants associate their perpetuation with success in maintaining their sense of spiritual and physical place (Schnaiberg and Gould 1994; Kellert and Wilson 1993; Kimmerer 2000). These values conflict with geographically broader, centralized, and authoritarian values, when agency discretion and authoritative values interpret them as invalid (Norton and Hannon 1997; Yazzie-Durglo 1998).

Behan (1997) implies that the scientific attitude we project in our language influences our interactions with the public. Science is of course a very important and necessary part of resource management. But when we emphasize a scientific and objective attitude to the exclusion of all else, we create an environment in which it is difficult for people to speak about intuitive and emotional experiences, and in which it is difficult for us to hear or understand them when they do (Behan 1997; Norton and Hannon 1997; Orr 2004). Our work requires us to have the best scientific information available about ecosystems (Orr 2004), but we also need to consider the kinds of

experiences that are expressed through emotions and values at the local, biosocial perspective, which is shaped by the social subsystem (Bonnicksen 1991; Behan 1997; Orr 2004). Otherwise, we are leaving out a very important part of what makes us human.

The combination of ecological, political, economic and sociocultural factors that influence the management process are essential and fundamental to understanding ecosystems as a whole and dynamic entity (Ditton 1997: Ewert 1997; Norton and Hannon 1997; Turner 2004). The United States is utilitarian but some segments of the culture have produced non-utilitarian concepts for conservation (e.g. the Endangered Species Act, Migrating Bird Act, and a variety of wildlife laws). This recognition of the value of a multi-disciplinary approach is already taking place in the field of ecological restoration (Jordan et al. 1987; Kimmerer 2000; Kimmerer and Lake 2001; Berkes et al. 2000; Garibaldi and Turner 2004). The theme of restoration is applied to both the biological ecosystem and to the human experience of the ecosystem (Kimmerer and Lake 2001). The process of ecosystem restoration includes restoring the human experience and relationship to the ecosystem (Jordan et al. 1987; Kimmerer and Lake 2001; Garibaldi and Turner 2004).

Indicators of a Cultural Ethic: Caring for the Land and Cultural Use of the Land

Tribal territories form the geographic limits of each tribe's jurisdiction (Getches et al. 1993), support a residing population, are the foundation of the tribal economy, and provide an irreplaceable forum for cultural integrity based on religious practices and cultural traditions premised on the sacredness of land (Deloria 1993). Today, fully functioning Indian nations possess four distinct yet interwoven and interdependent attributes of tribal sovereignty: secure land base, functioning economies, self-government

and cultural integrity (Getches et al. 1993; Deloria 1993). In short, these tribal lands are essential elements to tribal existence and autonomy as sovereign nations (Wilkinson 1987; Getches et al. 1993). Moreover, a priority implicit in Indian land tenure is maintaining a homeland in which both present and future generations of the tribes may live and flourish. Tribal individuals and families reside on secure land bases, which have supported and nourished their ancestors for thousands of years past, and continue to be the core and integral foundation of tribal existence (Getches et al. 1993; Deloria 1993).

For most Native peoples, creation stories, songs, prayers, and traditional ecological knowledge (Thrupp 1989; Turnbull 1994; Wolfey 1998; Riggs 1998; Kimmerer 2000; Kimmerer and Lake 2001; Garibaldi and Turner 2004; Berkes et al. 2004) and wisdom teach us to visualize and understand the connections between the physical environment, the spiritual values that create and bind a tribal community, and the social welfare of the community (Thrupp 1989; Tyler 1993; Nelson 1993; Berkes et al. 2004). Native peoples are taught and encouraged to develop a system of values that induces a profound respect for the natural forces that give life to the complex world of which they are a small part (Rogers-Martinez 1992; Deloria 1993). This traditional ecological knowledge is based on millennia of observation, habitation, and experience, all utilizing a consistency of human interaction and intervention with the environment (Rogers-Martinez 1992; Tyler 1993; Berkes et al. 2000). It is the traditional ecological knowledge that has preserved many tribal lands in a condition where many medicines and foods are abundant today (Thrupp 1989; Nelson 1993; Garibaldi and Turner 2004). As Europeans explored and settled North America, they compiled voluminous accounts of the continents' natural history (Cronon 1983). What rings clear is the vastness of

unbroken forest, the unfettered expanses of prairie, the phenomenal abundance of wildlife, and the richness and diversity of natural communities (Cronon 1983).

At the heart of tribal cultures and other indigenous cultures of the United States is the inseparability of the health and welfare of the tribal people and the natural environment (Pecore 1992; Kimmerer and Lake 2001). Most Native peoples understand that the environment is a blend of what is known as science and management (Pecore 1992; Yazzie-Pina and Covington 1994; Wolfey 1998; Riggs 1998; Kimmerer and Lake 2001). Indeed, tribal communities have persevered for centuries because many have knowledge of the natural, spiritual, and ecological world, and understand and respect the interconnectedness among humans and all other living things (Kellert and Wilson 1993; Moller et al. 2004). Additionally, tribal people possess a cultural-based knowledge of ecosystems that has evolved and accumulated and is continually tested and improved for maintenance of tribal existence (Kellert and Wilson 1993; Deloria 1993; Pecore 1993; Garibaldi and Turner 2004). The collection and use of this complex knowledge of the natural world is an integral part of any tribal decision-making process (Pecore 1992; Yazzie-Durglo 1998; Garibaldi and Turner 2004; Folke 2004).

In stark contrast with the world view of the dominant (Euro-American) culture (Black 1970) in the United States regarding natural resources, which is basically a scientific-utilitarian one, Native people tend more toward ethical and spiritual concerns (Overholt and Callicott 1982; Pecore 1992; Deloria 1993; Colding and Folke 2001) in regards to their environment. These concerns need to be addressed in order to understand the feasibility of such indigenous (tribal) membership influence in forest resource management. This section of the chapter summarizes characteristics of caring for the land

and cultural use of the land that define a cultural ethic. It stresses the need to reject the idealistic and/or preservationist views about Native American understanding of the land, and instead, to recognize both its limitations and its potential contributions to forest resource management in Indian country (Pecore 1992; McCorquodale et al. 1997).

The ending section of this chapter discusses operationalizing the dimensions of a cultural ethic in a survey questionnaire. In sociological theory, the difficulty is translating the problem or idea into good questions within the survey—operationalizing—for accurate data collection, interpretation and implementation (Denzin 1970; Ragin 1994; Singleton and Straits 1999). This survey approach may be used as an example to discovering what the tribal membership see as important issues in forest management and may help forest managers integrate these important issues into on ground forest management strategies.

Overview of the Concepts: Caring for the Land and Cultural Use of the Land as Indicators for a Cultural Ethic

1. Epistemological Characteristics of Caring for the Land

For more than 12,000 to 30,000 years, Native peoples had inhabited and intensely utilized the land; had gathered; hunted; fished; settled and cultivated; had learned the terrain in all its details, infusing it with meaning and memory; and had shaped every aspect of their lifeways around it (Nelson 1993; Cronon 1983). Native peoples through the centuries have altered their environment—hunting affected game populations; gathering had impacts on plant communities; settlements and agricultural fields across the landscape caused more visible and significant changes (Cronon 1983; Delcourt et al. 1986). Perhaps most important was the extensive manipulation of the environment on a

continental scale, through intentional use of fire (Cronon 1983; Arno 1980; Agee 1993; Anderson 2005).

The basic point is this: although no human society can exist without affecting its surrounding, Native peoples inhabited the continent for a long span of time, yet it remained in a condition that Europeans identified as "wilderness" (Nash 1967; Cronon 1983). This is strong testimony to the adaptation of mind—the braiding together of *knowledge* and *epistemology* that linked Native America's indigenous people with their environment (Thrupp 1989; Nelson 1993; Perrett 1998; Anderson 2005). It is important to remember that indigenous communities are no different from any others; some individuals violate even the strictest laws or moral edicts. Some Native peoples occasionally disobey the code of respect toward the environment and to animals, offending its spirit and bringing themselves and their community bad luck (Colding and Folke 2001).

Ethnographic records support the existence of a widespread and well-developed tradition of conservation, land stewardship (Rogers-Martinez 1992), and religiously based environmental ethics among Native peoples (Delcourt et al. 1986; Overholt and Callicott 1982). Aldo Leopold's eloquent and insightful formulation of a land ethic (Leopold 1949) is an example of convergence with Native American thought. The land ethic is a founding principle of *religious belief, ideology, attitude*, and *behavior* toward the environment. Both the Native American land ethic and the one espoused in Leopold's famous essay rest upon a similar fusion of scientific knowledge and environmental philosophy (Leopold 1949; Yazzie-Pina and Covington 1994). The one is lavishly and intricately expressed in a multitude of cultural contexts (Leopold 1949); the other is

contained in a credo remarkable for its simplicity and wisdom. However, taken together they represent a powerful statement about human relationships to the natural world (Yazzie-Pina and Covington 1994).

I do not mean to idealize traditional peoples or to imply that they live in a state of ideal bliss (harmony and perfection). They do not. But in Native cultures, ideological constraints on human behavior and uses of technology create a truly sustainable relationship between humans and the environment (Kimmerer and Lake 2001; Garibaldi and Turner 2004). In this relationship, Native people are nourished by what the natural community provides while the diversity and fecundity of nature is nourished in turn (Yazzie-Pina and Covington 1994; Kimmerer and Lake 2001; Anderson 2005). These ideological constraints (taboos, ecological knowledge, and experience) vary from one tribal community to the next and are defined in their own cultural ethic. Colding and Folke (2001) asserts in traditional cultures, social taboos guide human conduct toward the natural environment and are similar to formal institutions for nature conservation in contemporary society.

An idea that remains a key element in the concept of 'caring for the land' is the belief that the world is essentially connected to health of Native peoples (Pecore 1993; Yazzie-Pina and Covington 1994; and others) and is a spiritual entity (Deloria 1993; Pecore 1993; Yazzie-Pina and Covington 1994). Deloria (1993) asserts that the spirit of place is a concept not only akin among Native peoples, but also to historic European cultures. According to Deloria (1993), the spirit of the land in historic European culture transferred from one person to another by offering the buyer a handful of soil. The person selling the land was obligated to transfer the spirit of the land to the buyer as well as

transferring ownership title. In traditional Native American teachings the spirit of the earth is an essential part of the total understanding of the ways of creation and is bedrock to understanding how to care for the land as a living entity.

In addition to the spirit of place (Deloria 1993), it is also necessary to examine the concept of 'mother earth' as it is perceived by Native peoples. Traditional teachings view all elements of creation as being related, all rely on the earth for sustenance and are in this way bonded with each other to the earth as children to their mother. In practical terms respect and responsibility for the earth are perceived as a basic principle upon which understanding of life and its realities are based. This respect and responsibility are expressed through the consideration given to our relationship to the environment and to the animals and plants which share their life with us. Therefore, the conceptual understanding of caring for the land embraces respect, kinship, epistemology, religious belief, attitude, and behavior (Deloria 1993; Yazzie-Pina and Covington 1994).

2. Cultural Use of the Land: Traditional Use

All humans groups consciously change their environments to some extent and the best measure of cultural ecological stability may well be how successfully the environmental changes maintain its ability to reproduce/restore itself. The point is the environment may initially shape the range of choices available to a people at a given time, but then cultural use reshapes the environment in responding to those choices.

Cultural uses by Native peoples are a way of life and living. The Indian Forest Management Assessment Team (IFMAT)(Intertribal Timber Council IFMAT 1993) defines cultural resources as "those tangible items which relate to the traditional way that Indian peoples interact with their landscape, includes medicine, craft and food plants,

sacred or special areas and burial/archeological sites." Most governmental agencies and governmental laws pertaining to natural resources on Indian reservations lump cultural uses into cultural resources, a term that includes historic and archeological resources used in federal statutes relevant to protection and conservation (Getches et al. 1993). These tangible items are federally protected and should be given equal consideration in forest planning and management. However, cultural use is an epistemological view of the relationship to the environment on the one hand, while on the other the physical rearrangement of the environment to meet the needs of the people. More often these two concepts go hand in hand with how Native people use the environment. Cultural use can be identified as those physical manipulations and changes of the land for sustenance, consumption, and maintenance of culturally important medicines and food, not excluding spiritual fortification (Kimmerer and Lake 2001).

Some cultural uses (traditional-based uses) are: hunting, cultivating, fishing, camping, berry and nut gathering, firewood collection, spiritual use, and traditional ecological knowledge, such as the use of fire. Fire was useful in driving game and opening the forest "to increase visibility, improve forage" (Kay 1995), but importantly it was a tool to encourage the growth of certain plant species (Kimmerer 2000; Kimmerer and Lake 2001; Turner et al. 2003; Anderson 2005). Fire was used consciously to modify, maintain, and restore the structure and composition of ecosystems that could provide for the needs of the community (Kay 1995, Arno 1980; Agee 1993; Kimmerer and Lake 2001; Anderson 2005).

Analysis can be constructed so that the variables that define a cultural ethic—caring for the land and cultural uses can be observed separately. Religious belief,

ideology, attitude, and behavior characterize caring for the land and are very different from cultural uses characterized by hunting, fishing, plant gathering, spiritual use, and traditional knowledge. A good strategy for reviewing the literature is researching each separate variable in detail, but this approach can include a great deal of content that does not pertain to the current study. Therefore, finding literature that is relevant to the research can legitimize the overall concept. The approach of this study is to find overlapping concepts that pertain to or include the variable of caring for the land and cultural uses.

There have been basic ways of approaching the topic of indigenous knowledge empirically in anthropology and ethnography. Numerous analysts have discussed the knowledge, practices, and beliefs of poor people in developing countries. This phenomenon is termed local knowledge, indigenous skill, traditional knowledge, or ethnoscience in areas of rural agriculture (Thrupp 1989; Turnbull 1994; Folke 2004). The research in indigenous knowledge focuses on belief systems that motivate behavior and attitude toward the land (Kimmerer and Lake 2001; Colding and Folke 2001). This process is learning from Native people instead of about Native people (Sillitoe 1998). More precisely the field of human ecology envelops ecological thinking and actions of human relations and attitudes toward their environment (Sillitoe 1998; Folke 2004; Garibaldi and Turner 2004).

Local-Level Understanding: Knowledge as Power

In social anthropology research, Sillitoe (1998) defines local knowledge as "any knowledge held collectively by a population, informing interpretation of the world." Using local knowledge of Native people for management of their natural resources is key for reversing the top-down hierarchical approach and decreasing the scientific models

and reductionism principles typical of scientific research (Thrupp 1989; Sillitoe 1998; Garibaldi and Turner 2004; Moller et al. 2004). Regarding human values, Thrupp (1989) assesses that local level knowledge is not homogenous from one population to the next. Indigenous people have their own effective 'science' and resource-use practices (Morrison et al. 1994; Anderson 2005), and to assist them researchers need to understand something about their knowledge and management systems (Thrupp 1989; Berkes et al. 2000; Moller et al. 2004).

Sillitoe (1998) concludes that in anthropology and human ecology approaches, "research currently lacks paradigmatic or methodological coherence," and a battle between the western science research approach, which scientists imply has something valid to contribute, and indigenous knowledge, which scientists imply needs to be validated. Sillitoe (1998) proposes that research methods need to anticipate this, facilitating adoption of interventions by promoting partnership and an awareness of local perspectives. The understanding of local knowledge allows Native peoples to gain a sense of control in the processes of problem-solving—aiming for goals closely related to their own cultural perspectives—in managing their resources. Perhaps the most promising way to build and legitimize Native peoples' capacities is to understand that local knowledge and cultural-based competencies are a means of power, and can therefore be a source of empowerment through active participation in decision-making processes and making effective use of their knowledge (Thrupp 1989; Sillitoe 1998; Berkes et al. 2000). A decision process that is inclusive of and interactive with Native cultural values will result in greater trust in the decision-makers by tribal governments and the tribal membership.

Silviculture—Ecological Dimension

It is the thesis of this study to evaluate tribal membership predilection toward harvesting treatments by uncovering an acceptable practice that best resembles a cultural ethic. Therefore, harvest methodology is essential to understanding current tribal forest management. Harvest methods are prescribed to simulate a disturbance pattern (Smith et al. 1997). For instance, clearcutting is a regeneration method conducted to mimic severe disturbance and provide an environment for species that require a great amount of sunlight to regenerate (Smith 1962; Smith et al. 1997; Confederated Salish and Kootenai Tribe FEIS 2000). Other harvesting methods such as seed tree and shelterwood are conducted to increase or protect regeneration (Smith et al. 1997). Forestry methods for regenerating forests as part of a timber harvest fall into two broad categories: (1) even-aged management systems, which include clearcutting, shelterwood, and seed-tree methods, and (2) uneven-aged systems, which include single-tree and group selection methods. As part of these methods, regeneration can be obtained by natural seeding or planting, or by release of advanced regeneration (i.e., seedlings established in the previous stand).

The methods all have been used successfully in western North America and all will have their place in future forest management. They are the foundation upon which we will build new strategies to meet society's desire for sustaining forests with old-growth characteristics as well as its demand for wood (Oliver and Larson 1996; Smith et al. 1997).

Silviculture is the art and science of manipulating forest stands to achieve human objectives, including the production of goods and services (Smith et al. 1997). As a

discipline, silviculture has very strong traditions most of which are rooted in European forest practices. Basic concepts underlying the establishment, tending and harvest of forest stands were established by the beginning of the 20th century (Smith 1962). Nowhere are traditions more firmly established than in the approaches to regeneration harvesting of forest stands.

All regeneration harvest methods were created with a singular objective: regeneration and subsequent growth of a commercially important tree species (Smith et al. 1997). Management objectives for forest harvesting have become increasingly complex during the last several decades. Forest managers are no longer seeking simply to create a free-growing replacement forest while safely and efficiently harvesting the mature stand (Oliver and Larson 1996; Smith et al. 1997). Today, multiple objectives typically include maintenance of specific levels of ecosystem processes, including habitat for elements of biological diversity (Oliver and Larson 1996; Smith et al. 1997). Tree regeneration and its subsequent growth are often still concerns, although these objectives—especially for rapid growth of the regeneration—often are subordinated to other goals. Harvest cutting may include such diverse goals as maintaining tree root strength; providing for specified levels of snags of various species, sizes, and conditions; and fulfilling specific aesthetic criteria (Oliver and Larson 1996; Smith et al. 1997).

Disturbance regimes play a major role in the structure and composition of forests in the Inland West (Agee 1993; Covington and Moore 1994). A mean fire interval (MFI) of 42 years and a mean fire-free interval (MFFI) of 15.8 years are associated within mixed conifer habitat types in Montana (Arno et al. 1995). For lower elevation habitat types such as ponderosa pine and drier Douglas-fir habitat types, the fire interval is 5-30

years in most areas (Arno et al. 1995). Frequent low to moderate fires is an important disturbance mechanism typical of larch and ponderosa pine over Douglas-fir in stands where these species occur. A severe forest fire in northern Idaho and western Montana, called the 1910 Fire, was the last major fire event that affected the structure of these habitats and may be responsible for the existing structure and composition (Agee 1993; Arno et al. 1995). However, since fire suppression, many stands adapted to frequent low to moderate intensity fire regimes have increased numbers of shade tolerant species in the understory (Arno et al. 1995; Covington et al. 1997), disrupting the ecosystem structure in both flora and fauna. Frequent fire regimes play a role in the structure and composition of ecosystems adapted to disturbance regimes (Arno et al. 1995; Covington and Moore 1994; and others).

Tribal Forest Law and Policy—Political Dimension

A thorough analysis of the history of the Confederated Salish and Kootenai Tribe of the Flathead Reservation is of primary interest. Particular topics for analysis and discussion include: 1) the historic treaties made between the tribes and the U.S. government, 2) Indian forestry management documents, 3) Tribal power to develop and enforce environmental policies that parallel tribal membership values, 3) the tribal-government relationship, and 4) a thorough investigation and critical analysis of the congressional laws associated with natural resources land law (i.e., forestry/timber) and individual Tribal policy is vital to assessing the potential for changing the direction of forest management in Indian Country. Assessing the Federal-Tribal relationship, Tribal self-governance, and the canons of natural resource construction in Federal Indian land

law and policy pertaining to Indian forest management will open the door to change in tribal forest management.

The Flathead Reservation was established by negotiated treaty under the Hellgate Treaty of July 16, 1855, thereby granting exclusive rights of the resources on the reservation to the tribal membership. The Hellgate Treaty states that:

> The exclusive right of taking fish in all streams running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering, roots and berries, and pasturing their horses and cattle upon open and unclaimed land.

The tribal people have a vested interest in the condition, management, and protection of their resources.

In 1934, The Indian Reorganization Act (1934), also known as the Wheeler-Howard Act, was a major reversal of governmental policy and approach toward Indian affairs (Getches et al. 1993), particularly on the Flathead Indian Reservation. This Act's objectives sought to revise tribal governing structures:

> Section 1 (25 U.S.C.A. § 461) ended the policy of allotment, "no land of any Indian reservation* * *shall be allotted in severity to any Indian." This provision was a key factor in making it possible for self-government.

The Act's provisions relating directly to tribal organization, Sections 16 and 17:

> Any Indian tribes, or tribes, residing on the same reservation, shall have the right to organize for its common welfare, and may adopt an appropriate constitution bylaws* * *. [Procedure is then established for ratification by members and approved by the Secretary of the Interior.]
> In addition to all powers vested in any tribe or tribal council by existing law, the constitution adopted by said tribe shall also vest in such counsel an fixing of fees to be subject the approval of the Secretary of the Interior; to prevent the sale, disposition, lease, or encumbrance of tribal lands, interests in lands, or other tribal assets without the consent of the tribe; and to negotiate with the Federal, State and local governments* * *(25 U.S.C.A. § 474).

The CSKT of the Flathead Reservation has suffered land losses from the General Allotment Act as well as intense opposition from non-Indian neighbors (85 percent of the reservation comprise a non-Indian, non-tribal member population.) However, the CSKT have developed a governing constitution and bylaws as stated in the Indian Reorganization Act of 1934. Currently, the Confederated Salish and Kootenai Tribes are recognized by the United States government as competent to govern themselves within their traditional homelands under the Indian Self-Determination Act (1975). Also embedded within the Confederated Salish and Kootenai Tribes' vision and mission statements are their priorities for management and direction:

> "Vision—The *traditional principles and values* that served our people in the past are imbedded in the many ways we serve and invest in our people and communities, in the ways we have regained and restored our homelands and natural resources, in the ways we have built a self-sufficient society and economy, in the ways we govern our Reservation and represent ourselves to the rest of the world and in the ways we continue to preserve our right to determine our own destiny."
> "Mission—Our mission is to adopt *traditional principles and values* into all facets of tribal operations and service. We will invest in our people in a manner that ensures our ability to become a completely *self-sufficient society and economy*. We will strive to regain ownership and control of all lands within our reservation boundaries. And we will provide a sound environmental stewardship to preserve, perpetuate, protect and enhance natural resources and ecosystems" (Confederated Salish and Kootenai Tribes of the Flathead Reservation—Adopted by the Tribal Council May 1996).

The regulations that direct Indian forest management are outlined within the Code of Federal Regulations that describes the General Forestry Regulations applicable in Indian country. More specifically, the National Indian Forest Resources Management Act (NIFRMA) of 1990 along with the Tribal Forest Protection Act of 2004 frames forest management in Indian country.

Tribal Forest Resource Management

Since 1832, American Indian tribes have been treated as "domestic dependent nations" by the federal government (Cherokee Nation v. Georgia, 1831; Worcester v. Georgia, 1832). Tribal forest resource management under the Secretary of the Interior is granted broad authority over the sale of timber on the reservation lands (Timber Sales Act 1964). Under the auspices of the federal trust responsibility, timber on Indian land may be sold only with the consent of the Secretary, and the proceeds from any such sales less administrative expenses incurred by the Federal Government, are to be used for the benefit of the Indians or transferred to the Indian owner. Sales of timber must "be based upon a consideration of the needs and best interests of the Indian owner and his heirs" (Indian Timber Sales Act 1964). The statute specifies the factors, which the secretary must consider in making that determination. In order to assure the continued productivity of timber-producing land on tribal reservations, timber on unalloted lands "maybe [sic] sold in accordance with the principles of sustained yield" (Indian Timber Sales Act 1964).

More recently, under Title III—Indian Forests and Woodlands of the National Indian Forest Resources Management Act, the Secretary of the Interior is directed to manage the forest lands "consistent with the trust responsibility and with the objectives of the beneficial owners...For the purpose to provide authorization of necessary appropriations to carry out this title for the protection, conservation, utilization, management, and enhancement of Indian forest lands" (NIFRMA 1990). Section 304 of the NIFRMA (1990) requires that tribal forest management encompass "forest land development, including forestation, thinning, tree improvement activities, and the use of

silviculture treatments to restore or increase growth and yield to the full productive capacity of the forest environment." This requirement suggests that tribal forest management remain within the guidelines of a sustained yield management strategy.

Generally, the NIFRMA clarifies and redefines the role of the Bureau of Indian Affairs regarding tribal forestlands. It updates and amends the trust responsibility of the Federal Government under the Indian Self-Determination Act of 1975. Any program that the BIA runs, the tribe can contract to run itself. Recently, the Tribal Self-Governance Act of 1994 set forth a unique relationship between the federal government and tribal governments wherein each tribal government has an inherent right to self-governance as "reflected in the Constitution of the United States, treaties, Federal statutes, and the course of dealings of the United States with Indian tribes" (Tribal Self-Governance Law 1994). Thus, tribal people have a special right to their environment and the right to manage as sovereign nations under the blanket protection of the Federal government.

Currently, the Tribal Forest Protection Act (2004) allows for partnerships with the U.S. Forest Service and the Bureau of Land Management in reducing the threat of catastrophic fire, disease, or other threat to tribal lands and rangelands.

It is important to understand that the underlying point in the NIFRM Act accentuates economic benefits at the expense of cultural values and of tribal membership. The tribal concerns (those of culture versus economic values) remain unaddressed despite the ringing statutory declaration of the environmental protection and rational human governance espoused by the National Environmental Policy Act (NEPA) of 1976.

The purpose of NEPA in Indian country, under the trust responsibility, is mandated as the Code of Federal Regulations declares: "[I]t is the continuing

responsibility of the Federal Government to use all practicable means...to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may...fulfill the responsibility of each generation as trustee for succeeding generations...[E]very decision we make should reflect consideration of the seventh generation to come..."(25 C.F.R. § 163.27).

NEPA is applicable to the management of Indian forestlands by providing the avenue for developing multi-resource objectives and environmental review of proposed timber sales and other forestry related activities. NEPA allows for a more thorough analysis of potential environmental impacts due to harvesting activities, impact to wildlife, protection of cultural resources, habitat fragmentation issues, late seral habitat retention, water quality, and forest hydrology, to mention a few. NEPA has far-reaching potential for requiring compliance with other Federal environmental laws (such as the Endangered Species Act, Clean Water Act, and Clean Air Act) and requires Federal agencies to address these laws in forest planning. It may also require Federal agencies to integrate cultural values with tribal forest management practices by way of its requirement of social impact of alternatives.

Other Federal laws, which acknowledge and affirm certain tribal authority over cultural resources, are Archaeological Resources Protection Act (16 U.S.C. §§ 470cc (g) (2); 470dd); National Historic Preservation Act (16 U.S.C. § 470); Native American Graves Protection and Repatriation Act (25 U.S.C. § 3001); National Indian Forest Resources Management Act (25 U.S.D. § 3108); and the American Indian Religious Freedom Act (42 U.S.C. § 1996). The CSKT Cultural Resource Protection Ordinance (CRPO) is enacted pursuant to the Constitution of the Confederated Salish and Kootenai

Tribes of the Flathead Reservation (Article VI, Section 1) and as guidelines for the Tribal Council to protect traditional cultural resources. CRPO clarifies the meaning of culture as "the traditions, beliefs, practices, lifeways, arts and social institutions of the Pend d'Oreille, Salish and Kootenai people" (Part III, Section 1 of the CRPO). The ordinance also defines cultural resources as "native plant materials, objects, or cultural or religious sites, which are nominated or determined eligible for the Salish, Pend d'Oreille and Kootenai Register as having cultural significance. Cultural material may include, but are not limited to, such things as roots, berries, cedar bark, and Indian medicines." This ordinance requires the strictest review of proposed undertaking that may affect any cultural resources and solicits direct supervision from the traditional elders. The Tribal forestry department likewise has the obligation to consult the preservation office for any proposed projects.

A unique and increasingly significant aspect of the federal relationship with Native People involves not formal governmental relationships, but the continuing traditional religious and cultural significance of federally administered land for traditional Native Americans. The American Indian Religious Freedom Act (AIRFA) of 1978 requires review to identify and assure the consideration of Native American religious and cultural values, which may be affected by federal actions.

The flexibility in planning and resource management systems does exist to affirmatively address the religious importance of lands to Native Americans, and assure consideration and appropriate accommodations of these values in the decision making process. Cultural resources within the traditional property-oriented definition of federal programs of archaeology and historic property administration are based upon the

development of strategies to recover data, document resource profiles and in other ways mitigate adverse effects. However, non-tangible issues like cultural values are often over looked and under estimated in planning programs.

Tribal Forestry and the Tribal People

As a preliminary step, in 1992 the Confederated Salish and Kootenai Tribal Forestry Department (TFD) conducted a survey to solicit tribal membership concerns for initiation of the 10-year forest management planning following the guidelines of NEPA. The TFD believed that understanding the concerns of both resource managers and the tribal membership could be used in develop alternative strategies for resource management that would be more consistent with the tribal culture (Goode 1999). TFD mailed out 5005 surveys with 27% of the total responding to the survey. The 1992 Survey was technical and led to ambiguity among some members that knew English as a secondary language, and it contained forestry terms that were unfamiliar to the nonprofessional. Goode (1999) indicated that the responses were high due to monetary incentives offered to the tribal membership as well as to the access of TFD to tribal membership addresses and enrollment. Regardless, the survey offered the forestry department some vital information about how the forest was used by the tribal membership. Because of the highly technical perspective of the survey questions, the survey was not intended to solicit cultural values, such as epistemology and issues of land sacredness, but to determine tribal member use, method of harvesting, and level of support for future forest management.

Throughout the development of the CSKT Final Environmental Impact Statement (2000), the underlying premise was to manage for diverse and sustainable forests by

maintaining and restoring the processes, structures, and functions under which the forests have evolved. Thus, the forest plan suggested that strategies of silviculture should mimic those key structures and processes, such as disturbances (fire; fire regimes), that existed prior to fire suppression and Euro-American settlement. In the CSKT FEIS (2000), clearcutting is suggested as a tool for mimicking fire disturbance patterns across forest communities.

Historical perceptions of the environment used previously by the Bureau of Indian Affairs affect management practices today. This perception has dominated forest management both on the national and tribal levels (Cutsforth 1992). These strong anthropogenic and unreasonably optimistic set of beliefs in the philosophy of the western worldview (Black 1970) ignore the human relationship with, and obligation to, the environment. Thus, these fundamental beliefs are different from Native American belief systems, where the environment is considered as 'Mother Earth.'

The western worldview places value upon the environment by measuring the amount of resources available for human consumption. This emphasis creates a chasm between people and the environment for short-term economic incentives. This resources-oriented view of land management has been typical of forest management in the past, and these old views still are deeply embedded in the conceptual framework (utilitarian perspective) in forest management.

Management practices based upon respect for the environment will more likely have positive sustainable outcome for both the resource and the community than practices based solely upon scientific-utilitarian paradigm. The laws that govern tribal forest management on the Flathead are outlined in the National Indian Forest Resources

Management Act and in the Code of Federal Regulations. While the regulatory laws direct forest management, they fail to adequately incorporate the cultural values of the tribal people into management of their resources, but address more tangible and measurable cultural resources. These regulatory laws ignore the values and ethics associated with land sacredness. Through the National Environmental Policy Act, tribal agencies under the trust responsibility of the Federal government have an obligation to consider the values and view of tribal membership in forest planning and management. While the plan shifts weight toward economic goals it fails to involve the ritual taking and use of natural resources according to cultural protocols established in tribal methodology and invalidates a view where human beings are apart of the life continuum which includes animals and spirit beings. To place these values at the forefront in planning represents a sanctioning of ethics, which ensures continued future supply of strategic life supporting resources and thereby ensures the future of the people who depend on them for cultural and physical survival.

Taking Care of the Forest for Cultural Values: Monitoring and Adaptive Ecosystem Management

Monitoring is the collecting of information, which is used to evaluate success, failure, and overall progress. Program monitoring can be implemented in many ways, and tribes need to develop comprehensive monitoring strategies based on local needs and desires. A successful monitoring program may include goals with related measuring systems and standards; measures which may be quantitative or qualitative; and the same measuring strategies should be used in successive monitoring cycles to insure consistency. In addition, monitoring should be conducted throughout the year with set dates for the establishment and checking of benchmarks. For evaluation, the tribe may

appoint an oversight committee to check the results throughout the planning era. This ensures that the objectives and goals of the tribe and tribal membership are being addressed and implemented.

Grounded by Law—Any person or organization that hopes to influence federal agency decisions that are likely to affect the environment should be familiar with the National Environmental Policy Act (NEPA) of 1969 and the regulations promulgated by the Council on Environmental Quality. NEPA (40 C.F.R. §§ 1500.1(a)) is the basic charter for protection of the environment. A brief discussion may be helpful to explain how concerns such as cultural resources management and tribal religious values can be integrated into the comprehensive environmental review process established by the NEPA regulations.

The primary requirement of NEPA is that an environmental impact statement (EIS) be prepared for every federal action that will or may significantly affect the quality of human environment (40 C.F.R. § 1502.3). The NEPA regulations establish the procedural requirements that apply to federal agencies in the preparation of environmental impact statements. These requirements include many provisions concerning public involvement (40 C.F.R. §§ 1501.7(a), 1503.1(2)).

Whenever a tribe or its reservation is affected by specific proposed action, federal agencies are required to seek out the tribe for review. The CSKT Final Environmental Impact Statement (FEIS) (1999) clearly states some cumulative and adverse effects predict cultural impacts from the forest management plan implementation. Monitoring of these impacts is critical. The forestry department has installed and maintained a Continuous Forest Inventory (CFI), which is critical to sustained yield monitoring. It

provides the basic standard to measure changes on the forest and helps determine the positive or negative impact of forest management policy. The CFI volume, growth, and quality information allows the forestry department to make very important management decisions ranging from silvicultural treatments to log grade/recovery.

Forest inventory requires field measurements to determine area, timber volume, growth, tree condition and quality as well as variable data for management planning. This can be obtained by visiting permanent plots in the forest. This type of inventory represents the forest manager's benchmark for gauging the development of the future forest based on the impact of current and past management practices.

By monitoring the CSKT FEIS (1999, 2000) impacts and evaluating the findings, the tribe will have a measure of its success in moving toward its vision. Engaging in monitoring and evaluation program will provide the necessary feedback and provide a basis for modifying the forest plan to keep it up to date with changing circumstances. Some key elements I looked for in the forest plan were not so evident: 1) a process which calls for the regular review of implementation activities, and 2) a process to address field activities that are found to be out of compliance with the forest plan. I found it difficult to evaluate the monitoring aspects of the forest plan and found the processes to carry out the adaptive management limited in scope for integrating tribal concerns over the long-term.

The toughest job will be to solicit accurate information about sociocultural changes. Frequent public meetings are necessary to keep abreast of these changing social attitudes. The CSKT FEIS (1999, 2000) is limited in satisfying the guidelines for monitoring requirements under NEPA and the NIFRMA. To set monitoring standards for

sociocultural changes will ensure compliance with the federal laws as well as tribal policy for the long-term.

The Confederated Salish and Kootenai Tribal Forest Management: Cultural Reality

For many years, Native traditionalists have pointed to the growing convergence of scientific prediction and Native prophecy. The intuitive, observational acumen of Native cultural practitioners, particularly when informed by the values and stories that detail prophetic tradition has upheld certain basic truths. One is that everything in the living world is related. Another is that everything must be in balance, with harmony as a positive factor. It has not been lost on elders that new currents of thinking in the academy—ecological, multi-disciplinary, and interrelations between human and their environment—are increasingly working from these premises. Scientists from various institutions are seeking out Native elders. Signaling what might become a trend, these scientists from the hard branches request to hear from Native people their opinions, stories and observations on the effects and possible causes of environmental change, a problem that may very well be humanity's greatest challenge of the 21st century.

The Confederated Salish and Kootenai Tribes (CSKT) of the Flathead Reservation recently composed the Final Environmental Impact Statement (CSKT FEIS 2000) for forest-related resource management. This forest management plan will determine forest resource management for more than a decade on the Flathead Reservation. Using the CSKT FEIS, this section summarizes the FEIS (2000) proposed alternative that will direct forest management, and analyzes the intent of the proposed alternative in relation to cultural values and ethics of the Salish, Kootenai and Pend d'Oreille people. It is the thesis of this paper that forest-related resource management

based upon a traditional cultural perspective can provide a sound basis for sustainable forest management on the Flathead Reservation. In other words, the Tribal Forestry Department must return to its traditional roots: that of traditional cultural values and perspectives of the people who seek to care and nurture the land (Confederated Salish and Kootenai Tribal Vision and Mission Statement (1996): p. 26, Chapter 2). This paper will follow these main points in the analyses of the proposed alternative: 1) to what extent does the FEIS reflect the CSKT cultural values and ethics, as a whole, and how well the tribal goals and objectives meld in forest resource management; 2) to determine whether or not implementation of the plan effectively characterizes the tribal goals and objects; 3) to evaluate the process and substantive standards that determine forest resource management in Indian country; and finally, 4) to determine if the monitoring process ensures that the plan's implementation is consistent with governing tribal values.

Summary of the Confederated Salish and Kootenai Tribes' Proposed Forest Management Plan: Final Environmental Impact Statement (2000)

The tribes on the Flathead Reservation comprise three unique groups—the Salish, Kootenai, and Pend d'Oreille—with approximately 6,952 enrolled tribal members. These distinct tribal groups share a reverenced belief of respect toward the environment (Incashola 2000). Another similarity these distinct groups share is the long-term association with the Flathead basin region as ancestral territory. The Salish, Kootenai, and Pend d'Oreille have lived in the Flathead basin and the woodlands for a long time.

Proposed Forest Management Plan

The proposed forest resource management plan takes an ecosystem management approach with emphasis placed on fire regime behavior; thus, silvicultural treatments are to mimic and to restore these natural ecological processes across the landscape (CSKT

FEIS 2000). The purpose of the Final Environmental Impact Statement (CSKT FEIS 1999; p. 3) is to "provide information to the public, landowners, and the Superintendent of the Flathead Agency on how the proposed action and the various alternatives will affect the environment. It is intended to foster informed decision-making and informed public participation." The public scoping and commenting period is outlined under the National Environmental Policy Act (NEPA), whereby all federal agencies are mandated to comply with NEPA guidelines. Additionally, the proposed plan seeks to restore and maintain the long-term ecological integrity of the forests consistent with Tribal values. The overarching goals of the forest management plan are to (CSKT FEIS 2000; p. 11):

1. Strengthen tribal sovereignty and self sufficiency through good forest management;
2. Manage forest ecosystems to include natural processes and to balance cultural, spiritual, economic, social and environmental values;
3. Adopt a process which accommodates changes in tribal values and resources;
4. Facilitate tribal member involvement in forest stewardship;
5. Provide sustained yield of forest products and maintain or enhance forest health;
6. Develop options for managing land use conflicts;
7. Provide perpetual economic benefits of labor, profit, and products to local communities;
8. Manage forest ecosystems to protect and enhance biological diversity;
9. Provide a variety of natural areas that tribal members can use for solitude, cultural activities, and recreation pursuits;
10. Work cooperatively with adjacent landowners and Federal agencies to minimize cumulative impacts;
11. Protect human life, property and forest resources through fire suppression and fuels management; and,
12. Comply with Tribal and Federal laws.

The proposed action intends to provide long-term direction for the Tribes' forest resources, management standards, describes the resource management practice, and levels of resource production. This forest plan should achieve compliance with the tribal goals and objectives, to ensure that management activities are compatible with sustainable forest ecosystems, to balance cultural, social, economic, and environmental

values, and to establish a basis for an adaptive management and monitoring approach that melds with Tribal membership values (CSKT FEIS 1999, 2000).

Summary of the Alternatives

The Interdisciplinary Team (IDT) under the guidelines of the National Environmental Policy Act (NEPA) developed five alternatives--four of these alternatives are *action* alternatives, meaning they veer from past management practices, while one alternative is the *no action* alternative, meaning this alternative continues the past management practices.

Among the action alternatives, alternatives 1, 2, and 3 take an ecosystem management approach and seek to restore more natural stand structure, processes, and functions of the entire the forest environment on the landscape level. Alternative 1 sets the highest level of restoration and is termed the *environmentally preferred alternative.* Alternative 2 ranks second with respect to restoration. Alternative 3 ranks third in regards to restoration. Alternative 5 takes a passive approach to management, where timber harvesting would be limited to salvage operations after disturbances (fires, windthrow, or insect and disease outbreaks). The Proposed Action and the Preferred Alternative is Alternative 2—Modified Restoration Alternative. Table 1 shows alternatives as compared to each other alternative (from CSKT FEIS 1999 p. 7).

Each alternative objective is viewed against the issues developed during the scoping process under NEPA. The issues were derived from public comments and are grouped by forest resources: grazing, water and fisheries, wildlife, watersheds, tribal cultural resources, scenery and recreation (clearcutting and visuals), socio-economic,

forest management (disturbance and vegetation changes), air quality, and monitoring strategies over time.

Alternative 2—Modified Restoration and Cultural Values and Ethics of the Confederated Salish and Kootenai Tribes

Respect is the fundamental law of the Confederated Salish and Kootenai tribal society (Incashola 2000). In the cultural framework of the CSK tribal society, the harvesting and use of natural resources means more than securing an economic commodity in order to earn a living, it is a way of life (Incashola 2000). This perspective

Table 1. Major Characteristics of Alternatives. Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation Forest Management Plan (CKST FEIS 1999: p. 7).

Name	No.	Type	Theme
Full Restoration (Environmentally Preferred Alternative)	1	Action	Ecosystem management based, emphasis on restoration
Modified Restoration (Proposed Action and Preferred Alternative)	2	Action	Ecosystem management based, emphasis on balancing restoration with the needs of sensitive species and human uses
Restoration Emphasizing Commodities	3	Action	Ecosystem management based, emphasis on commodity production
Continue Past Management	4	No Action	Continue forest practices of the 1980's
Custodial	5	Action	Restoration through natural forces, minimal management (salvage only)

is a vital process in socialization, moral education, kinship, economic responsibilities and the expression of individual skill and ability. In the same way that the discipline of economics reflects the value system and worldview of its European roots, tribal practices have developed within a context that reflects their value systems. In their sociocultural system, wise and proper resource use is fundamental to tribal law.

The proposed forest plan—Alternative 2—addresses the issues of natural resource degradation to support forest management action. Cultural resources and forest based cultural activities are the bases for forest management and not the goals and objectives relating to cultural values and ethics. To the Salish, Kootenai and Pend d'Oreille tribes, their oral tradition speaks of their genesis within their territories and of the connections between the spiritual power and life force (both earthly and supernatural) and between the people and place (Incashola 2000). This knowledge creates a physical and spiritual home infused with the mystery of creation, the power of the life forces within it and the 'breath of the Ancestors' which connects the living with the spiritual consciousness and knowledge of the ancestors who preceded them for thousands of years. These views of the land and connectivity with it are what define cultural values and ethics.

The sociocultural and spiritual expression of this interconnected and multidimensional sense of mystery, power, consciousness and knowledge that constitutes homeland includes certain rights to special places and territories. The forest management plan (CSKT FEIS 2000) obliges these tangible resources with road closures, reduction of additional roads in roadless areas and protection of sacred sites by Federal and Tribal laws. The forest plan also assures the limiting of access to non-tribal membership using fence closures; this action also limits tribal membership to those sacred areas. The forest plan ensures the restoration and maintenance of native plant communities in riparian habitats where intense grazing has degraded the land, yet does not address how reducing the grazing of domestic animals will affect those members who rely on ranching for income. The plan details the method of silviculture use for restoring the forest to pre-European times, but does not mention the conflicts the tribal membership have with

clearcutting and the long history of high-grade logging. Finally, the forest plan suggests the use of herbicides and chemical fertilizers in the forest as a remedy for reducing noxious weeds and improving forest regeneration.

Although the proposed forest management plan attempts to balance the goals and objectives of economic incentives with cultural resources, it does not address the values and ethics of cultural (traditional) people. The next section discusses different definitions of cultural values and ethics in terms that forest managers understand. The central point is that defining the term or at least discussing the concepts included each time it is used should minimize ambiguity when making decisions about management without first reviewing tribal membership preferences to harvesting techniques.

The Confederated Salish and Kootenai Tribes of the Flathead Reservation and the Forest Plan Perspective

For cultural resources, the proposed forest management plan of the Confederated Salish and Kootenai Tribes of the Flathead Reservation discusses protection, preservation, restoration, and maintenance of the tribes valued resources (CSKT FEIS 2000; p. 126). The approach is ecosystem management for forest health conditions prior to fire suppression (CSKT FEIS 2000; p.13 and p. 276). The definitions of forest health range between utilitarian and ecosystem perspectives. From a utilitarian perspective, a desired state of forest health can be considered "a condition where biotic and abiotic influences on forest (e.g., pests, pollution, silvicultural treatments, harvesting) do not threaten management objectives now or in the future" (CSKT FEIS 1999). That is, a forest is considered healthy if management objectives are satisfied, and unhealthy if they are not. "Consistency with objectives" is a central theme in many utilitarian definitions of forest health (Society of American Foresters 1993) and is rooted in the traditional

definition of pests as species that interfere with intended uses of forests (Barbosa and Wagner 1989). This theme in the Confederated Salish and Kootenai Tribes FEIS (1999, 2000) has been criticized because on the one hand, a healthy forest depends on meeting management objectives according to recent ecosystem management philosophies and on the other, is unhealthy forest if it does not meet forest management objectives. Thus, this utilitarian approach to defining forest health suffers from circular logic, where a desired state of forest health depends on the occurrence of a healthy forest. The CSKT forest plan implies that a healthy forest can be described by many standards. A single forest condition could be viewed as healthy from one perspective or use but unhealthy from another (forest resource managers versus tribal membership).

Managing for multiple objectives complicates the prioritization of objectives. Some authors have proposed that simplifying the formulation of objectives by returning to the management philosophy that allocated land to categories of similar use (Seymour and Hunter 1992). An ecosystem perspective emphasizes the basic ecological processes that create and maintain forest conditions to satisfy a range of diverse objectives. The CSKT forest plan suggests that a forest is in good health if it has a fully functioning community of plants and animals (CSKT FEIS 2000; p. 87), it is an "ecosystem in balance" (Monnig and Byler 1992; p. 6), and also includes the idea of resilience, "a healthy forest is one that is resilient to changes" (Joseph et al. 1991; p. 7). "The term forest health denotes the productivity of forest ecosystems and their ability to bounce back after disturbance" (Radloff et al 1991; p. 42). Monitoring becomes a nightmare when trying to measure the degree of resilience. The difficulty with using the term resilience of a forest is simple, we really do not know the degree of resilience of a forest

until it has been exposed to and changed by disturbance. This difficulty in measuring resilience suggests the problems associated with its use in defining forest health (Kolb et al. 1994).

The useful approach of an ecosystem perspective should include specific types and rates of ecological processes, and numbers and arrangement of structural elements that characterize diverse, productive, forest ecosystems. In addition, it should include a qualitative statement of the types of processes, structures, and resources needed to support productive forests in a sense of satisfying the tribal membership. The reasoning for forest management should include a useful ecosystem concept of forest health that consider patterns and rates of change in forest composition and structure or successional processes. Leopold recognized the temporal variability of forest vegetation when he wrote, "health is the capacity of the land for self-renewal" (Leopold 1949; p. 259). The forest plan must consider the capacity for forest replacement within the timespan of successional processes and not make broad assumptions.

Again, the health of forest ecosystems or landscape is more complex than the health of a stand. The health of the ecosystems depends both on the Tribal Forestry Department's objectives for the forest (utilitarian perspective) and on the interaction of biotic—including human—and abiotic processes that produce a range of habitats required for continued existence of native and culturally valued species (ecosystem perspective). The Confederated Salish and Kootenai Tribes FEIS (2000) uniformly diagnoses clearcutting to resolve the forest health conditions evident on the Reservation. If both the utilitarian perspective and ecosystem perspective were unified and management applied to incorporate tribal values and ethics on the landscapes with a mosaic of different stand

ages, structures, and levels of management, then one may believe it would satisfy the range of demands placed on the landscape by the tribe. Rather than implementing a narrow range of treatments (temporary even-aged, even-aged, permanent even-aged) suggested in The Confederated Salish and Kootenai Tribes FEIS (2000), along with broadening the objectives to thoroughly define cultural values and ethics, this would satisfy the demands of the tribal membership and legitimize forest management on the Flathead Reservation.

Implementation of the Forest Plan and Tribal Goals and Objectives

Implementation of the Confederated Salish and Kootenai Tribes FEIS (2000) and the ecosystem approach requires more than conventional science-based knowledge. The gap between how management now operates (multiple uses) and how management must begin to manage (ecosystem perspective) is very wide and deep. Even ecological and biological norms come with ethical strings attached and change does not come easily. However, given the destruction and rapid depletion of resources, no alternative exists but to practice "what we preach."

Many northwest ecosystems have been changed due to anthropogenic values in resource management. There is much damage to repair. Ecological restoration is critical to recovering forest health conditions outlined in the Confederated Salish and Kootenai Tribes FEIS (2000).

The concerns of ecosystem health, expanding insect and disease problems, increasing potential for wildfire size and frequency, ecosystem sustainability, the loss of old-growth trees from logging, and the loss of biological diversity has led to a regionwide attempt to design ecological treatments for restoring pre-European contact conditions for

the forests (Everett et al. 1994; Confederated Salish and Kootenai Tribes FEIS 1999, 2000). The changes in forest structure (e.g., tree density, cover, and age distributions) have been blamed for many forest management problems (Agee 1993). Adaptive ecosystem management approaches (Walters 1986) along with ecological restoration concepts can be initiated for helping degraded systems recover (Leopold 1949). In this approach the tribal society, resource management professionals, and scientists enter into a partnership "to regularly reshape management goals, redefine objectives, and redirect management actions" in response to changing "socioeconomic information and evolving biological, physical, chemical, and environmental conditions" (Walters 1986). However, in the Confederated Salish and Kootenai Tribes adaptive management means, "we will plan and implement our activities to the best of our abilities, monitor the result to see if we are meeting our goals, and if our approach proves inadequate, make the necessary changes to better meet our goals" (Confederated Salish and Kootenai Tribes FEIS 1999; p. 121). Past forest management applied on Indian lands, in large measure, has been based solely on professional judgment and empirical observation and not responsive to tribal member concerns. The adaptive approach of the Confederated Salish and Kootenai Tribes must reflect the value tribal people place on resources.

To restore ecological conditions that are designed to mimic pre-European contact involves the integration of science and management in the field (Kaufman et al. 1994)). The Confederated Salish and Kootenai Tribes FEIS (2000) suggests 1) reducing tree densities in ponderosa pine habitats, and dry Douglas-fir habitats, 2) to manage for forest conditions that fall within the historical range of variability (HRV) to ensure sustainability, 3) treating heavy surface fuels with prescribed fire, 4) restoring indigenous

plant and animal communities where feasible, and 5) developing and managing disturbance regimes which emulate historic fire regimes (pre-suppression times) within habitat types.

An ecological approach to ecosystem management by implementing restoration ecology principles must include deliberate strategies for understanding and integrating the traditional cultural values of the Salish, Kootenai and Pend d'Oreille tribes. This is in strong contrast to arbitrarily implementing ecological restoration without full recognition of what the tribal membership would like to see in their forests.

This next chapter defines quantitative research analysis as a multi-faceted process for evaluating sociological paradigms and attempts to assess meaning, context, and depth of the social experience. Qualitative research is a technique used to assess social experiences and social meaning given a network of variables to understand and explain social phenomena. It differs somewhat from the hard sciences in that it uses positivism, which is shaped by positivist and post-positivist traditions in the physical and social. Denzin and Lincoln (1998) argue that positivist science tradition holds "there is a reality out there to be studied, captured, and understood"; which differs from the post-positivists who maintain, "reality can never be fully apprehended; only approximated." The strategies of qualitative research "are but one way of telling a story about society or the social world." This next section attempts to capture perceptions from the individual's point of view, examines the constraints of everyday social reality because they are a part of the 'world in action and embed their findings in it' (Denzin and Lincoln 1998).

CHAPTER 3

SURVEY USE FOR UNDERSTANDING THE CULTURAL ETHIC AND ATTITUDES TOWARD SILVICULTURE

"Science, for example, is concerned with finding natural or naturalistic explanations for the vast array of tangible, measurable processes at work around us. Science is interested solely in how and why things work, not why they exist or what their underlying meaning may be. To be a scientific question, any query must be testable, either by experiment or by logical reasoning based on the available evidence. Therefore, and by definition, science would never attempt to hand down an absolute answer to anything, because new evidence always has the possibility of reversing or modifying an earlier conclusion. Furthermore, also by definition, a question that cannot be tested in any tangible, measurable way is not a scientific question." —A Scientist

Operationalizing the Dimensions of a Cultural Ethic in a Survey Questionnaire

Social research is concerned with measuring not only things that are easily seen (e.g., age, sex, skin color), but with measuring things difficult to observe like aspects of the social world (e.g., attitudes, ideology, morale, values associated with the environment) (Neumman 1991). Ragin (1994: p. 3) states that "social research is one among many ways to constructing 'representatives' of social life" and tell something about social life. Information about traditional knowledge, values of land sacredness, and tribal membership perceptions about harvest treatments may contribute toward an understanding, accurate interpretation and integration of tribal membership cultural ethics and values into forest management. This chapter is an example of a survey methodology for filtering tribal membership concerns as basis for forest management.

There are stages in quantitative social research. Figure 2, on page 52, illustrate a simplistic approach to social research. Stage 1) formulation of the problem—at the beginning of the measurement process, the researcher conceptualizes each variable in the hypothesis. According to Neumann (1991), conceptualization is the process of taking a construct or concept and refining it by giving it a conceptual or a theoretical definition in abstract, theoretical terms. In this step, the question is what is a cultural ethic? This question refers to the construct or idea. From this point the most appropriate units of analysis are teased apart. The two indicators of a cultural ethic are 'caring for the land' and 'cultural uses' (Chapter 2; p. 17). However, these dimensions are ambiguous and need further redefining to develop sound explanations of a cultural ethic.

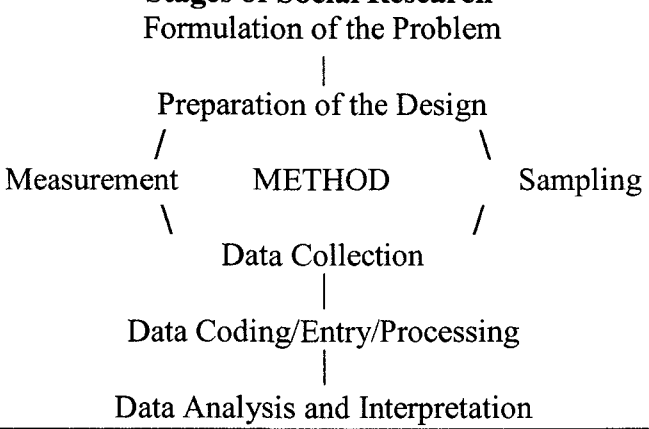

Figure 2. Stages of Social Quantitative Research. This simplistic model borrowed from Sociology 462, Quantitative Research Methodology. Dr. Rebecca Richards, Sociology Department, University of Montana, 1999.

In moving into stage 2) Preparation of the design—caring for the land, means respect, kinship, ideology, epistemology, attitude, and behavior toward the environment. These are abstract concepts of caring for the land, yet define the way Native people interact with the environment and how tribal traditional values historically integrate with land stewardship philosophy (Hughes 1983; Jorgensen 1984). Indigenous people have shaped the land that are today national forests in the United States (White 1982, 1992;

Kimmerer and Lake 2001), using a management philosophy of ecological knowledge combined with epistemology (Jorgensen 1984; Hughes 1983; Berkes et al. 2004). Given this understanding, further conceptualization is the process of thinking through the meanings of a construct or idea to develop a working definition of caring for the land. The Native American relationship to the environment encompasses knowledge of animals and plants, methods of subsistence and survival, religious and spiritual beliefs centered on the natural world, ecological concepts and conservation practices, affiliation with place, and the morale or ethical dimensions of a hunting lifestyle (Jostad et al. 1994; Nelson1993; Roger-Martinez 1992; Berkes et al. 2004). Putting these aspects into working operational term(s) is a difficult ordeal. For simplification, caring for the land can be defined as having cultural knowledge, a belief, because survival of Native people in the environment depend upon this knowledge (Hughes 1983; Jorgensen 1984; White 1982; 1992; Cronon 1989).

Cultural knowledge is defined as "a condition by sociocultural tradition, being culturally relative understanding inculcated into individuals from birth, structuring how they interface with their environments" (Sillitoe 1998, p. 204). The objectives of understanding cultural knowledge are to introduce a locally informed perspective, to promote an appreciation of indigenous power structures and expertise into resource management (Jostad et al. 1994; Kimmerer 2000; Kimmerer and Lake 2001; Folke 2004; Moller et al. 2004).

After a working definition is derived, stage 3) measurement and sampling—is operationalization of the construct. Ragin (1994) defines operationalization as "a definition of specific operations, measurement instruments, or procedures. It is referred to

as the indicator or measure of the construct." This process links the language of theory with the language of empirical measures (Neumman 1989; Ragin 1994; Singleton and Straits 1999), and the world of ideas to observable reality (Ragin 1994; Singleton and Straits 1999).

The Rule of Correspondence (Neumman 1991; Ragin 1994; Singleton and Straits 1999) is a logical statement of how an indicator corresponds to an abstract construct. Ragin (1994: p. 136) states that "a rule of correspondence states a person's verbal agreement with a set of 10 specific statements and is evidence that the person holds strongly these beliefs and values." The purpose of asking questions is to move from abstract to the concrete. Conceptualizing a variable, giving a clear conceptual definition, and then operationalizing it by developing operational definitions or set of indicators, allows for empirical interpretation. In theory there are three levels: conceptual, operational, and empirical (Ragin 1994; Singleton and Straits 1999) in the measurement process.

Most traditional cultural people share a unique relationship in language that expresses the obligation human kind has with the natural environment (Overholt and Callicott 1982; Deloria 1993; Nelson 1993; Yazzie-Pina and Covington 1994). The moral edicts are depicted in animated stories of creation, prayers, songs, and traditional events (Yazzie-Pina and Covington 1994). Language is key to understanding the direct relationship between human and the natural world (Yazzie-Pina and Covington 1994).

Cultural uses by Indigenous people have been conceptualized as an epistemological view of their relationship to the environment on the one hand, while on the other physically rearranging the environment to meet the needs of the individual or

community (Kimmerer and Lake 2001). More specifically, cultural uses are hunting, cultivating, fishing, camping, berry and nut gathering, spiritual use and traditional ecological knowledge. The questions in the survey may help the researcher define cultural use of the forest environment and why these plants or medicines are collected. Other questions can be asked that could give an idea of frequency of use, if there is a need to know percent of cultural use with time.

Examples: Constraints and Successes of Surveys in Indian Country.

Survey questionnaires are unique because they stand on their own. No interviewer is present to convince the respondents how to fill out the questionnaire. Therefore, motivating people to respond is one important goal in designing surveys. Surveys can be used when the research is localized when information is needed about political attitudes, sensitive issues, and a host of other issues people often consider private. What makes people respond to surveys? I have asked tribal professionals who have conducted surveys on reservations to share their experience.

Rockwell and Goode (1999) conducted a mail survey in 1992 on the Confederated Salish and Kootenai Tribes of the Flathead Reservation in Montana. With the initiation of the development of a 10-year forest management plan in 1992, the Tribal Forestry Department surveyed the tribal membership to solicit concerns and opinions about forest management. The Forestry Department believed that understanding the concerns of both resource managers and the tribal membership could be used to develop alternative strategies for resource management that would be more consistent with the tribal culture. The survey was mailed to each tribal member and 5005 surveys were mailed out. Of this total, 1359 members responded to the survey questionnaire a 27% response rate. This

response rate may have been increased by the fact that the Tribal Forestry Department offered an incentive for filling out and returning the survey. According to Rockwell and Goode (1999), reasons that may have reduced the response rate were highly complex technical questions associated with forest management using forestry terms such as million board feet and basal area, and the length of the survey. The Goode and Rockwell (1999) survey did not question tribal membership preferences for different silvicultural treatments. In their survey, the use of harvest treatment pictures were not used to access tribal membership concerns over forest management. However, Rockwell and Goode (1999) believed that this survey, regardless of the low response rate, allowed for defining a management scheme for the 10-year management plan that would be acceptable to the entire tribal membership.

Waconda (2000) conducted two mail surveys: one to tribal elders on Pueblo reservations in the Southwest and to Bureau of Indian Affairs forest resource professionals who work on reservations nationwide. Both surveys were conducted in 1991. Waconda (2000) found that some of the problems with mail surveys on tribal lands are low response rates due to the lack of education among tribal membership, the complexity and technical nature of the survey, and the language differences (English language versus Native language). He believed that more follow-up calls to remind tribal members to complete the questionnaire were necessary in order to increase the response rate. According to Waconda (2000) the successes of using surveys were: the responses clarified the objectives for resource management; developed direct interaction between management and tribal membership or representative; and developed a sense of empowerment in decision-making for tribal members. He also suggested that the survey

gave information useful for professionals to meet the needs of the tribe, and supported a belief that forestry jobs are for management of the tribal membership resources (Waconda 2000).

In view of the successes and problems associating with conducting mail surveys on reservations, it is evident that there are no easy solutions to evaluating what tribal members desire for natural resource management. One obvious problem in evaluating tribal consensus is to over-generalize individual or a small number of responses as reflecting the wants of the entire population. Both non-government and government organizations can help to build the legitimacy of local-level knowledge in management by developing a strong network and understanding with the local Native population (Thrupp 1989; Garibaldi and Turner 2004). There are two general reasons for conducting a mail survey; to understand the local perspectives of what formulates a cultural ethic and to understand the perspectives toward natural resource management.

Fowler (1993) suggests translating the research problem or idea into good questions in a survey—questions that respondents can understand, and answer objectively—produce close estimates of what the respondents think or do. Writing good questions means minimizing measurement error, and increasing reliability that can increase validity of the survey measure. According to Fowler (1993), "the researcher would like to be able to make the assumption that differences in answers stem from differences among respondents rather than from differences in the stimuli in which respondents are exposed." It is imperative to understand how tribal societies care for the land, thus the initial step in retrieving measurements is to clarify the concepts embedded

in the hypotheses with words in a survey that derive legitimate results (Ragin 1994; Singleton and Straits 1999).

Assessment of a Cultural Ethic—Sociocultural Dimension

The concept of social acceptability of forest resource management derives from multiple factors—knowledge of the forest, held values, site-specific context, shared judgments of harvesting treatment, ecosystem management, visual preferences, and agency discretion—contributing to public discernment (Shindler et al. 2002). Brunson et al. (1996) defines social acceptability as a judgment process whereby individuals (1) compare the perceived reality with its known alternatives and (2) decide whether the "real" condition is superior or sufficiently similar to the most favorable alternative condition. The process of management decisions affects social acceptability in turn.

This study presents a survey questionnaire that could be used to examine the acceptability and formation of individual judgment about harvest treatments. I demonstrate the use of the survey using a small number of responses from volunteers. The respondents do not reflect the opinion of the entire membership of the Confederated Salish and Kootenai Tribe but only of those that filled out the questionnaire. The responses cannot be used to conclude anything about the larger tribal membership.

APPENDIX IV shows the survey sent out in the CharKootsa Newspaper to tribal members of the Confederated Salish and Kootenai Tribes of the Flathead Reservation. The Forest Survey sent to the CSK members totaled approximately 3,522 (1,889 living on reservation and 1,633 living off reservation). The non-respondents were not sampled to determine why they did not respond to the survey because the survey was voluntary and anonymous, and there was no way to identify who had not filled out the survey. The

letters attached to the questionnaire indicates only members ranging in age from 18 years old to the elders of the tribe were to participate and that the survey participation was strictly voluntary. Children and those in early teen years did not receive a questionnaire because the CharKootsa Newspaper is sent only to tribal members 18 years and older (Charlo-Crumbly 2004).

Using this survey, the core values expressed by age category (less than 60 years old and 60 years and older) were examined for the key variables of caring for the land (cultural knowledge) and cultural use. These variables are the indicators for a cultural ethic and linked to visual attributes of specific harvest treatments. Caring for the land may describe a tribal member's belief about land and the basic philosophy of land sacredness/value. An understanding of how tribal members view the landscape and how this view changes with intensity of harvest treatments may indicate the acceptable range of silvicultural strategies for forest management. Most commonly Native cultures are regulated by a complex system of social sanctions and religious taboos, founded in a basic philosophy toward the natural environment (Colding and Folke 2001). Briefly, to manipulate the land in such a way that disrupts these values (land health) is linked to disrupting the health of the people.

Cultural use can be described as those practices that have been passed down through generations, such as uses for physical/spiritual subsistence (e.g., hunting, cultivating food, berry picking, vision quests, areas of sacredness). For most Native cultures, creation stories, songs, taboos, prayers, and traditional ecological knowledge and wisdom teach to visualize and understand the connections between the physical environment and the spiritual values that create and bind a tribal community (Deloria

1992; Wolfley 1998; Colding and Folke 2001). A learning system of cultural values induces a profound respect for the natural forces, which give life to the complex world of which Native peoples are a small part. The wisdom and knowledge of the ecosystems is based upon millennia of observation, habitation, and experience and is passed from generation to generation. These learned skills embrace the cultural knowledge that will be useful to guide and establish a cultural ethic. The survey can be used to illustrate how respondents view some silvicultural strategies, thus aiding in formulating the conceptualization of measurements for estimating a cultural ethic (putting concepts into operation) for forest management directions.

To maximize confidentiality of responses associated with the use of this survey, no data on respondent identification was recorded, just tribal membership and age; thus, there was no way to identify or contact individual non-respondents (all respondents and non-respondents were held in confidence). This method enhanced privacy and limited individual identity.

Data Analysis

The extreme low response rate, and the lack of non-response information, meant that the survey answers could not be analyzed for inference about the population. This section demonstrates how data could be analyzed to increase understanding about a cultural ethic and attitudes toward silvicultural treatments if a representative sample could have been obtained.

The Statistical Package for Social Sciences (SPSS) (2005) was used to manage data. The features that SPSS maintains are modules for statistical data analysis, including descriptive statistics such as plots, frequencies, charts, and lists, as well as sophisticated

inferential and multivariate statistical procedures like analysis of variance (ANOVA), factor analysis, cluster analysis, discriminate analysis and categorical data analysis. SPSS is well suited for survey research but is not limited to this topic of exploration. Fisher's Least Significant Difference (FSD) multiple range tests may be used to assess the differences between categories of tribal membership values of silviculture strategies. In this case, cultural ethic (caring for the land variable and cultural use variable) is the dependent variable that will be explained and predicted. Variation in the dependent variable is thought to depend on or to be influenced by certain other variables. Silvicultural strategies, the independent variable, are the presumed cause. The FSD test was used because it does not require equal number of cases in comparison groups and is more sensitive for detecting significant group differences.

A multivariate analysis was used to analyze simultaneous associations among age, education, and factors of cultural ethic and forest silvicultural strategies. The multivariate analysis test was used to disentangle variables among factors that affect a cultural ethic and assess their separate effects against silvicultural strategies. Additionally, there are exploratory data techniques that go beyond broad patterns of covariation to identify sets of cases that deviate from the broad patterns or to uncover subtle patterns. Sometimes these techniques can be used to identify complex patterns of causation that are specific to subsets of cases included in a study.

Discriminate Analysis (Klecka 1980) is a statistical procedure used to differentiate between two or more groups of objects to several variables simultaneously at the interval or ratio levels. It allows interpretation of group differences and classifies case to the group most resembled.

Assessment of Stand Units—Ecological Dimension

This section outlines field inventory procedures for measurement and data collection of 15 (five plots per harvest unit) circular plots on the Flathead Indian Reservation in northwestern Montana. Selection of stands for the survey included only stands in the Selow Management Unit with one block type clear cut picture taken from the Selow Management Unit across the valley into the Magpie Management Unit. Field procedures provide basic measurements needed to evaluate and describe stand structure and composition for use in the survey. In selecting these plots, I tried to include a variety of habitat types and silvicultural strategies. These plots ranged from low elevation ponderosa pine habitat type to high elevation commercial alpine-spruce habitat types and were selected for similar silvicultural strategy, slope, and aspect. Photo points consisted of silvicultural strategies that ranged from even-aged systems—clearcutting method, seed-tree method, and shelterwood cutting methods to uneven-aged systems—selection methods (groups or strips), where possible.

Most sites had stand examination information and harvest prescription cards associated with each sampling unit that were obtained from the CSKT Tribal Forestry Department. In addition to the stand and harvest prescription cards, I collected stand sub-unit information used to classify vegetation included species composition, size class, crown cover, and basal area. For each stand unit, forest structure (horizontal and vertical), ground disturbance (soil displacement and scarification of ground), and litter accumulation was determined. A stratified sampling technique was used where each habitat association had non-overlapping sub-units so that measurements within the sub-units are more alike than in the habitat associations. This technique results in more

precise estimates of parameters. Digital pictures of the sampling units were used in the survey.

Approximately five stand units from each habitat association (five groups) were assessed to get a fair representation of silvicultural strategy; however, not all harvest management units contained all five habitat types. The stand unit information can be used to make descriptive and quantitative comparisons among tribal membership preferences toward harvest treatments.

Stand Selection: Pfister et al. (1977) identified 64 habitat types for Montana. Not all habitat types occur on the Flathead Reservation and because of the complexity only five general habitat types used for commercial harvesting were used in this study. The habitat climax series include: Douglas fir, Grand fir, Western red cedar, and Sub-alpine fir.

Stands were included in this study based on the following criteria:

1. Stands within Selow, Pistol Creek, and Frog, harvested prior to 2001.
2. Stands within commercial harvesting perimeters.
3. Stands within *Pinus ponderosa, Pseudotsuga menziesii, Abies grandis,* and *Abies lasiocarpa* Climax series.

Stands were excluded in this study based on the following criteria:

1. Stands within Centipede and Boulder management units, these units contained the stands within *Pinus flexilus, Picea, Thuja plicata, Pinus albicaulis, and Pinus contorta* Climax series.
2. Stands within *Pinus flexilus, Picea, Thuja plicata, Pinus albicaulis,* and *Pinus contorta* Climax series.
3. Identified sacred sites used culturally / traditionally by CSK Tribal membership.

Uneven-aged, temporary even-aged and permanent even-aged units were selected with regard to management areas. The CSK Tribal Forestry Department uses uneven-aged management systems to manipulate current stands towards a healthy, uneven-aged

structure containing 4 to 5 age classes (CSKT FEIS 1999, 2000). Temporary even-aged management system are used to replace the current, undesirable, unhealthy stand with a regeneration harvest and manipulate the future stand towards a healthy uneven-aged structure containing 4 to 5 age classes (CSKT FEIS 1999, 2000). In contrast, a permanent even-aged system is used to manage the current, existing stand until a regeneration harvest is appropriate and then manage the future stand with even-aged silvicultural methods to maintain the even-aged character (CSKT Forestry Department 2001—See APPENDIX I for details).

Table 2. Listing of Candidate Independent Variables Identified Their Source, Measurement Scale, and Analysis Disposition.

#	INDEPENDENT VARIABLE	INCLUDED IN ANALYSIS	FOUND IN Rx SHEET	MEASUREMENT SCALE
1	Aspect	Yes	Yes	nominal
2	Elevation	Yes	Yes	interval
3	Fire Group/Regime	Yes	Yes	nominal
4	Forest Type	Yes	Yes	nominal
5	Habitat Type	Yes	Yes	nominal
6	Reforestation Method	Yes	Yes	nominal
7	Basal area	Yes	Yes	interval
8	Slope	Yes	Yes	interval
9	Trees/Acre (TPA)	Yes	Yes	nominal
10	Type of Treatment	Yes	Yes	interval
11	Burning Index	Yes	No	interval
12	Fuel Load	Yes	No	interval
13	Age	Yes	Yes	interval
14	Stand Size Class	Yes	Yes	nominal
15	Thinning Prior	Yes	No	nominal
16	Type of Fuel	Yes	No	nominal

Initially, sixteen independent variables were identified for each stand in each of the five harvest management units (See Table 2, above). In order to insure that all applicable stands were identified, several database checks were conducted. The first visit,

included stand search and query using Tribal Geographical Information Systems (GIS). Uneven- and even-aged stands were queried using existing stand conditions and stand types. This investigation was based on current harvest units and harvest treatment (even-aged and uneven-aged) for each stand. The second visit included narrowing down the selected stands using these sampling units: elevation, aspect, current harvest units, habitat type, even-and uneven-aged treatments. The third visit was to find the stands units within each harvest treatment unit. Prescription cards were used to find current details of the type of harvest treatment and stand unit characteristics—basal area, elevation, trees per acre, type of mechanical use, and purpose for management.

Independent Variables Excluded from Analysis

Burning Index, Fuel load, stand size class, thinning prior, and type of fuel were not included in this study. Some stand files were incomplete when examining information for these variables. Some of the information available in GIS was unreliable and did not match current harvesting information. The GIS information regarding stands and harvest units did not match current harvesting information. Hence, prescription cards were used to validate the on-site stand unit information.

Independent Variables Included in Analysis

The remaining independent variables were used in each sampling unit (Table 2). These additional variables were included: Percent canopy closure, age and type of individual trees and height of individual trees (APPENDIX III).

The variable Fire Group/ Regime was determined by placing the appropriate habitat types in the fire groups derived by Fischer and Bradley (1987) and outlined in the 2000 FEIS for the Confederated Salish and Kootenai Tribes of the Flathead Reservation.

Independent Variable Categorization

The selection of the fourteen independent variables thought to best depict the stand units was based on suggestions from the Tribal Forestry Department personnel, the habitat types available for commercial harvesting, and univariate regression analysis (Table 2). Category definitions associated with each independent variable were based on habitat type and harvest treatment. Candidate variables were categorized in several ways in order to explore any possible significance of the variable. If a stand had been dozer or mechanical piles and burned, it was categorized as pile and burn. If a stand had been understory, broadcast, or jackpot burned, it was categorized as burned.

The next section comprises tribal membership responses in a survey tool that entails a framework (theory, ontology) organized around a specific set of questions (epistemology) that are then examined (analysis) in specific ways—empirical materials that bring bearing on the question collected, analyzed, and documented cases (individuals to societal)—to determine a cultural ethic.

CHAPTER 4

SURVEY EVALUATION IN CONTEXT OF A CULTURAL ETHIC

Human Dimension—Sociocultural Dimension and Silviculture—Ecological Dimension

Understanding the links between cultural values and silvicultural preferences can be arduous where numerous values are at stake. Ultimately, decisions about forest management and silviculture practices are subject to public scrutiny. Social acceptability of landscape modification can be useful guidance for Tribal Forest Department and Tribal governmental entities in making decisions that affect long-term tribal timber environment.

The following section illustrates the selection of representative forest stands for use in a survey designed to examine the acceptability and formation of individual judgment about harvest treatments on the Flathead Indian Reservation in Montana. Since the survey response rate was extremely low, the survey answers can not be analyzed for inference about the entire population.

Harvested stands prior to 2001 include Pistol Creek, Selow, and Frog Management units. These stands are within the *Pinus ponderosa, Pseudostuga menziesii, Abies grandis*, and *Abies lasiocarpa* Climax series. Uneven-aged (selection cut including group and individual tree harvest), temporary even-aged and permanent even-aged (clearcutting, seed tree and shelterwood harvest) units were selected from each

management unit. To minimize the length of the survey stand units from the Selow management unit were used. One visual picture of a block clear cut in the Magpie management unit was taken from Selow management unit.

Picture 1 of question 1 in the Forest Survey (APPENDIX IV) is uneven-aged individual tree selection in *Pinus ponderosa/Symphoricarpos albus* (PIPO/SYAL) habitat type. The aspect is SE with 26-35% slope at an elevation of 3500 feet with mixed fire regime behavior according to the stand prescription work (CSKT Instruction for Forest Field Reconnaissance 1996; APPENDIX I—Instructions for Forest Field Reconnaissance). The harvest treatment was commercial thinning removing trees with blights and rust (BR) damage leaving mostly *Pinus ponderosa* and *Pseudostuga menziesii*. According to the CSKT Forest Management Plan (2000) uneven-aged method is described as "to manipulate the current, existing stand towards a healthy, uneven-aged structure containing 4 or 5 age classes."

Picture 2 of question 3 in Forest Survey (APPENDIX IV) is permanent even-aged, seed tree harvest treatment in *Abies grandis/Linnaea borealis* (ABGR/LIBO) habitat type. Aspect is NE with 35-50% slope at 4400 feet elevation with sensitive visual from the town of Dixon, MT. The harvest treatment was to manage the current, existing stand until a regeneration harvest is appropriate then manages the future stand with even-aged silvicultural methods to maintain the even-aged character. The habitat type has a fire regime that suggests stand replacement fire behavior.

Picture 3 of question 5 in Forest Survey (APPENDIX IV) is temporary even-aged management (shelterwood treatment) in *Pseudotsuga menziesii/Physocarpus malvaceus* (PSME/PHMA) habitat type with a mixed fire regime behavior. Aspect is NW with 35-

50% slope at 4400 feet in elevation and sensitive visual from town of Dixon, MT (APPENDIX I). This harvest treatment was intermediate (INT) treatment that would prolong the culmination and increase the overall board feet production of the current stand (APPENDIX II). The harvest treatment of temporary even-aged was to replace the current, undesirable, unhealthy stand with a regeneration harvest and manipulate the future stand towards a healthy uneven-aged structure containing 4 or 5 age classes. This stand manipulation was to leave seral *Pinus ponderosa and Larix occidentalis* removing shade-tolerant *Pseudotsuga menziesii* due to mistletoe damage (CSKT Instruction for Forest Field Reconnaissance 1996; APPENDIX II).

Picture 4 is a visual of past block clearcut harvest treatment in the Magpie management unit taken from the Selow management unit; and Picture 5 is a visual of present feathered-edge clearcut harvest treatment in Selow management unit.

In Chapter 2, the variables defining a cultural ethic—cultural/traditional use of the land and caring for the land—are outlined in the example survey questionnaire (APPENDIX IV). Survey methods record variations in social perceptions with categories that vary in amount. Ranked data are numbers or attributes that can be ordered in terms of magnitude and most often used for explanation, description and evaluation. A scaling technique was used to improve the ability to measure attitudes and beliefs. At times in the survey, several questions are asked about the same idea for patterns. This scaling technique thus gives a way to collapse answers to the whole series into one indicator on how people really think about an issue. The variables that define a cultural ethic, the human dimension of natural resource management, are caring for the land (belief system)

and traditional use of the land. By evaluating these variables may determine a harvest approach that may emulate a cultural ethic.

The hypotheses that further define the two variables are 2, 3, 4, and 5, listed as: (2) Older Salish and Kootenai tribal members (60+ years) are more concerned about forest resource management (silviculture treatments), than younger tribal members; (3) Salish and Kootenai tribal members who participate in cultural use are more opposed to intense silvicultural strategies than tribal members who do not; (4) Silvicultural practices like those of even-aged management tend to be less favored than silvicultural practices like uneven-aged management; and (5) Salish and Kootenai tribal members that exhibit a cultural ethic tend to be more in favor of silvicultural treatments that leave more trees per acre, have large diameters, and resemble older stand structure.

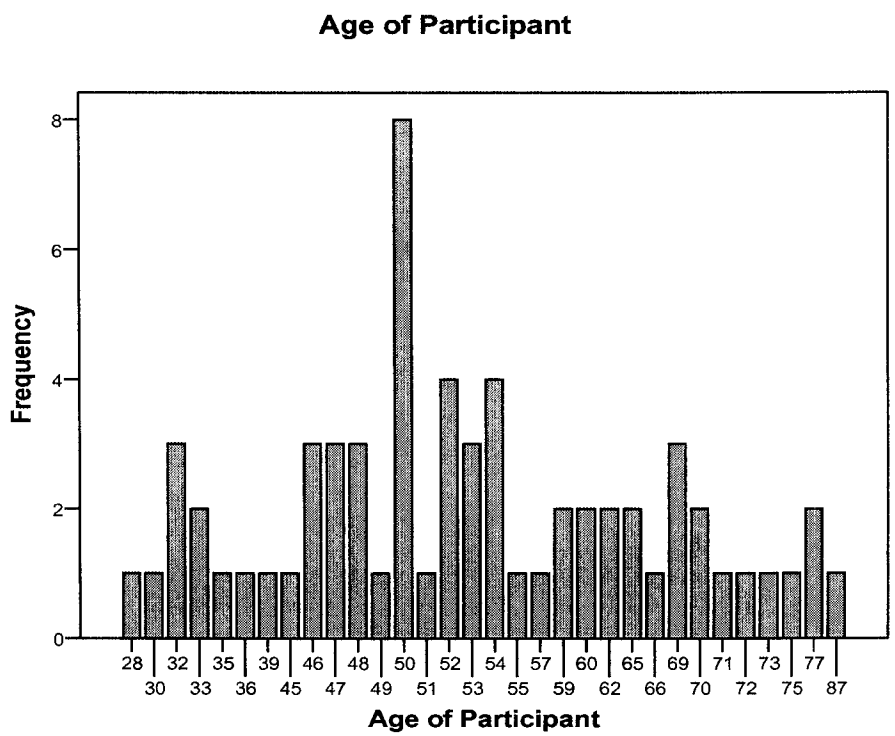

Figure 3. Age distribution of Sixty-Six Participants from the Confederated Salish and Kootenai Tribe of the Flathead Indian Reservation in western Montana.

Age of tribal membership responses spread from 28 to 87 years old (Figure 3, Age of Participant). Of the 66 respondents, 12.1 percent (8 individuals) were 50 years of age, 73% (47 individuals) were under 60 years old, and only 29 % (19 respondents) were over 60 years of age. Total tribal responses were 66 complete survey counts out of 3,522 survey-inserts in the tribal newspaper, *The CharKoosta*. However, due to a computer glitch, the Daily Interlake technician deleted a name, which caused all the name fields to move over one space (Charlo-Crumley 2004, personal communication). Charlo-Crumley indicated that there were several surveys returned to her office at the CharKoosta Newspaper from non-tribal member subscribers. Of course, due the cost of the survey inserts made it impossible to reprint and redistribute the survey inserts. Overall, given the error made plus the lack of monetary incentive for filling out the survey, 2% response indicates those surveys that were complete. The data collected applies to the 66 respondents (complete surveys); however 356 surveys were tallied overall but were incomplete or were damaged and not used in the survey study. The data collected from the 66 respondents does not reflect the entire tribe collectively, but is information only to 2% of the tribal membership.

Table 3, represents gender distribution of 60.6 % (40) male and 37.9% (25) female respondents. No non-tribal member or members under 18 years of age responses were not tallied or collected. All membership responses will remain confidential.

Table 3. Gender Percentages of Participants Responding to the Forest Survey.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Gender Response	1	1.5	1.5	1.5
	Female	25	37.9	37.9	39.4
	Male	40	60.6	60.6	100.0
	Total	66	100.0	100.0	

Age Category data measured on an interval scale, where the data values indicate both the order of values and the distance between values. Age Category was categorized into less than 60 years, and, greater than 60 years groups. The age groups were compared in terms of acceptability of harvest treatments—visual harvest treatment questions 1, 3 and 5 of the survey (Forest Survey, APPENDIX IV). Age Categorical data, at this point, is a meaningful order of categories, but there isn't a measurable distance between categories. This technique is to display ordinal-by-ordinal data using crosstabulation for Pearson's Chi-Square analysis.

Age Category is crosstabulated to the individual variables of Past Seed Tree Treatment, Present Seed Tree Treatment, and Past Un-Even Aged Treatment using Gamma statistics. The variables of Past Seed Tree Treatment, Present Seed Tree Treatment, and Past Un-Even Aged Treatment levels of measurement were rank-ordered ranging from Very Acceptable=5; Somewhat Acceptable=4; Neutral=3; Acceptable=2; and Not Acceptable=1. The purpose of crosstabulation is to show the relationship (or lack there of) between two variables within defined categories.

Past Uneven-Aged Treatment

The results of Past Uneven-Aged Treatment (Visual Picture #1 in Forest Survey, See APPENDIX IV) compared to Age Category points out that 57.9 percent of members 60 years and older and 74.4 percent of members less than 60 years old found this harvest treatment to be Very Acceptable (See Table 4). Combined Age Categories of Very Acceptable is 69.4 percent; Acceptable is 19.4 percent; Neutral is 8.1 percent; Somewhat

Acceptable and Not Acceptable is 1.6 percent. This observation indicates the acceptability ranges of members 60 years and older to the acceptability ranges of members less than 60 years of age to Past Un-Even Aged harvest treatment.

Gamma statistics is a measure of association that measures the Proportional Reduction in Error (PRE) obtained using the independent variable to predict the value of the dependent variable. Table 5, shows gamma statistics that is symmetric measurement of the association between two ordinal variables that range between negative 1 and 1. The

Table 4. Summary of Levels of Acceptability of Past Un-Even Aged Treatment and Age Category. Rank-Ordered: 5=Very Acceptable; 4=Acceptable; 3=Neutral; 2 =Somewhat Acceptable; and 1=Not Acceptable.

			Age Category		Total
			less than 60	60 and older	
Past Uneven-Aged Treatment	Not Acceptable	Count	1		1
		% within past UEA treatment	100.0%		100.0%
		% within AgeCategory	2.3%		1.6%
		% of Total	1.6%		1.6%
	Somewhat Acceptable	Count		1	1
		% within past UEA treatment		100.0%	100.0%
		% within AgeCategory		5.3%	1.6%
		% of Total		1.6%	1.6%
	Neutral	Count	3	2	5
		% within past UEA treatment	60.0%	40.0%	100.0%
		% within AgeCategory	7.0%	10.5%	8.1%
		% of Total	4.8%	3.2%	8.1%
	Acceptable	Count	7	5	12
		% within past UEA treatment	58.3%	41.7%	100.0%
		% within AgeCategory	16.3%	26.3%	19.4%
		% of Total	11.3%	8.1%	19.4%
	Very Acceptable	Count	32	11	43
		% within past UEA treatment	74.4%	25.6%	100.0%
		% within AgeCategory	74.4%	57.9%	69.4%
		% of Total	51.6%	17.7%	69.4%
Total		Count	43	19	62
		% within past UEA treatment	69.4%	30.6%	100.0%
		% within AgeCategory	100.0%	100.0%	100.0%
		% of Total	69.4%	30.6%	100.0%

measure of association provides a standard against which to judge the relationship between the two variables observed in the table. The association indicates the strength of a relationship between two variables on an ordinal scale. Values close to an absolute value of 1 indicate a strong relationship between the two variables. A value on the statistic between 0.0 and +1.0 indicates a positive (or direct) relationship. That is, as the value of one variable increases the value of the other variable also increases. A value on the statistic between 0.0 and -1.0 indicates a negative (or indirect) relationship. That is, as the value of one variable increases the value of the other variable decreases. In Table 5, the association indicates the direction of the relationship (positive or negative). The association does not infer whether the relationship observed in the sample is true of the general population.

Table 5. Gamma Statistics for Symmetric Measures of Past Uneven Aged Treatment and Age Category.

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	-.321	.231	-1.233	.217
	Spearman Correlation	-.164	.131	-1.286	.203(c)
Interval by Interval	Pearson's R	-.130	.132	-1.017	.313(c)
N of Valid Cases		62			

a. Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.
c Based on normal approximation.

In Table 5, the gamma significance value is -.321 indicating an inverse relationship whereby both age categories are more acceptable of this Past Un-Even Aged Treatment today. Meaning, the majority of individuals who participated in the Forest Survey found Past Un-Even Aged harvest treatment more acceptable.

Past Seed Tree Treatment

The results of Age Category and Past Seed Tree Treatment (Visual Picture #2, See APPENDIX IV) shows that out of 66 member respondents to question #3 in the

survey, 53 member respondents thought that this Past Seed Tree Treatment is less acceptable visually. The levels of acceptability ranging from 5=Very Acceptable to 1=Not Acceptable were collapsed into two separate columns of 2=Very Acceptable and 1=Less Acceptable which allows for a cleaner view of ordered attributes of each variable. Members, 83.3 percent, in 60 years and older age category designate this Past Seed Tree harvest treatment, less acceptable (See Table 6). What's more, member respondents in age category of less than 60 years thought this Past Seed Tree harvest treatment to be less acceptable by 1.1 percent.

Table 6. Summary of Levels of Acceptability Collapsed into Less Acceptable and Very Acceptable Columns of Past Seed Tree Treatment with Age Category Crosstabulation.

			Age Category		
			less than 60	60 and older	Total
Past Seed Tree	Less Acceptable	Count	38	15	53
		% within PastSeedTree	71.7%	28.3%	100.0%
		% within Age Category	84.4%	83.3%	84.1%
		% of Total	60.3%	23.8%	84.1%
	Very Acceptable	Count	7	3	10
		% within PastSeedTree	70.0%	30.0%	100.0%
		% within Age Category	15.6%	16.7%	15.9%
		% of Total	11.1%	4.8%	15.9%
Total		Count	45	18	63
		% within PastSeedTree	71.4%	28.6%	100.0%
		% within Age Category	100.0%	100.0%	100.0%
		% of Total	71.4%	28.6%	100.0%

Rank-order: 1=Less Acceptable (containing 1=Not Acceptable, 2=Somewhat Acceptable, and 3=Neutral) and 2=Very Acceptable (containing 4=Acceptable and 5=Very Acceptable)

Participants in age category of less than 60 years, 38 counts, show that Past Seed Tree harvest treatment less acceptable compared to participants in the same age category indicating Past Seed Tree harvest treatment very acceptable (Figure 4). Participants in the age category in the 60 and older, 15 counts, indicate this harvest treatment less acceptable while only 3 participants indicating Past Seed Tree harvest to be very acceptable.

Pearson's Chi-square test determines whether two variables of Past Seed Tree harvest treatment and Age Category are independent of each other. The chi-square measures test the hypothesis that the row and column variables in a crosstabulation are independent. The most common used value in the Pearson's chi-square, shown in the first row of Table 7, indicates that the two variables are independent. A value that is not significant indicates that the variables do not vary significantly from independence. A chi-square test of independence was calculated comparing the result of Past Seed Tree Treatment with Age Category.

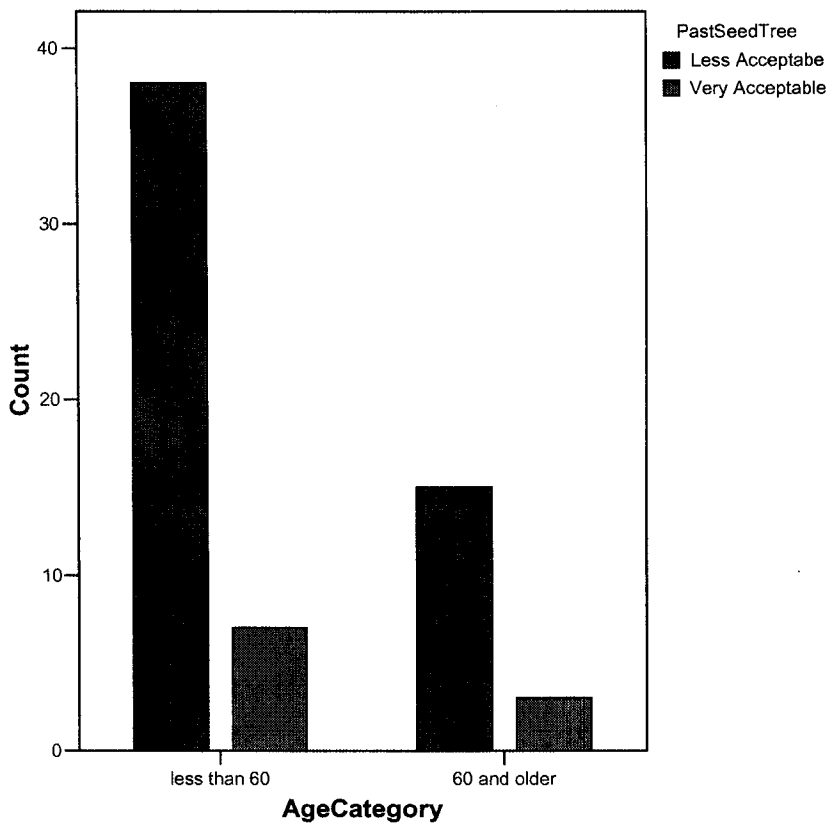

Figure 4. The Number of Participates in Age Category to the Level of Acceptability to Past Seed Tree Harvest Treatment.

No significant relationship was found (chi-square = 0.012, p = 0.913); however, cells with counts less than 5 indicate missing values (See Table 7). As a general rule for

chi-square is that no more than 20 percent of the cells should have counts below five. A low significance value typically below .05 indicates that there maybe a relationship between the two variables. While chi-square measure may indicate that there is a relationship between two variables, it does not indicate the strength or direction of the relationship. Meaning, there was no significant relationship between age categories because both age categories indicated Past Seed Tree Harvest less acceptable overall.

Table 7. Chi-Square Tests of Levels of Acceptability Collapsed into Less Acceptable and Very Acceptable of Past Seed Tree Treatment and Age Category.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.012(b)	1	.913		
Continuity Correction(a)	.000	1	1.000		
Likelihood Ratio	.012	1	.914		
Fisher's Exact Test				1.000	.592
Linear-by-Linear Association	.012	1	.914		
N of Valid Cases	63				

a Computed only for a 2x2 table
b 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.86.

The gamma statistics (See Table 8) is a measure of association between the two variables, Past Seed Tree Treatment and Age Category. The value is .041 meaning that there is a low relationship between the two variables. Values close to an absolute value of 1 indicate a strong relationship between the two variables. Variables close to 0 indicate little or no relationship. In this case, a low relationship exists with a significance level of .914, $p > .05$, and a value of .041, which indicates there is no relationship between the ordinal variables. There is no difference in age categories.

Table 8. Gamma Crosstabulation of Levels of Acceptability of Past Seed Tree Treatment and Age Category—Symmetric Measures.

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.041	.377	.108	.914
N of Valid Cases		63			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Present Seed Tree Treatment

Table 9, shows the crosstabulation summary of Age Category and Present Seed Tree Treatment (Picture #5, in APPENDIX IV) acceptability levels and indicates member respondent percentages for age category of 60 and older to be 68.4 percent, Very Acceptable, compared to age category of less than 60 years to be 53.5 percent, Very Acceptable. The percentage within age category of Less Acceptable view of Present Seed Tree Treatment totaled 41.9 %, compared to within age category of Very Acceptable view at 58.1%.

Table 9. Summary of the Levels of Acceptability of Present Seed Tree Harvest Treatment and Age Category Crosstabulation.

			Age Category		Total
			less than 60	60 and older	
Present Seed Tree	Less Acceptable	Count	20	6	26
		% within PresentSeedTree	76.9%	23.1%	100.0%
		% within AgeCategory	46.5%	31.6%	41.9%
		% of Total	32.3%	9.7%	41.9%
	Very Acceptable	Count	23	13	36
		% within PresentSeedTree	63.9%	36.1%	100.0%
		% within AgeCategory	53.5%	68.4%	58.1%
		% of Total	37.1%	21.0%	58.1%
Total		Count	43	19	62
		% within PresentSeedTree	69.4%	30.6%	100.0%
		% within AgeCategory	100.0%	100.0%	100.0%
		% of Total	69.4%	30.6%	100.0%

Rank-order: 1=Less Acceptable (containing 1=Not Acceptable, 2=Somewhat Acceptable, and 3=Neutral) and 2=Very Acceptable (containing 4=Acceptable and 5=Very Acceptable)

Gamma statistics of the variables, Table 10, shows no relationship between the two variables—Levels of Acceptability of Present Seed Tree Harvest and Age Category.

Table 10. Gamma Statistics of the Levels of Acceptability and Age Category—Symmetric Measures.

		Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Gamma	.307	.263	1.132	.258
N of Valid Cases		62			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Hypothesis 3—Salish and Kootenai tribal members who participate in cultural uses are more opposed to intense silvicultural strategies than tribal members who do not. Due to the low response rate of the tribal membership, the result provides an example of how one could analyze such a hypothesis and can not be inferred to the entire tribal population.

The Cultural uses are those items listed in question #15 (APPENDIX IV). This cultural use category is collapsed into two sub-categories separating subsistence use from family use. Subsistence use includes firewood gathering, gathering cultural plants, post/pole harvesting, mushroom/berry picking, fishing or fly-fishing, and wildlife hunting. Family uses include family/friends, camping (primitive and/or developed sites), swimming, and picnicking. Another category that included both subsistence and family use (minus forestry oriented jobs category that includes thinning, planting, logging contracts) was created to view the entire main activities and called All Cultural Use.

In the example survey, low cultural and high cultural use are scale order from 5=Very important to 1=Not important. These variables were further collapsed into two categories: low cultural use and high cultural use. Low cultural use contains importance levels 1 though 3 and high cultural use contains 4 through 5 importance levels. These variables can be individually compared with responses for survey pictures (questions 1, 3, and 5) to attempt to answer whether or not members with high cultural use orientation oppose intense silvicultural treatments.

All Cultural Use frequencies for low and high cultural uses are listed on Table 11, which shows that member respondents consider themselves to exhibit high cultural use are 57.6 percent (38 responses) compared to 42.4 percent (28 responses) low cultural use out of 66 cases.

Table 11. All Cultural Use Recoded Which Includes Subsistence Use and Family Use Categories Minus Forestry Oriented Jobs Category Compared to Low and High Cultural Use Recoded Frequencies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low Cultural Use	28	42.4	42.4	42.4
	High Cultural Use	38	57.6	57.6	100.0
	Total	66	100.0	100.0	

Tables 12 shows the percentage between Family Use and Subsistence Use and the percentage of high to low Cultural Use categories, by Age Category, for each of the three harvest treatments—Past Uneven-Aged, Past Even-Aged, and Present Seed Tree Treatments (pictures in question 1, 3, and 5, respectively). This technique adds a layer variable to create a 3-way table in which categories of the row and column are further subdivided by categories of the layer variable. The variable is called the control variable because it may reveal how the relationship between the row and column variable changes when you "control" for the effects of the third variable. Table 12 is simple crosstabs which examines the influence on one variable on another whereby questioning whether Family Cultural Use is related to Age Category as the dependent variable and Past Uneven-Aged harvest treatment as the independent variable. At first glance, less than 60 age category respondents appear to be very acceptable of the Past Uneven-Aged harvest treatment (overall 90% of those respondents said harvest treatment to be very acceptable, but the difference between the highest and lowest Family Cultural Use percentage—is 44%). Also, note that few respondents said, "Less Acceptable" most had a definite

opinion here. With recoding of the variables, most respondents with high Family Cultural Use (74%) say that Past Uneven-Aged harvest treatment is very acceptable, over 67% of the high Family Cultural Use respondents said this compared to 25% of the respondents

Table 12. Family Cultural Use Recoded with Past Un-Even Aged Harvest Treatment Recoded to Age Category Recoded into Two Categories Crosstabulation.

AgeCategory				Past UEA		Total
				Less Acceptable	Very Acceptable	
less than 60	Family Cultural Use	Low Cultural Use	Count	1	10	11
			% within Family Cultural Use	9.1%	90.9%	100.0%
			% within Past UEA	25.0%	25.6%	25.6%
			% of Total	2.3%	23.3%	25.6%
		High Cultural Use	Count	3	29	32
			% within Family Cultural Use	9.4%	90.6%	100.0%
			% within Past UEA	75.0%	74.4%	74.4%
			% of Total	7.0%	67.4%	74.4%
	Total		Count	4	39	43
			% within Family Cultural Use	9.3%	90.7%	100.0%
			% within Past UEA	100.0%	100.0%	100.0%
			% of Total	9.3%	90.7%	100.0%
60 and older	Family Cultural Use	Low Cultural Use	Count	2	8	10
			% within Family Cultural Use	20.0%	80.0%	100.0%
			% within Past UEA	66.7%	50.0%	52.6%
			% of Total	10.5%	42.1%	52.6%
		High Cultural Use	Count	1	8	9
			% within Family Cultural Use	11.1%	88.9%	100.0%
			% within Past UEA	33.3%	50.0%	47.4%
			% of Total	5.3%	42.1%	47.4%
	Total		Count	3	16	19
			% within Family Cultural Use	15.8%	84.2%	100.0%
			% within Past UEA	100.0%	100.0%	100.0%
			% of Total	15.8%	84.2%	100.0%

in the low Family Cultural Use category, in this sample. Of the 60 and older Age Category (84%), 42% of these respondents indicate that Past Uneven-Aged harvest treatment in both low and high Cultural Use categories to be very acceptable compared to over 15% in the less acceptable category.

Table 13. Age Category Recoded with Past Seed Tree Harvest Treatment Recoded to Cultural Use Recoded Crosstabulation.

Past Seed Tree			All Cultural Use2		Total
			Low Cultural Use	High Cultural Use	
Less Acceptable	Age Category	less than 60	11	27	38
		60 and older	11	4	15
	Total		22	31	53
Very Acceptable	Age Category	less than 60	3	4	7
		60 and older	1	2	3
	Total		4	6	10

Table 13 shows Age Category comparisons with high and low Cultural Use to Past Seed tree harvest treatment. Observe that individuals of both high Cultural Use and low Cultural Use in both less than 60 years and 60 years and older age category indicate Past Seed Tree harvest to be less acceptable.

Table 14. Age Category Recoded with Cultural Use Recoded to Past Seed Tree Harvest Treatment Recoded Chi-Square Tests.

Past Seed Tree		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Less Acceptable	Pearson Chi-Square	8.727(b)	1	.003		
	Continuity Correction(a)	6.994	1	.008		
	Likelihood Ratio	8.813	1	.003		
	Fisher's Exact Test				.005	.004
	Linear-by-Linear Association	8.562	1	.003		
	N of Valid Cases	53				
Very Acceptable	Pearson Chi-Square	.079(c)	1	.778		
	Continuity Correction(a)	.000	1	1.000		
	Likelihood Ratio	.080	1	.777		
	Fisher's Exact Test				1.000	.667
	Linear-by-Linear Association	.071	1	.789		
	N of Valid Cases	10				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.23.
c 4 cells (100.0%) have expected count less than 5. The minimum expected count is 1.20.

Table 14 presents statistics and measures of association. Pearson Chi-Square test, Fisher's Exact Test, Likelihood Ratio tests between Age Category with Cultural Use to Past Seed Tree harvest treatment. The low significance value (chi-square = 8.727, p = 0.003) indicates that there may be some relationship between the two variables, meaning that the association between Age Category and the level of Cultural Use variables point out that Past Seed Tree harvest treatment to be less acceptable.

Table 15 shows a 3-way table in which categories of the row and column are further subdivided by categories of the layer variable, Age Category with All Cultural Use to Present Seed Tree harvest treatment acceptability levels. This technique questions whether Age Category is related to Cultural Use as the dependent variable and Past Uneven-Aged harvest treatment as the independent variable. Notice that regardless of age and high or low cultural use, all counts indicate that Present Seed Tree harvest treatment to be very acceptable.

Table 15. Age Category Recoded with All Cultural Use Recoded to Present Seed Tree Crosstabulation.

Present Seed Tree			All Cultural Use2		Total
			Low Cultural Use	High Cultural Use	
Less Acceptable	Age Category	less than 60	7	13	20
		60 and older	5	1	6
	Total		12	14	26
Very Acceptable	Age Category	less than 60	5	18	23
		60 and older	8	5	13
	Total		13	23	36

Table 16 shows the Pearson's Chi-Square test of Age Category with Cultural Use to Present Seed Tree harvest treatment of both low and very acceptability levels. In both the Less and Very Acceptable levels, the significance are 0.037, $p < .05$ and .0.017, $p < .05$, respectively. A strong relationship between Age Category and Cultural Use exists and their level of acceptability to this type of harvest treatment is similar.

Table 16. Age Category Recoded with All Cultural Use Recoded to Present Seed Tree Chi-Square Tests.

Present Seed Tree		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Less Acceptable	Pearson Chi-Square	4.338(b)	1	.037		
	Continuity Correction(a)	2.612	1	.106		
	Likelihood Ratio	4.585	1	.032		
	Fisher's Exact Test				.065	.052
	Linear-by-Linear Association	4.172	1	.041		
	N of Valid Cases	26				
Very Acceptable	Pearson Chi-Square	5.702(c)	1	.017		
	Continuity Correction(a)	4.108	1	.043		
	Likelihood Ratio	5.684	1	.017		
	Fisher's Exact Test				.030	.022
	Linear-by-Linear Association	5.544	1	.019		
	N of Valid Cases	36				

a Computed only for a 2x2 table
b 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.77.
c 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.69.

In Table 17, below, the dependent variable age category to the independent variable family cultural use, 52% of the less than 60 age category says that high cultural use to be very important. However, respondent numbers vary from 60 and older age category of 19 out of 64 total to 45 in the less than 60 age category.

Table 17. Age Category Recoded to Family Cultural Use Recoded Crosstabulation.

			Family Cultural Use		
			Low Cultural Use	High Cultural Use	Total
AgeCategory	less than 60	Count	12	33	45
		% within AgeCategory	26.7%	73.3%	100.0%
		% within Family Cultural Use	54.5%	78.6%	70.3%
		% of Total	18.8%	51.6%	70.3%
	60 and older	Count	10	9	19
		% within AgeCategory	52.6%	47.4%	100.0%
		% within Family Cultural Use	45.5%	21.4%	29.7%
		% of Total	15.6%	14.1%	29.7%
Total		Count	22	42	64
		% within AgeCategory	34.4%	65.6%	100.0%
		% within Family Cultural Use	100.0%	100.0%	100.0%
		% of Total	34.4%	65.6%	100.0%

Table 18 is Pearson's Chi-Square test indicating a significance of .04, $p<.05$ between age category and family cultural use implying that family cultural use ranked high in less than 60 age category. A strong relationship between family cultural use and age category exists with these tribal member respondents.

Table 18. Age Category Recoded to Family Cultural Use Recoded Pearson's Chi-Square Test.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.993(b)	1	.046		
Continuity Correction(a)	2.924	1	.087		
Likelihood Ratio	3.888	1	.049		
Fisher's Exact Test				.082	.045
Linear-by-Linear Association	3.930	1	.047		
N of Valid Cases	64				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.53.

Another example hypothesis that could be tested would be that members who participate in cultural use (high cultural use value) tend to deem intense harvest treatments unacceptable (picture 2 in question 3 of the Forest Survey, Past Seed Tree or Permanent Even-Aged harvest). Table 19 shows cultural uses, both family and subsistence cultural uses, by responses to the visual picture 2—Past Seed Tree harvest

Table 19. All Cultural Use Recoded and Past Seed Tree Harvest Treatment Recoded Crosstabulation.

			Past Seed Tree		Total
			Less Acceptable	Very Acceptable	
All Cultural Use2	Low Cultural Use	Count	23	4	27
		% within All Cultural Use2	85.2%	14.8%	100.0%
		% within PastSeedTree	41.8%	40.0%	41.5%
		% of Total	35.4%	6.2%	41.5%
	High Cultural Use	Count	32	6	38
		% within All Cultural Use2	84.2%	15.8%	100.0%
		% within PastSeedTree	58.2%	60.0%	58.5%
		% of Total	49.2%	9.2%	58.5%
Total		Count	55	10	65
		% within All Cultural Use2	84.6%	15.4%	100.0%
		% within PastSeedTree	100.0%	100.0%	100.0%
		% of Total	84.6%	15.4%	100.0%

treatment or Permanent Even-Aged management. Both combined low and high cultural use categories found past seed tree harvest treatment less acceptable (84.6% compared to 15.4%). Note that 49.2% in the high cultural use category indicate past seed tree treatment less acceptable compared to 9.2% of the high cultural use category that indicate past seed tree treatment very acceptable.

Table 20. All Cultural Use Recoded and Visual Pictures 1 or 2 (Clearcut Methodology) Preference Crosstabulation.

			Choose Picture 1 or Picture 2			Total
			Picture 1	Picture 2	Neither	
All Cultural Use2	Low Cultural Use	Count	1	20	6	27
		% within All Cultural Use2	3.7%	74.1%	22.2%	100.0%
		% within Choose Picture 1 or Picture 2	50.0%	39.2%	50.0%	41.5%
		% of Total	1.5%	30.8%	9.2%	41.5%
	High Cultural Use	Count	1	31	6	38
		% within All Cultural Use2	2.6%	81.6%	15.8%	100.0%
		% within Choose Picture 1 or Picture 2	50.0%	60.8%	50.0%	58.5%
		% of Total	1.5%	47.7%	9.2%	58.5%
Total		Count	2	51	12	65
		% within All Cultural Use2	3.1%	78.5%	18.5%	100.0%
		% within Choose Picture 1 or Picture 2	100.0%	100.0%	100.0%	100.0%
		% of Total	3.1%	78.5%	18.5%	100.0%

In Table 20, the variable All Cultural Use to Visual Picture 1 or 2 (in question 7 of Forest Survey, APPENDIX IV) crosstabulation. Visual Picture 1 is a representation of past clearcutting methodology with large areas of land cut in a square, cropped fashion. Visual Picture 2 is a current edge-feathering clearcut methodology. Both pictures are clearcut techniques. All cultural use recoded compared to both picture 1 and picture 2 with participants with no opinion in the neither category show that both high and low cultural use categories prefer picture 2. Meaning, for this pair of pictures, 78.5 percent

prefer an edge-feathered clearcut over the block type clearcut, and 3.1 percent preferred the block type clearcut, and 18.5 percent had no opinion (Figure 5).

Figure 5 shows a comparison between All Cultural Use Recoded to the number of respondents who had a choice between Picture 1 and Picture 2 with low and high cultural use levels. Respondents, 31 counts with high cultural use picked Picture 2 over Picture 1.

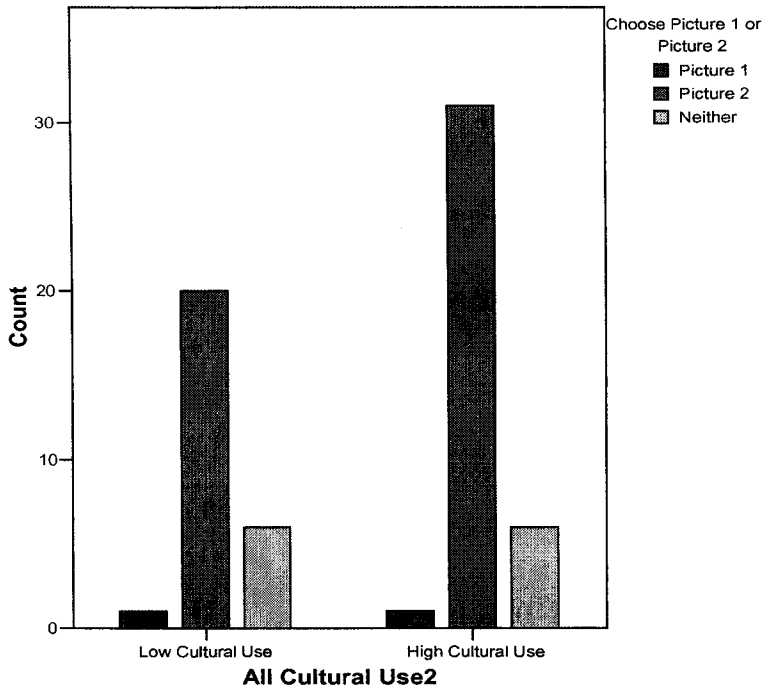

Figure 5. Bar Graph Representing the Numbers of Participants Indicating Low and High Cultural Use Categories to the Preference Between Pictures 1 or Picture 2 Clearcutting Visual Types.

Hypothesis 4—Silvicultural practices like even-aged management tend to be less favored than silvicultural practices like uneven-aged management. Crosstabulation percentage shows the relationship between two variables of Participant Gender and Past Uneven-Aged harvest treatment and Past Seed Tree harvest treatment (even-aged method). Figure 6 indicates most participants found that Past Uneven-Aged harvest treatment very acceptable, 68.2% compared to 1.5% not acceptable. In comparison to Past Seed Tree (even-aged method), both male and female respondents found this harvest

treatment to be not acceptable (59.1%) with 16.7% in the somewhat acceptable range. Only 4.5% found this harvest treatment very acceptable (Table 21).

Analyzed results between Past Seed Tree and Gender of Participant reveal 84.6% found this treatment to be Less Acceptable (Table 22). Female respondents, 92%, overall thought this treatment less acceptable compared to 79.5% of the male respondents. Very

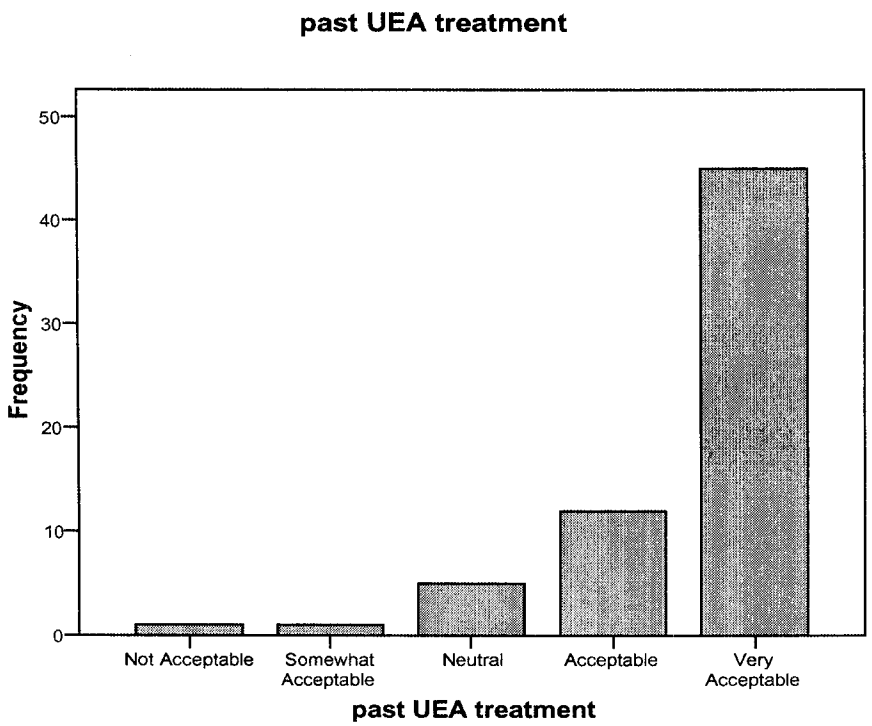

Figure 6. Past Uneven-Aged Harvest Treatment to Acceptability Frequency.

few females found this treatment to be Very Acceptable (8%) compared to 20.5 % of males. More evaluation of the gender differences in perception of Past Seed Tree harvest treatment would be necessary to tease out reliable differences. However, the majority of respondents found that uneven-aged harvest treatment more favorable than even-aged harvest treatment; supporting hypothesis 4.

The survey contains two even-aged harvest treatments in question 3 and question

Table 21. Past Seed Tree Harvest Treatment Frequency of Acceptability Responses.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Acceptable	39	59.1	60.0	60.0
	Somewhat Acceptable	11	16.7	16.9	76.9
	Neutral	5	7.6	7.7	84.6
	Acceptable	7	10.6	10.8	95.4
	Very Acceptable	3	4.5	4.6	100.0
	Total	65	98.5	100.0	
Missing	System	1	1.5		
Total		66	100.0		

5 (See Forest Survey, APPENDIX IV). To see the difference between responses for the two techniques, Table 23 was created to see whether this Present Seed Tree harvest method (pictured above question 5, APPENDIX IV) with leaving more trees per acre compares with the Past Seed Tree Treatment (pictured above question 3, APPENDIX IV) which leaves fewer trees per acre. In Table 23, 67.5% of the male respondents

Table 22. Gender of Participant to Preference of Past Seed Tree Harvest Treatment Crosstabulation

			Past Seed Tree		Total
			Less Acceptable	Very Acceptable	
Gender of Participant	No Gender Response	Count	1	0	1
		% within Gender of Participant	100.0%	.0%	100.0%
		% within PastSeedTree	1.8%	.0%	1.5%
		% of Total	1.5%	.0%	1.5%
	Female	Count	23	2	25
		% within Gender of Participant	92.0%	8.0%	100.0%
		% within PastSeedTree	41.8%	20.0%	38.5%
		% of Total	35.4%	3.1%	38.5%
	Male	Count	31	8	39
		% within Gender of Participant	79.5%	20.5%	100.0%
		% within PastSeedTree	56.4%	80.0%	60.0%
		% of Total	47.7%	12.3%	60.0%
Total		Count	55	10	65
		% within Gender of Participant	84.6%	15.4%	100.0%
		% within PastSeedTree	100.0%	100.0%	100.0%
		% of Total	84.6%	15.4%	100.0%

compared to 43.5 % female respondents think this type of treatment, Very Acceptable. Notice that 56.5% of the female respondents perceive the treatment Less Acceptable compared to male respondents at 32.5 %. Overall, 57.8% of the respondents found this

Table 23. Gender of Participant to Present Seed Tree Preference Crosstabulation.

			Present Seed Tree		
			Less Acceptable	Very Acceptable	Total
Gender of Participant	No Gender Response	Count	1	0	1
		% within Gender of Participant	100.0%	.0%	100.0%
		% within PresentSeedTree	3.7%	.0%	1.6%
		% of Total	1.6%	.0%	1.6%
	Female	Count	13	10	23
		% within Gender of Participant	56.5%	43.5%	100.0%
		% within PresentSeedTree	48.1%	27.0%	35.9%
		% of Total	20.3%	15.6%	35.9%
	Male	Count	13	27	40
		% within Gender of Participant	32.5%	67.5%	100.0%
		% within PresentSeedTree	48.1%	73.0%	62.5%
		% of Total	20.3%	42.2%	62.5%
Total		Count	27	37	64
		% within Gender of Participant	42.2%	57.8%	100.0%
		% within PresentSeedTree	100.0%	100.0%	100.0%
		% of Total	42.2%	57.8%	100.0%

harvest treatment Very Acceptable. Leaving more trees per acre tends to be a favorable even-aged harvest method compared to even-aged method that leaves fewer trees per acre. Of the total, 27 male respondents found that this Present Seed Tree harvest treatment Very Acceptable compared to 10 female respondents. Both male and female

respondents (13 counts) imply Present Seed Tree harvest treatment to be Less Acceptable.

Hypothesis 5—Tribal members that exhibit a cultural ethic tend to favor silvicultural treatments that leave more trees per acre, have large diameters, and resemble older stand structure. Table 24 frequencies show the percent of respondents who consider themselves Native American Cultural (Traditional) in response to question 16, in Forest Survey (APPENDIX IV). Overall 48 (72.7%) of the 66 respondents consider themselves Native American Cultural (Traditional) compared to 12 (18.2 %) who do not consider themselves Native American Cultural (Traditional) and 6 (9.1%) who were indifferent.

Table 24. Native American Cultural (Traditional) Overall Frequencies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	48	72.7	72.7	72.7
	No	12	18.2	18.2	90.9
	Indifferent	6	9.1	9.1	100.0
	Total	66	100.0	100.0	

Table 25 displays the percentages of 66 respondents who ranked how important is considering yourself Native American Cultural (Traditional) from 5=Very Important to 1=Not Important (see question 17, APPENDIX IV). Of the total respondents (63 out of 66), 57.6% indicated that being Native American Cultural (Traditional) is very important to them, while 3% indicated that being Native American Cultural (Traditional) not as important.

Table 25. Native American Cultural (Traditional) Importance Frequencies.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	2	3.0	3.2	3.2
	Somewhat Important	2	3.0	3.2	6.3
	Neutral	10	15.2	15.9	22.2
	Important	11	16.7	17.5	39.7
	Very Important	38	57.6	60.3	100.0
	Total	63	95.5	100.0	
Missing	System	3	4.5		
Total		66	100.0		

Figure 7 presents the percentages of respondents who think that a belief in the environment as a family member, i.e. 'Mother Earth' encourages respect while in forest (Forest Survey, question 18). Overall 75.8% respondents (50 respondents) indicate that this belief encourages respect while in the forest. A small percent 3% (2 respondents) says that this belief is not important to them.

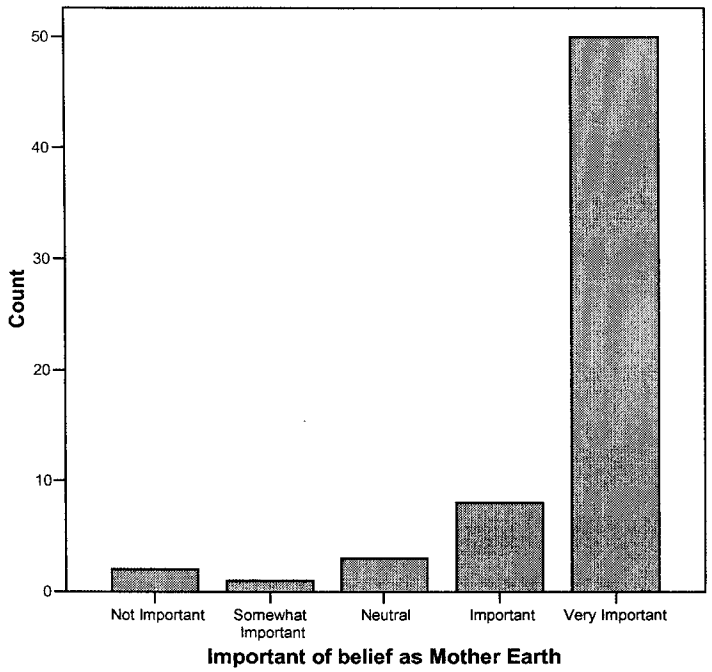

Figure 7. How Important Does a Belief in the Environment as a Family Member, i.e. 'Mother Earth' Encourage Respect in the Forest Frequency.

In the Forest Survey, questions 19 and 20, ask the respondent to identify the type of harvest treatment that they would like to see in the forests and what harvest treatment best describes 'caring for the land'. The idea is members prefer harvest treatments that leave more trees per acre than harvest treatments that leave fewer trees per acre (Forest Survey, question 19). Figure 8 represents the frequency of answers to "what type of harvesting treatment would you like to see in the forests?" Each answer to question 19 and 20 is followed by the letter a-l. Therefore, the first question in 19 is 19a, so on and so

forth (see APPENDIX IV, questions 19 and 20; p.4). Notice that 19b (Leaving both tall

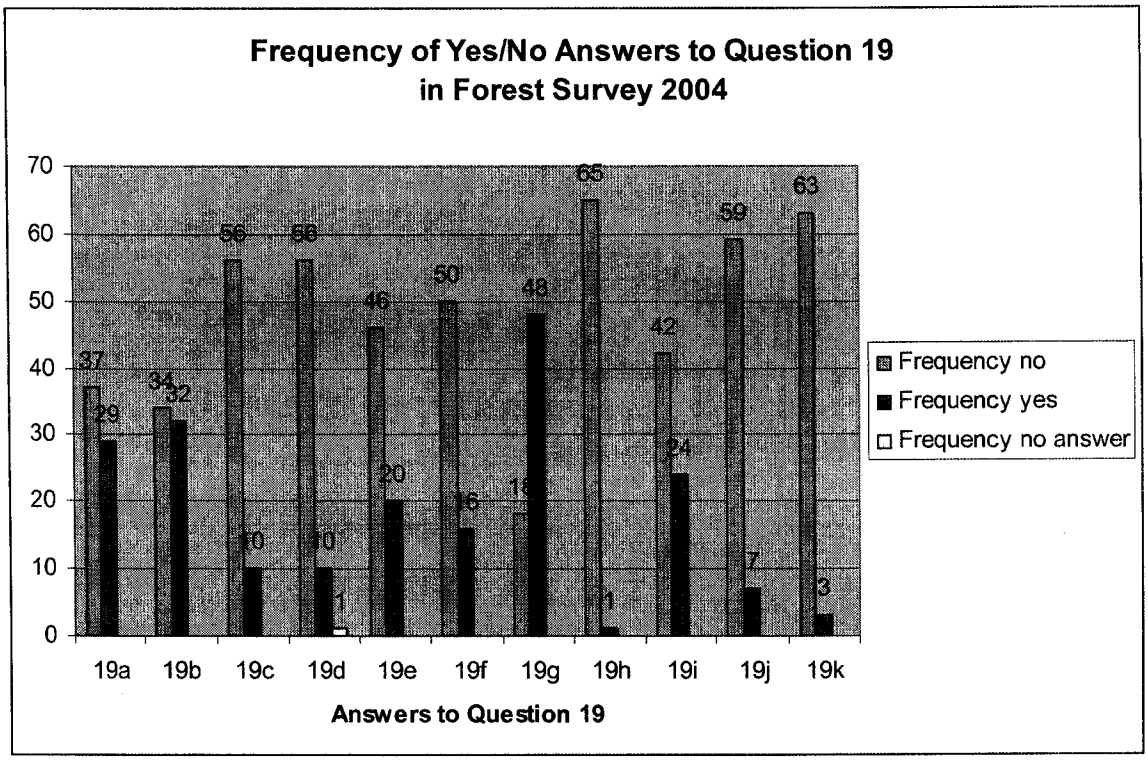

Figure 8. Membership Response Frequency to the Type of Harvest Treatment Preferred in the Forest.

and short size trees) and 19g (Cleaning up the slash) have the highest frequency of yes-marked answers, 32 and 48, respectively. The respondent had the opportunity to answer as many blocks as needed to satisfy the question; therefore, the no-marked frequency option is simply that the respondent did not check that box. The yes-marked answers are more representative of the answers that satisfy the question to the respondent. The most important choice in question 19 is 19h (Taking all the trees) whereby 98.5 % of the respondents (65 out of 66 respondents) did not mark this as an option. Most of the respondents 72.7 percent (48 individuals) marked 19g (Cleaning up the slash) option as the type of harvest treatment they would like to see in the forests on the Flathead Indian Reservation.

Question 20 asked the respondents to answer "what harvest treatment BEST

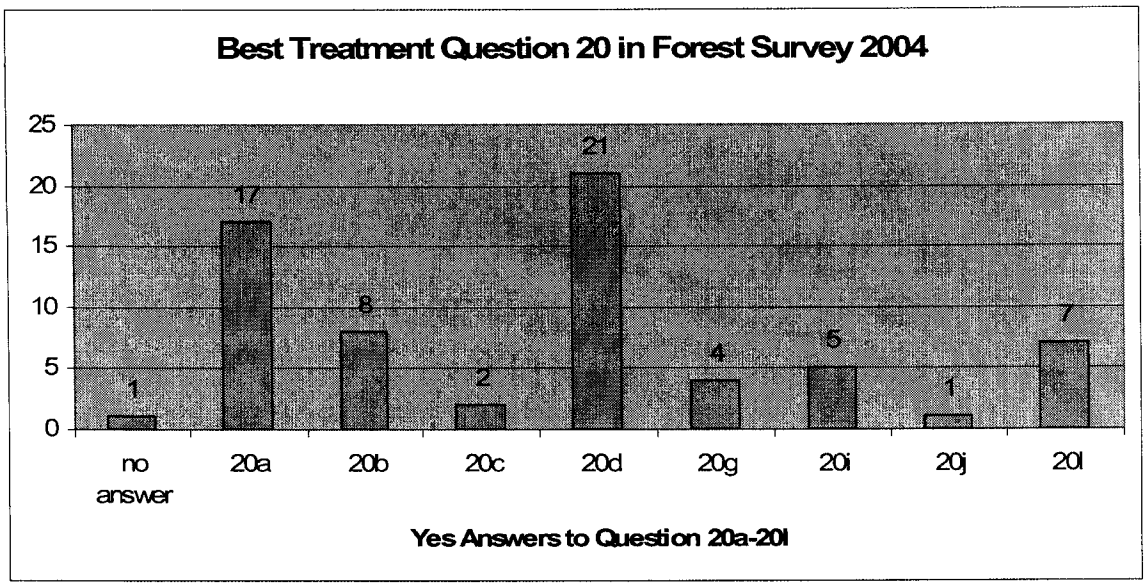

Figure 9. Displays the Response Frequencies to Question 20 in Forest Survey of "what harvest treatment BEST describes, to you, caring for the land?"

describes, to you, caring for the land?" Figure 9 confirms that the majority of the respondent's choice 20a (Leaving more trees per acre after treatment) and 20d (Taking trees that have disease) options by 25.7 % and 31.8 %, respectively. All together 38 out of 66 respondents indicate that these two harvest treatment options reflect 'caring for the land'. Questions 20b (Leaving both tall and short size trees) and 20l (None of the above) options at 12.1% and 10.6 %, respectively, give an idea about what describes 'caring for the land'.

Belief in 'Mother Earth' variable recoded (Belief in Mother Earth-R) represent two categories of responses to include Not Important (those responses that include Not Important to Neutral) and Very Important (those responses that include Important to Very Important). Leaving More Trees per Acre after treatment recoded includes those respondents who chose no preference, leaving more trees per acre, leaving both tall and short size trees, and leaving trees that are large and tall from Question 19 in the Forest Survey (APPENDIX IV). Table 26 in the crosstabulation analysis of the two variables

Leaving More Trees per Acre with Size and Height Recoded against Belief in Mother Earth Recoded. Notice that of the respondents who feel that a belief in 'Mother Earth' encourages respect while in the forest and find this belief very important, all determined

Table 26. Crosstabulation of the Two Variables Leaving More TPA with Size and Height Recoded and Belief in Mother Earth Recoded

			Belief in Mother Earth R		
			Not Important	Very Important	Total
Leaving more TPA with size and height	No Preference	Count	3	14	17
		% within Leaving more TPA with size and height	17.6%	82.4%	100.0%
		% within Belief in Mother Earth R	50.0%	24.1%	26.6%
		% of Total	4.7%	21.9%	26.6%
	Leaving more TPA	Count	0	26	26
		% within Leaving more TPA with size and height	.0%	100.0%	100.0%
		% within Belief in Mother Earth R	.0%	44.8%	40.6%
		% of Total	.0%	40.6%	40.6%
	Leaving both tall and short size trees	Count	3	9	12
		% within Leaving more TPA with size and height	25.0%	75.0%	100.0%
		% within Belief in Mother Earth R	50.0%	15.5%	18.8%
		% of Total	4.7%	14.1%	18.8%
	Leaving trees that are large and tall	Count	0	9	9
		% within Leaving more TPA with size and height	.0%	100.0%	100.0%
		% within Belief in Mother Earth R	.0%	15.5%	14.1%
		% of Total	.0%	14.1%	14.1%
Total		Count	6	58	64
		% within Leaving more TPA with size and height	9.4%	90.6%	100.0%
		% within Belief in Mother Earth R	100.0%	100.0%	100.0%
		% of Total	9.4%	90.6%	100.0%

that Leaving More Trees per Acre with size and height is characteristic of 'caring for the land'. Fifty-eight of the sixty-four respondents (90.6%) strongly believe that the belief in Earth encourages respect in the forest also think that harvest treatments that leave more

trees per acre after harvesting tend to express a cultural ethic of caring for the land. In contrast, 9.4% of the respondents did not think that a belief in mother earth as important

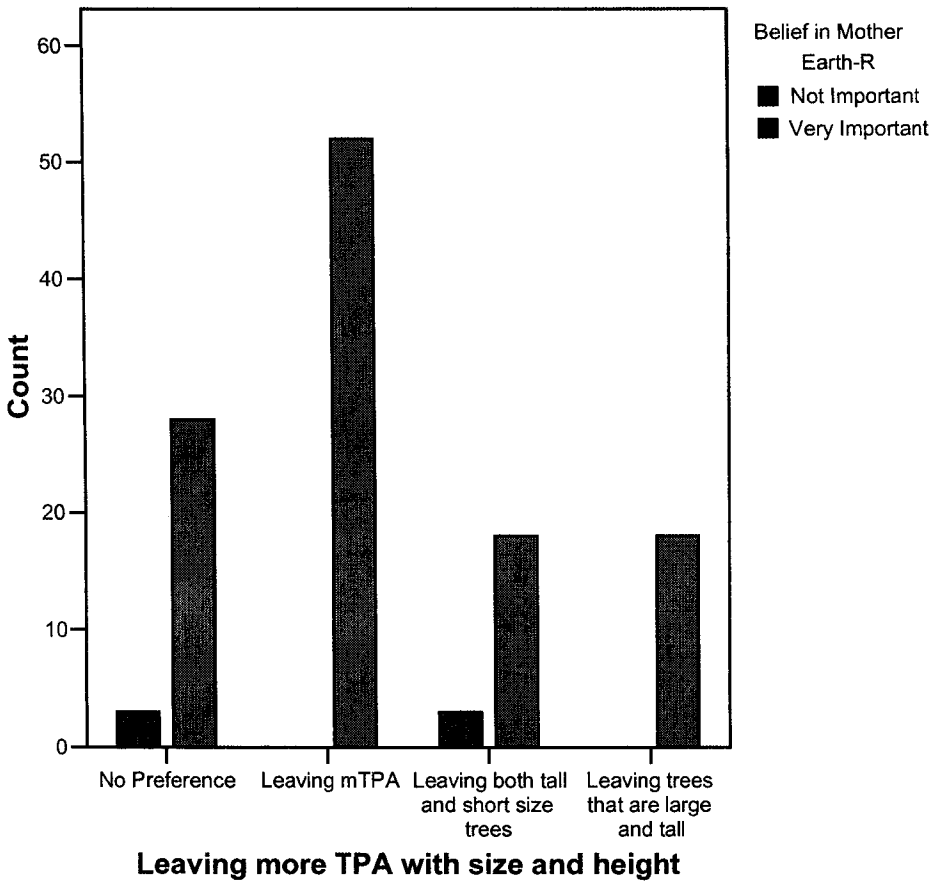

Figure 10. A Bar Graph Showing the Two Variables Leaving More Trees Per Acre Recoded to a Belief in 'Mother Earth' Recoded and Respondent Preferences.

to them, also did not select harvest treatments that characterized caring for the land. The respondents who belief in 'Mother Earth' maintain that this belief encourages respect chose leaving more trees per acre after treatment, leaving both tall and short size trees and leaving trees that are large and tall as indication of 'caring for the land' as top priority in harvest treatments (Figure 10, above).

Pearson Chi-Square test measures two variables and whether they are independent, Belief recoded and Leaving More Trees per Acre variable recoded (Table

27). In this analysis, the significance value is .038, $p < .05$, indicating a strong relationship between the two variables. However, the concept of a cultural ethic has two parts: an epistemological view of the environment and cultural use of the environment.

Table 27. Pearson Chi-Square Test of Belief in 'Mother Earth' Recoded With More Trees per Acre Variable Recoded (Leaving MTA, Leaving Tall and Short Trees and Leaving Trees that are Large and Tall including No Preference)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.438(a)	3	.038
Likelihood Ratio	10.485	3	.015
Linear-by-Linear Association	.276	1	.599
N of Valid Cases	64		

a 4 cells (50.0%) have expected count less than 5. The minimum expected count is .84.

Table 28 (below) shows Pearson Chi-Square tests for the independent variables of Leaving More Trees per Acre with Size and Height and All Cultural Use to the Belief in Mother Earth as the dependent variable. No significant relationship was found (chi-square = .3.00, p = .083); however, Table 29 shows the measure of association between two ordinal variables that ranges from -1 to 1. In this case, the value = 0.706, p = 0.014, meaning there is a strong relationship between belief in 'Mother Earth' and Cultural Use

Table 28. Chi-Square Tests for Leaving More Trees per Acre with Size and Height to All Cultural Use with Belief in 'Mother Earth' Recoded as the Control Variable.

Belief Recoded		Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Not Important	Pearson Chi-Square	3.000(b)	1	.083		
	Continuity Correction(a)	.750	1	.386		
	Likelihood Ratio	3.819	1	.051		
	Fisher's Exact Test				.400	.200
	Linear-by-Linear Association	2.500	1	.114		
	N of Valid Cases	6				
Very Important	Pearson Chi-Square	2.739(c)	3	.434		
	Likelihood Ratio	2.851	3	.415		
	Linear-by-Linear Association	.928	1	.335		
	N of Valid Cases	58				

a Computed only for a 2x2 table
b 4 cells (100.0%) have expected count less than 5. The minimum expected count is 1.00.
c 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.88.

and the preference of leaving more tree per acre with the variables of size and height.

Table 29. Ordinal by Ordinal Directional Measurements for Leaving More Trees per Acre with Size and Height to All Cultural Use with Belief in 'Mother Earth' Recoded.

Belief Recoded				Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Not Important	Ordinal by Ordinal	Somers' d	Symmetric	.706	.228	2.449	.014
			Leaving more TPA with size and height Dependent	.750	.217	2.449	.014
			All Cultural Use2 Dependent	.667	.272	2.449	.014
Very Important	Ordinal by Ordinal	Somers' d	Symmetric	.139	.119	1.161	.246
			Leaving more TPA with size and height Dependent	.167	.144	1.161	.246
			All Cultural Use2 Dependent	.118	.102	1.161	.246

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Table 30, shows that when the dependent variables, Belief and Leaving More Trees per Acre are compared to the independent variable, All Cultural Use of high and low cultural use, the contingency coefficient value is .346 with a significant value of

Table 30. Belief in the Environment Recoded Dependent Variable to Leaving More Trees per Acre with Size and Height Dependent Recoded to All Cultural Use Recoded Symmetric Measurements.

All Cultural Use2			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Low Cultural Use	Nominal by Nominal	Contingency Coefficient	.346			.299
	Ordinal by Ordinal	Gamma	1.000	.000	1.560	.119
		Spearman Correlation	.329	.113	1.743	.094(c)
	Interval by Interval	Pearson's R	.278	.095	1.446	.161(c)
	N of Valid Cases		27			
High Cultural Use	Nominal by Nominal	Contingency Coefficient	.382			.097
	Ordinal by Ordinal	Gamma	-.200	.379	-.517	.605
		Spearman Correlation	-.090	.171	-.534	.596(c)
	Interval by Interval	Pearson's R	-.055	.156	-.328	.745(c)
	N of Valid Cases		37			

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.
c Based on normal approximation.

.299, meaning that values close to 1 indicates a high degree of association between the variables. The negative values indicate a negative relationship whereby there is an inverse relationship between variables. Contingency coefficient values of each statistic range from 0 to 1, in this test the value is .346 in the Low Cultural Use category versus .382 in the High Cultural Use category. The low values for the test indicate a relationship but a fairly week one.

Total frequency responses to Past Un-Even Aged, Past Even-Aged, and Present Even-Aged harvest treatments (Table 29) show that overall responses to each harvest treatment. Past Even-Aged (Past EA) is 59.1 percent who thought this treatment to be Not Acceptable, compared to 68.2 percent of Past Uneven-Aged harvest treatment and 36.4 percent of Present Even-Aged treatment in the Very Acceptable range. Generally, most tribal responses sway toward the uneven-aged and present even-aged harvest treatments when compared in percentage to past even-aged technique.

Table 31. Frequencies Percentages of Respondents toward Past Uneven-Aged, Past Even-Aged and Present Even-Aged Harvest Treatments.

	Past UEA	Past EA	Present EA
Not Acceptable	1.5	59.1	10.6
Somewhat Acceptable	1.5	16.7	15.2
Neutral	7.6	7.6	15.2
Acceptable	18.2	10.6	19.7
Very Acceptable	68.2	4.5	36.4
Total	97.0	98.5	97.0
Missing System	3.0	1.5	3.0
Total	100.0	100.0	100.0

In summary, of the respondents 59.1% find that past seed tree harvest treatment (Past EA) Not Acceptable compared to 68.2% who find that the past uneven-aged treatment Very Acceptable, while 36.4% find the present seed tree harvest treatments (Present EA) Very Acceptable as well. The majority of the responses found that past uneven-aged harvest treatments (Past UEA) are more favorable than both Past EA and Present EA techniques.

This type of survey example—attempting to define a cultural ethic in relation to harvest treatments—may give Tribal Forestry direction for integrating tribal membership preferences or set basis for forest harvest techniques that emulate tribal membership desires. This example survey can be used as an appropriate tool to obtain data or obtain preference revealing data from the tribal membership regarding how tribal timber assets should be administered. Tribal forestry and governments may also use tribal referendums or plebiscite to decide a question of importance and to obtain data from the tribal membership. The tribal membership right of preference expression derives from having membership in the tribe collectively and may be more democratically legitimate than involving only a fraction of membership concerns into forest management.

CHAPTER 5

FEDERAL TRUST AND TRIBAL AUTONOMY

Tribal Forest Law and Policy—Political Dimension

For a long time, Native American people have held a belief that Mother Earth is to be protected and revered just as the natural resources (timber) on their reservation lands. A Native American was quoted by the Indian Forest Management Assessment Team (IFMAT) while visiting on a reservation, "Our land is what makes us who we are. Whatever we do travels in a circle. Somewhere down the road, good or bad will come back. We have to look ahead and take care of what we have" (Intertribal Timber Council 1993).

In this study, objectives one was to determine the laws and policies that establish Tribal forest management on the Confederated Salish and Kootenai Tribes of the Flathead Reservation. More specifically, when these laws designed to manage tribal resources are inconsistent with tribal membership consensus, these laws and policies tend to be less culturally sensitive. On the Flathead Indian Reservation, timber harvesting is an essential element in sustaining the tribal government and is an essential commodity for many tribal members (CSKT FEIS 2000; p. 85). The forest landscape to the Salish, Pend d'Oreille, and Kootenai offer commercial forest products as well as spiritual fortification and cultural traditional use opportunities.

Historical Background of Indian Policy and Law

Native American tribes have long been treated as "domestic dependent nations" of the federal government (Cherokee Nation v. Georgia 1831), with the federal government acting as equals after the Revolutionary War (Pevar 1992). Chief Justice Marshall in Cherokee Nation v. Georgia (1831) determined that the Cherokee Nation was "a state. . .a distinct political society, separated from others, capable of managing its own affairs and governing itself." This determination created the foundation for the sovereignty doctrine and self-determination policy of today. However, Congress is the only government entity that holds power to invade, abrogate, or control Indian lands (Dussias 1993). The sovereignty status of Indian tribes is based upon the theory of "inherent right" to control the lands within the exterior boundaries of their reservations (Mettler 1978; Getches et al. 1993).

In the early eighteenth and early nineteenth centuries, Native Americans exchanged vast amounts of land for reservations on which they now reside. During the general allotment era, substantial amounts of reservation lands held in trust were divided into individual parcels, of which every Indian would receive a parcel, and surplus parcels would be sold to white settlers (General Allotment Act 1887; Monette 1995). The idea was to assimilate Indian people into the white culture. During this time, the federal government began to allow more Indian tribal access to the benefits from selling of reservation timber. Indian lands fell in vastness from 140 million acres to 50 million acres (Cohen 1941; Monette 1995), with a checkerboard land ownership pattern. The fragmentation of ownership includes beneficial ownership as Indians communally, trust and fee ownership as Indians individually (allotments), and non-Indian fee land

ownership (Cohen 1941; Getches et al. 1993). The general allotment era, abolished in 1934 (Indian Reorganization Act), set the stage for continual legal battles over tribal property and territory, and began the period of the "trust" doctrine (Getches et al. 1993). In Seminole Nation v. United States (1942), as one example, the Court found a cause of action against the United States for breach of a fiduciary duty under the trust relationship for distributing annuity payments to tribal officials when they believed the funds were being misused.

Three Federal statutes attempted to assimilate Indian people into white culture (General Allotment Act 1887); tolerate Indian tribes (Indian Reorganization Act 1934); and to terminate Indian tribes (Termination Act 1953). Three relentless Acts intended to break up tribal territory and the tribal culture, failed. Today about sixteen million acres on 214 reservations in 23 states in the United States are managed by Tribal entities (Intertribal Timber Council 1993). Half of the sixteen million acres are considered commercial timberlands while the other half are woodlands (Intertribal Timber Council 1993).

Federal Trust Responsibility—what is it?

The relationship of the federal government toward Indian tribes over the last few centuries has been one of oppression and paternalism. Today, Indian tribes are asserting their inherent right of self-governance to manage natural resources under the protection of the federal government's Bureau of Indian Affairs. The emphasis of federal policy is in tribal self-determination (Indian Self-Determination and Education Assistance Act 1975). Indian tribes more and more are forced to defend tribal lands from the onslaught of land and natural resource hungry adjacent private, state, and federal landowners.

Indian tribes are declaring protection of forested tribal lands and their natural resources (Tribal Forest Protection Act 2004) and holding the federal government accountable for its fiduciary duty.

The trust responsibility, grounded by plenary power of Congress to enact legislation specific to Native people, land and government, exists only at the sufferance of Congress (United States Constitution and the trust relationship imposed by the federal government as trustee of Indian lands). The sovereignty of tribes provides the setting from which to weigh the interests of the tribe against the interest of the government. Tribal sovereignty powers are limited by three principles: "1) An Indian tribe possesses all the powers of a sovereign state, 2) Conquest renders the tribe subject to the legislative power of the United States and, in substance, terminates the external powers of sovereignty of the tribe. . .but does not by itself affect the internal sovereignty of the tribe, i.e., its powers of local self-government, and 3) These powers are subject to qualification by treaties and by express legislation by Congress" (Cohen 1941; Getches et al. 1993).

Since the tribal land base is the *sine qua non* of sovereignty, the trust duty in issues relating to natural resources rises to a position of significant importance to tribes. Simply, the trust responsibility extends only to land that of which title resides in the United States (Cohen 1941; Getches et al. 1993). To Native American tribes the land base is an ancestral entity that is revered for the most part because of the importance of memories in their culture. The tribal land base is fixed, meaning the tribe cannot relocate to a better or different piece of land, the trust duty must be focused on preservation for future generations. Additionally, the land base through its natural resources provides the

reservations economy, marks tribal jurisdiction, and provides a place for present and future generations of the tribe. Without ecologically viable land, the self-determination of a tribe is rendered an ineffective concept.

History of Timber Harvesting in Indian Country

The management of Indian forest lands (timber harvesting and management) is fulfilled by the Executive Office, specifically the Bureau of Indian Affairs in the Department of the Interior. The trust responsibility under the Bureau of Indian Affairs is to regulate and oversee timber harvesting on Indian forest lands for production, development, and protection of tribal timber resources (United States v. Cook 1873; United States v. Shoshone Tribe of Indians 1938; Indian Timber Sales Act 1964). Pursuant to the Indian Timber Sales Act (1964), tribes may harvest timber on their reservations. The sale of timber must "be based upon a consideration of the needs and best interests of the Indian owner and his heirs" (Indian Timber Sales Act 1964) and "sold in accordance with the principles of sustained yield management or converted to a more desirable use" (Indian Timber Sales Act 1964).

Indian timber lands are managed in regulations and policy under the guidance of the Bureau of Indian Affairs. The Code of Federal regulations are the guiding regulations that express the objectives of Indian forest lands: "the development of Indian forest land . . . by Indians . . . to promote self-sustaining communities, so that Indians may receive from their Indian forest land not only stumpage value, but the benefit of all the labor and profit that such Indian forest land is capable of yielding" (Code of Federal Regulations 1996). Therefore, prior to the passing of the National Indian Forest Resource Management Act of 1990, the purpose of Indian forest management under the Code of

Federal Regulations (1996) was for the benefit of labor and profit under sustained yield management objectives.

The National Indian Forest Resource Management Act (NIFRMA) of 1990 is federal Indian forest policy that today allows Native American tribes the opportunity to fulfill self-determination in managing the forests on Indian lands. After the passing of NIFRMA, the Intertribal Timber Council developed an Indian Forest Management Assessment Team (IFMAT) (1993) to report on the goals and objectives set forth in approved forest management plans as directed by NIFRMA (1990). NIFRMA set definite goals for self-determination which is magnified with the Tribal Self-Governance Law (1994); Indian tribes are obliged to fulfill management objectives in direct line with their own ideas of sustaining forest resources for future generations. Tribal Self-Governance Law (1994) hand in hand with the Indian Self-Determination Act (1975; 1996) may prove to allow tribal government entities as co-trustee with the federal government over all natural resources within the exterior boundary of the reservations as well as the ceded territories and adjacent land ownership management strategies in protection of tribally valued assets. Does this oblige tribal governments to act prudently in administrative decision making in regards to natural resource management further than maximizing revenues for the short-term? Does this co-trustee position prove important in seeking out tribal membership concerns in forest management?

Forest Resource Management on Flathead Indian Reservation in western Montana

The Flathead Indian reservation tribal membership interests about the health, visual characteristics of their forests and economic yield through stumpage value are vital concerns. When a community of people lives on the land where timber is harvested, the

concerns become intertwined with other concerns such as scenic beauty, financial profits, spiritual rewards, and other diverse cultural needs (APPENDIX V—Tribal Membership Comments). The unique cultural connectivity of the Indians on the Flathead Indian reservation to their landscape is infused in attitude and belief in Mother Earth.

The Flathead Indian Reservation was the first tribe in the United States after the Indian Reorganization Act of 1934 to establish a constitution of government and develop a charter in 1935. The Act sought to protect the tribal land base, ending the practice of allotment, and permitted the tribes to set up legal structures for self-governance. Taking the lead in the management of their timber resources, The Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation Forestry Department has compacted (Tribal Self-Governance Law of 1994) with the federal government under the trust responsibility of the Bureau of Indian Affairs since 1995 (Durglo 2003).

The CSKT Forestry Department's philosophy for management is:

> Forestry's mission is to promote perpetually productive ecosystems for future generations in accordance with goals of the Confederated Salish, Pend d'Oreille, and Kootenai Tribes. We will prescribe and implement sound silvicultural treatments to promote forest health and return forest lands to near pre-settlement fire maintained forest structures. Our decisions will be based on Tribal social and economic needs, as well as sound scientific and ecological principles." (Confederated Salish and Kootenai Tribal Forestry Department 2004).

The CSKT FEIS (2000) focuses on ecosystem management strategies whereby an integrated approach is taken to incorporate diversity of forest structures and function using ecological process such as historical use of fire to restore the forest to pre-European conditions. One of the major elements is to include socially acceptable perspectives through tribal membership surveys (CSKT FEIS 2000; p. 15-16). According to the CSKT FEIS (2000), tribal membership concerns are a vital link to forest resource management.

The intent of Congress and purpose of NIFRMA (1990) was to place primary responsibility of Indian forests in Indian hands. The Confederated Salish and Kootenai Tribes Forest Management Plan (2000) espouse the guiding vision of the tribe and the vision of the forestry department as well as following after the principles of sustained yield management. The FEIS (2000) takes a multi-disciplinary approach to forest resource management under the principles of ecological restoration. Sustained-yield management is currently defined in the regulations: "the yield of forest products that a forest can produce continuously at a given intensity of management" (Code of Federal Regulations 1996).

Contemporary tribal forest management requires consideration of the social acceptability of management practices of the tribal membership and the checks of tribal legends and taboos to moderate resource use on the Flathead Reservation. The Tribal Forestry Department has attempted to change past management of the forests to best meet the financial needs and cultural needs of the tribal people as defined by the objectives of forest management (Durglo 2003).

Tribal forestry proposed Alternative 2 is to balance socio-economic, environmental, and cultural values (CSKT FEIS 2000). Despite the attempts toward an ecosystem approach centered on overall landscape forest health issues, some tribal members see the new forest plan as justification for over-utilization and not responding to traditional perspectives of land values (i.e., land sacredness) as the basis for forest ecosystem management. The current philosophy defended by the Tribal Forestry Department (TFD) in the FEIS (2000) uses clearcutting as the method for obtaining, restoring, and maintaining forest health conditions closer to pre-contact times.

Nevertheless, tribal members also realize that to preserve forested areas without management contradicts past traditional/cultural uses. Other tribal members have felt that current management issues that affect traditional values have not been adequately considered in forest resource planning. These issues have compelled the TFD to push forward with the current philosophy because of the economic demands associated with supplying Tribal revenues, meeting budget demands, and increasing conflicts with tribal members (Durglo 2003).

The ecosystems of the Flathead Reservation have been exploited by forest management practices that have focused on commodity gain for the short-term—unlimited resource availability (Confederated Salish and Kootenai Tribes 2005). In the search for implementation methods outside the Tribal Forestry Department goals and objectives, there is little information pertaining to meeting Tribal membership concerns. However, Tribal Forestry is evolving in their thinking of land management to include the tribal membership, especially including elders of the tribe to view current harvesting techniques in the field (Durglo 2003). However, there seems to be participation of tribal membership on only a superficial level and an integration of suggestions from only a fraction of the tribal membership rather than embedding the entire tribal membership views concerning harvesting practices into on ground forest management. A more complete inclusion requires embracing cultural value by defining what the membership considers culturally acceptable harvesting techniques.

The FEIS (2000) fundamentally adheres to basic guidelines for forest management by focusing on Tribal Sovereignty in the administration of managing forest lands according to the goals and objectives of the Tribal Government. Under the Tribal

Self-Governance Law (1994) and the procedural guidelines of the National Environmental Policy Act (1969), the tribal membership have a significant opportunity to change and to influence the way their forest resources are managed by participating actively in management decisions that effect the quality and quantity of their forest lands. Tribal members may participate in not only defining tangible values such as cultural use (hunting, fishing, berry picking, mushroom gathering, etc) but also defining intangible values (belief in environment, spiritual association to the environment, etc.) of culturally acceptable harvest treatments through survey tools or tribal plebiscitary means.

The Tribal Forestry Department is attempting to outline definite principles of forest management that illustrates respect for the environment that support cultural values and ethics—by keeping management planning localized and tailored to meet the needs of the local tribal membership (Durglo 2003). However, the Tribal Forestry Department must survey the entire tribal membership to get an accurate accounting of forest management to meet tribal membership preferences to harvest treatments that are analogous to a tribal cultural ethic. It is essential for tribal programs to outline principles of forest management consistent with respect for nature, such as the vision for the future of both the tribe and Mother Earth (outlined in the CSKT Vision Statement). The Tribal Forestry Department must re-evaluate silvicultural treatments that would conserve forest conditions closer to pre-European contact, such as retention of large diameter trees that take a long time to grow rather than mimicking fire behavior by clearcutting (CSKT FEIS 2000). Harvesting must utilize wise-land use judgments (e.g., uneven-aged management, and flexible harvesting strategies for long-term productivity) that are more inline with tribal membership preferences.

The Tribal Forestry Department must reduce emphasis on economic goals by re-establishing an avenue for cultural identity and resource sustainability. Resource sustainability means developing a cultural forestry technique that meets the needs of the present cultural population without compromising the ability of future cultural population to have enough flexibility to make changes and to meet their own needs. Tribal Forestry Department through delegated contractual powers under the federal Self-Determination Act (1975) can empower its co-trustee obligation in retaining the tribal character of its tribally reserved lands. There is much to learn from traditional values of land sacredness. Greider and Garkovich (1994) discuss a theoretical framework to understanding how indigenous cultures define and relate to nature and to the environment. The authors imply that landscapes are a symbolic conceptual reality interpreted by cultural values and beliefs. If landscapes are symbolic of conceptual reality, then symbolism is defined by interpretation of what a culture views or sees as value! It exemplifies and intensifies a meaning for and by which Native people draw fundamental knowledge of their role and influence they have with nature. To go beyond, Greider and Garkovich (1994) suggest it is recognition of the value and intuitiveness from which many Native cultures derive a source of existence. As the Tribal Forestry Department and the Tribal people work in concert with each other, the development of management decisions may be more in tune with the concept of reverence for Mother Earth.

Realizing Tribal Self-Determination

Tribal people define their cultures and livelihood from their landscapes. Through the self-determination policy, the Indian Self-Determination Act (1975), Indian tribes could identify federal government services that they wish to provide their own tribal

members and contract for federal funding to provide those services themselves. In 1994, Congress broadened the self-determination policy with "an Act...to provide for tribal Self-Governance" (Indian Self-Determination Act Amendments 1988). These amendments allow tribes to negotiate broad compacts with the Department of the Interior that covered virtually all federal services on a reservation. At a more practical point, it might encompass the ability of a tribe to determine its own governmental structure and implement the policies that will effectuate cultural values in on ground resources management. Tribes have a right to self-determination, a major component of which is ownership and control over their lands and resources. This right of self-determination is collective ownership of land inclusive of all members of the tribe, not just a few. In attempting to identify and delving more into what the tribal membership want to see in their forests and how they feel about their forests is the first step in implementing culturally appropriate management strategies that emulate cultural integrity.

Self-determination, when introduced in the 1970's, was meant to encompass tribal people's inherent right to self-governance (Indian Self-Determination Act 1975). The Confederated Salish and Kootenai Tribes assumed management responsibility of their forests in 1995, under the Indian Self-Determination of 1975, which allows the Tribes to take the lead in managing their forested lands. This holds greater promise which may open the door for the CSKT Forestry Department to deem cultural and social integration and revitalization of culturally ethical treatments in forest management as they pursue self-determination and self-governance. By empowering all Tribal membership voice in the management of their forests, the CSK Tribes can build on their wise stewardship responsibilities of their land and resources as a basis for asserting exclusive jurisdiction

over their resources. The Tribal membership and Tribal Forestry Department together do not need to reinterpret or redesign their inherent culture/tradition beliefs as a means to interact successfully with their non-Indian economies and governments to realize self-determination. Their role is to tailor forest harvest strategies closer to what the tribal membership want to see in their forests by collectively gathering all membership preferences and finding that area of harvest treatments that fall within a range of cultural acceptability. By joining together Tribal membership governance and their cultural/traditional belief orientation into forest management, will not only legitimize Tribal Forestry Department but will coherently pattern socially comprehensible Tribal government action. This course can restore the communicative power of the Tribal membership and give content to the concept of tribal self-determination.

CHAPTER 6

CONCLUSION

McCorquodale et al. (1997) define cultural values as those "values that mandate protection of sacred sites, traditional use areas, archaeological sites and material, culturally important wildlife, and culturally significant ecological and aesthetic settings." The Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation integrate those cultural resources valued by the tribal membership into forest management planning (CSKT FEIS 2000). Going beyond the measurable cultural values that McCorquodale et al. (1997) define, by defining the attitudes and beliefs of Tribal people toward their landscape and incorporating these cultural/traditional values into on ground forest management can empower Tribal people as integral part of tribal environmental self-determination. This paper was to understand how to best manage natural resources on tribal lands, the Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation in western Montana, based on solid knowledge of the laws and tribal policies that govern forest resource management. It also was intended to recognize the factors that affect a cultural ethic—caring for the land and a belief in 'Mother Earth'—and how this cultural ethic may be integrated into forest management practices.

In general, an example survey was conducted to determine the acceptability range of past seed tree harvest, present seed tree harvest, and past uneven-aged harvest treatments along with two different clearcut techniques. The purpose was to determine which harvest treatment came closer to a cultural ethic (traditional use, belief in 'Mother Earth' and caring for the land) of the CSKT membership. Of the tribal membership (>2% of the total Tribal membership) who voluntarily participated in the example Forest Survey (2004) considered uneven-aged management strategies more culturally acceptable as compared to past even-aged harvest techniques. Over 90% of the respondents strongly believe that the belief in 'Mother Earth' encourages respect in the forest also think that harvest treatments that leave more trees per acre after harvesting tend to mimic a cultural ethic. In addition, members over 60 years old determined that past seed tree harvest (even-aged) treatment tend to be less culturally acceptable as compared to past uneven-aged harvest treatment. The members that exhibit high cultural use and a strong belief in 'Mother Earth' found that intense harvest treatment do not express caring for the land and determined that large block-shaped clearcuts are less preferred than feather-edged clearcut technique.

The percentage of tribal membership responses to the Forest Survey (2004) indicated their non-acceptability of clearcutting practices versus acceptability of harvest treatment that leave more trees per acre after harvesting as culturally acceptable. One respondent stated, "Clear cutting is what I object to" and another states, "I am not for clear cutting. I hate the way it looks and I don't think it's a good method of forest management. Clearcuts that were done in the Arlee area when I was a child are still huge, ugly scars on the mountainsides. Selective thinning seems to be more effective and is

more aesthetically pleasing." Other comments include "I think they should log those (in reference to the Mission Mountain Range) areas and then burn and replant with fir and larch" and in comparison to selecting switch clear cutting visual picture was culturally acceptable, one comment was "Both pictures are good."

The success of the forestry program cannot be measured simply by income generated or volume marketed, it is the Native American cultural/traditional values that dictate a broader, more holistic standard of success. Social acceptability is an essential element in resource management issues facing tribal forestry today. Regardless of the problem (restoration, fire behavior, forest health, cultural resources, etc.), the political and cultural environment surrounding decisions takes on multi-disciplinary questions, not just ecological questions. Growing dissatisfaction with clearcutting can be attributed to societal shifts from the utilitarian point of view (commodity and production), to an aesthetics and value of land sacredness point of view. The land is vital to the sustenance of Indian people. The cultural ethic—cultural/tradition use and caring for the land that Native people possess, is vital to how this is expressed in harvesting treatments. Given the importance of determining social/cultural acceptability of types of timber harvesting techniques, some Indian forestry programs have adapted more cultural/traditional approaches while defining tribal and cultural self-determination.

As an example, Nesper and Pecore (1993) recognize the value of forests as both a source of tradition and the means of life in a changing world for the Menominee people. The Menominee Tribal Enterprises use a spiritual basis for sustained yield management recited by their ancestors (chiefs and headmen) of the tribes: "Start with the rising sun and work toward the setting sun, but take only the mature trees, the sick trees, and the

trees that have fallen. When you reach the end of the reservation, turn and cut from the setting sun to the rising sun and the trees will last forever." This tidbit of wisdom has placed the Menominee tribe in the forefront of sustained yield management today. The Menominee Tribe nurtured the spirit of the chiefs who had articulated the basis of sustained yield forestry. At the same time, the indigenous belief that each life form is a "person to be respected for its knowledge and power pervaded the pursuit of the material conditions of life" (Pecore and Nesper 1993; p. 29). These values are realized daily in the practice of the Menominee forestry department in Wisconsin.

Indian lands are not public lands and have a special cultural value to Indian people. The National Forest Management Act (1976) outlines substantive and procedural guidelines for the Forest Service to strict adherence to multiple use management strategies while implementing timber harvesting on a sustained yield basis. Although these substantive and procedural guidelines direct management on public lands, these laws and policies take on a utilitarian bias in forest management. This utilitarian bias has influenced tribal forest management under the trust responsibility of the Bureau of Indian Affairs. The National Indian Forest Resources Management Act (1990) outlines how Indian forest lands should be managed and the Code of Federal Regulations define rules that govern management under the Bureau of Indian Affairs. While the regulatory laws direct forest management they fail to adequately incorporate the cultural values of the people into the management of their resources. However, attempts are being made to evolve tribal forest management to do so (Durglo 2003).

Like the Multiple-Use and Sustained-Yield (MUSY) Act, NIFRMA fails to set balance between the utilitarian and environmental conservation philosophies. However,

with the relationship outlined in the Tribal Self-Governance Law of 1994 and the procedural guidelines of NEPA, tribes have a significant opportunity to change and to influence the way their forests are managed, if they want to. NEPA is an avenue by which tribal members can evaluate environmental consequences and project alternatives that best address a cultural ethic and not only cultural resources (uses) of their forest lands. NEPA requires full consideration of the same in agency decision making. Tribal involvement in BIA and Tribal Forestry commenting will tend to result in more thorough BIA and Tribal Forestry accountability and in other federal agencies being more responsive to tribal concerns and values. The statutes and regulations, although at times ambiguous, create institutionalized channels by which they can influence administrative decisions. Such institutionalized channels have also been opened for tribal governments. The tribal forest harvesting decisions express a prescriptive opinion reflecting the value people place on their environment. Whose opinion will it reflect?

In determining culturally appropriate harvesting techniques, Tribal Forestry Department must search and query Tribal membership preferences and values of land sacredness and reach far outside the normal utilitarian view, to incorporate, and redefine Tribal forest management that supports tribal environmental and cultural self-determination. It a more practical sense, this approach might encompass the ability of the Tribe to determine its own governmental policies and implement these policies that will emulate cultural/traditional values of land sacredness.

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APPENDIX I

DEFINITION OF STAND VARIABLES

Definition of variables in study data set. Confederated Salish and Kootenai Tribal Forestry code description are from Instructions for Forest Field Reconnaissance (1996).

Management Area—this is the name of the harvest management area.

Stand Number—assigned stand numbers within a section where the stand is located. For example, a stand is located on T.17 N., R. 19 W., Section 13; therefore, the stand number is 791305.

7	=the last number of the township
9	=the last number of the range
13	=the section number
05	=the stand number recorded after the other four stands

Slope—percent slopes by category.

0	=(0-5%)
1	=(16-25%)
2	=(26-35%)
3	=(35-50%)
4	=(50-70%)
5	=(>70%)

Aspect—the eight cardinal directions on a compass.

N	=North
NE	=Northeast
E	=East
SE	=Southeast
S	=South
SW	=Southwest
W	=West
NW	=Northwest

Elevation—in hundreds of feet located on the contour map. Elevation Group—Elevation in hundreds of feet by percentile.

0-45
>45-48
48-53
>53

Fire Group—Habitat types placed in fire groups as defined by Fischer and Bradley 1987.

4	=Warm, dry Douglas-fir habitat types
6	=Moist, Douglas-fir habitat types
7	=Cool habitat types usually dominated by lodgepole pine
8	=Dry, lower subalpine habitat types
9	=Moist, lower subalpine habitat types
11	=Moist grand fir, western redcedar, and western hemlock habitat types.

Forest Type—Based on the majority of tree numbers up to 5.0 inches dbh and on basal area over 5.0 inches dbh.

PSME = Douglas-fir
PIPO =Ponderosa Pine
ABLA =Subapline fir
ABGR =Grand Fir
THPL =Western redcedar

Fuel Treatment Group 1—based on combined outcomes of primary and secondary fuel treatments.

Pile/Burn	=those stands that have either been dozer or mechanically piled then piles burned.
Burn	=those stands that have been either understory or broadcast burned.
None	=those stands that did not have any fuel treatment. Includes stands that were piles but not burned.

Fuel Treatment Group 2—based on combined outcomes of primary and secondary fuel treatments.

Fire Regimes-Fire Regimes based on Habitat Type Classification (Pfister et al. 1997).

Fire Regime A	Fire Regime B	Fire Regime C	Fire Regime D
130	250	Habitat Type Groups	All Habitat Types
141-2	261	(D, E, and F)	Series 800
161-2	280		
171	281		
210	282		
220	283		
230	290		
260	291		
262	293		
310	320		
311	322		
312	*450		
313	*470		
321	*640		
324	*654		
330	*663		
340	*720		
	**732		

*These types are also in the mixed regime, but in the old habitat classification fall into the PEA category,. . .habitat type groups E and F. Some of these types rarely occur here such as 450 (spruce/vaca), 470 (spruce/libo), 640 (abla/vaca). All of them are characterized by low brush profiles, and usually have considerable lodgepole pine. They often are intrusions into the stand replacement regime (C), and might appear as stingers of mixed fire behavior (B) within that regime.

**732—Abla/vasc/vasc. . .was the old Habitat Type Group G.

Habitat Type—Habitat Types based on Pfister et al. 1997.

ADP CODE	HABITAT ABBREVIATION	FULL SCIENTIFIC NAME
250	PSME/VACA	*Psuedotsuga menziesii*
260		
262		
283		

Habitat 1 and Habitat 2—Enter the Habitat Type Code #.

Canopy Closure—This is the percentage of crown closure.

1 =(0-29%)
2 =(30-69%)
3 =(>70%)

DBH (Dominate Size Class)—this figure can be found on the stand exam or ocular. Size Classes are broken down into five classes as follows:

1 =(1" – 5")
2 =(5.1 - 10")
3 =(10.1" – 15")
4 =(15.1" – 0.9")
5 =(21+")

Overstory and Understory Species
S =Seral Species (Ponderosa pine, Western Larch and Lodge Pole Pine)
C =Climax Species (All other species)
0 =NONE
1 =SERAL SPECIES (>75% OF STAND)
2 =SERAL SPECIES (25-75% OF STAND)
3 =CLIMAX SPECIES (> 75% OF STAND)

Seral Class—Circle the letter that the stand best represents. This figure is found by using the above canopy% and DBH and then using the VEGETATIVE SERAL/CLASS MODEL.

DBH (Snags)
This figure can be found on the stand exam or ocular.

Stand age (Large trees 20+)
Only enter a number here if the 20+ size class makes up 20 percent or more of the stand.

Trees/Acre (Large Trees 21+)
Only enter a number here if the 20+ class makes up 20 percent of the stand. Use the stand exam to find this figure.

Snags per Acre >9"
Use the stand exam or ocular estimate.

Down Woody Material
Circle, L, M or H. Mainly looking at the large material. Use an ocular estimate.

Canopy Layers
Circle S or M. For a stand to be multiple layers there must be two – five size classes making up 20 percent of the stand or more. Each size class must be greater than 20 percent of the stand or more. Each size class must be greater than 20 percent of the stand.

Tops (Number of Live Trees per Acre, > 9" DBH with Dead or Missing Tops)
Find this figure from the stand exam or ocular estimate.

Growth (20^{th}'s Last TEN years)
Increment bore a tree that falls in the DBH (Dominant Size Class). Try to find a dominant or co-dominant tree. Enter the figure in the recon database, for example.
You bore and measure the last ten years of the trees growth by using a 20 scale ruler. It reads as $12/20^{th}$'s and you enter the figure as 12.

Stand Age (Dominate DBH Class)
Increment bore a tree that falls in the DBH (Dominant Size Class). Try to find dominant or co-dominant tree.

Total Basal Area
Enter the total basal area by using the stand exam or ocular estimate.

Volume per Acre
Use the stand exam or ocular estimate.
Trees/Acre (Total Stand)
Use the stand exam or ocular estimate.

Damage 1 and 2
Circle the appropriate code:

MT	=MISTLETOE
BB	=BARK BEETLE
BW	=BUDWORM
RR	=ROOT ROT
BR	=BLIGHTS AND RUST
DR	=DROUGHT

Severity 1 and 2
Circle the appropriate code.

Management Prescription
PEA (PERMANENT EVEN-AGED)
This code applies to Habitat Groups E and F (primarily subalpine fir types) and on steep sites where prescribed burning is the only means of achieving site preparation.

TEA (TEMPORARY EVEN-AGED)
This code applies to Habitat Groups B, C, and D. These stands are infected with dwarf mistletoe and root rots and cannot hold at 35 – 45 basal area in the stand to create a new age class. Eventually, these stands will be converted to an uneven-aged stand structure over time.

UEA (UNEVEN-AGED)
This code applies to Habitat Groups B, C, and D. These stands can hold between 35 – 45 basal area of crop trees and greater than 50% crown ratios) and optional trees (disease free and between 30 – 50 % crown ratios).

LPM (LODGEPOLE PINE MANAGEMENT)

These stands have been delineated out 20 years ago by forestry to produce post and poles and approved by Tribal Council. If the stands have less than 20% lodgepole pine and greater than 35% slope, PEA or TEA will be the appropriate call.
NCF (NON-COMMERCIAL FOREST
These areas are so steep (>70% slope), unstable or rocky that they cannot be used for timber production without causing serious impacts and lack the capacity to grow at least 15 cubic feet of timber per acre per year.

INA (INACCESSIBLE)
A stand of timber cannot be accessed by a logging road because of rock cliffs or right-of-way problems.

Stand Type
Circle the code that keys out on the dichotomous key for the stand recon.
Silviculture System
Circle the code for the appropriate silvicultural treatment.

1 =Precommercial Thinning
2 =Other Wood Products Commercial Thinning
3 =Commercial Thinning, Sawlog Products
4 =Clearcut
5 =Clearcut with enough Green Tree Retention to Buffer Visual Impacts
6 =Seedtree
7 =Seedtree with enough Green Tree Retention to Buffer Visual Impacts
8 =Shelterwood
9 =Final Harvest of Seedtree, Shelterwood, or Green Tree Retention
10 =No Treatment
11 =Group Selection
12 =Individual Tree Selection
13 =Salvage Harvest of Imminent Mortality Trees

Logging Method
CS (CABLE SIMPLE)
This method is used if you can see from the top of a stand to the bottom or vice versa and has a concave slope over 40%.

CX (CABLE COMPLEX)
This method is used if you cannot see from the top of a stand to the bottom or vice versa and has a convex slope over 40%. These stands will require profiles.

T (TRACTOR)
Use this method if the slopes are less than 40%.

M (MECHANICAL)
Use this method if the slopes are less than 40%.

H (HELICOPTER)
Use this method if the stand is inaccessible.

Site Prep
MT (MECHANICAL TRACTOR)
Use on stand if the slopes are less than 35%. If the stand has root rot, use a broadcast burn.
XT (MECHANICAL EXCAVATOR)
Use on stand that are visually sensitive and have slopes between 35 – 50%.
BB (BROADCAST BURN)

Use on stands that are not visually sensitive and have slopes between 35 – 70%. If the slopes are between 50 – 70%, the stands will still need to be burned even if the stand is visual. If root rot is evident on the area, code it as BB on slopes less than 35%.
UB (UNBURN)
N (NONE)
Visual
S (Sensitive)
Use this code if the stand can be seen from any major highway, town, Flathead River, and Flathead Lake.
N (Nonsensitive)

Product Type
C (Commercial)
Use this code if the stand has all merchantable timber.

S (Small Wood Products)
Use this code if the stand has no merchantable timber but makes up 25% of the stand of 3" top and 18 foot length pieces.

M (Mixed Wood Products)
Use this code if the stand is merchantable and small wood products. Still need 25% of 3' and 18 foot length pieces

Follow-up
P =Plant
PCT =Precommercial Thin

Ponderosa Pine Woodland
Bunch grass habitat type areas. Also, pine encroachment areas.

APPENDIX II

GENERAL MANAGEMENT SYSTEM—STAND TYPE KEY DEFINITIONS

UNEVEN-AGED—UEA
Manipulate the current, existing stand towards a healthy, uneven-aged structure containing 4 to 5 age classes.
TEMPORARY EVEN-AGED—TEA
Replace the current, undesirable, unhealthy stand with a regeneration harvest and manipulate the future stand towards a healthy uneven-aged structure containing 4 to 5 age classes.
PERMENANT EVEN-AGED—PEA
Manage the current, existing stand until a regeneration harvest is appropriate, and then manage the future stand with even-aged silvicultural methods to maintain the even-aged character.

SITE PLANTABLE
Is the surface of the site armored with rock or is the site otherwise as severe as to make planting or artificial planting physically impossible? A stand is considered 'plantable' if 70 percent of random plots in it are determined to be plantable with a dibble bar. A plot is plantable if a tree can be planted with 5 attempts.

EXISTING STAND CONVERTIBLE
Will a residual stand of low-risk, non-host trees meet, or at least approach, minimal uneven-aged stocking requirements (BA of 50+ sq. ft. of crop trees) after a weeding or other intermediate treatment?

EVEN-AGED SYSTEMS
MERCHANTABLE—Net board foot stocking >= 3,000 bf/ac.
IMMINENT MORTALITY—High-risk beetle stands or active armillaria or M. annossum stands with mortality >= 50 bf/ac.
COMPLETE STAND REPLACEMENT—same criteria as Existing Stand Convertible.
FULLY STOCKED—SDI >=100.
GROWTH OK—Growth at or near managed levels: 250+ bf/ac/yr
50+cf/ac/yr
RELEASABLE—Same criteria as Existing Stand Convertible.

UNEVEN-AGED: STAND TYPE ABBREVIATIONS

GS1—Group select, 1-story stand, 261 habitat type. Harvest a portion of the current stand with a group selection regeneration system. The area between the regeneration groups is treated recurrently to maintain stand vigor. Yield at any given entry may be the sum of the regeneration harvest and an intermediate harvest, or just the regeneration harvest.

DG1—Defer group selection in a 1-storied stand. Next harvest will be a GS1, with all that it implies.

IT1—Individual tree selection in a 1-storied stand.

DI1—Defer individual tree selection in a 1-storied stand.

GS2—Group selection in a 2-storied stand on a 261 habitat type.

DG2—Defer group selection in a 2-storied stand.

IT2—Individual tree selection in a 2-storied stand.

DI2—Defer individual tree selection in a 2-storied stand.

GS3—Group selection in a 3+ storied stand.

DG3—Defer group selection in a 3+ storied stand.

IT3—Individual tree selection in a 3+ storied stand.

DI3—Defer individual tree selection in a 3+ storied stand.

CT1—Commercial thin in a 1-storied stand; stand is presently non-regeneration due to small tree sites; future entries will be individual tree selection.

PT1—Pre-commercial thin in a 1-storied stand; stand presently non-regenerable.

DT1—Non-regenerable one storied stand; no treatment necessary new.

PT2—Same as PT1, only in a 2-storied stand.

DT2—Same as DT1, only in a 2-storied stand.

RENGEN OK

Will there e more than 200 clean, non-host crop trees/ac after harvest.

LIBERATE

Is the releasable understory in jeopardy of infection from the overstory, or in Permanent Even-Aged units, is the overstory a potential impediment to future growth of the understory.

CROP STAND OK—Same criteria as REGEN OK.

EVEN-AGED SYSTEMS: STAND TYPE ABBREVIATONS

HRR—High Risk Replacement: Current stand must be wholly or mostly replaced with a regeneration harvest due to immediate circumstances of high mortality.

INT—INTermediate Treatment: An intermediate treatment would prolong the culmination and increase the overall board feet production of the current stand. No regeneration harvest is necessary at this time.

GRM—GRowing, Mature: Current low-risk stand is growing at or near managed growth rates.

CLM—CuLMinated: Current low-risk stand is growing well below managed growth rates.

LIB—LIBeration: Current stand comprises a salvable understory crop stand in jeopardy of infestation, mortality or significant growth loss due to an impeding overstory, which must be removed.
GRP—GRowing, Poles: Current pole-sized stand is growing at or near managed rates and needs little or no immediate attention.
REF—REForestation: Current merchantable stand is understocked and will not become adequately stocked with a healthy stand within a reasonable time frame.
FDR—Forest Development Rehab: Current un-merchantable stand is understocked and will not become adequately stocked with a healthy stand within a reasonable time frame. Funding for reforestation will come from FD Add-ons.
PCT—Pre-Commercial Thinning: Current crop stand requires an intermediate treatment in order to maintain managed growth rates.
GRS—Growing Seedlings/saplings/poles: Current crop stand is growing at or near managed conditions and needs little or no immediate attention.

APPENDIX III

STAND MEASUREMENTS

Pistol Creek Management Unit
Plot 1—783013
Picture #1 taken SE 60° at 100 ft
Slope 16 %
Aspect SE 10°
BA 40 with CM 10
Spherical Densiometer Reading 15.36 %

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
DF-1	57.61	8.99	116	N 0	15.24	5.79	4.17x5.03
PP-1	25.38	6.83	57	NW 30	12.80	3.35	3.05x1.75
PP-2	36.04	7.92	54	NW 72	16.15	4.88	2.44x3.86
PP-3	29.70	6.83	59	SE 42	19.51	10.36	3.20x.71
PP-4	25.89	6.91	41	SE 50	18.59	9.75	2.36x2.23

Plot 2—783012
Picture #2 taken NW 16° at 100 feet
Slope 10%
Aspect NW 16°
BA 50 with CM 15
Spherical Densiometer Reading 60.89%

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
PP-1	39.08	8.91	62	NE 40	21.03	11.28	3.35x3.05
PP-2	73.35	7.01	157	NW 36	32.31	9.75	4.42x5.59
PP-3	19.29	2.29	39	NW 88	10.67	1.22	.91x1.09
PP-4	62.94	8.97	155	SW 76	26.82	9.14	3.5x4.27
PP-5	28.68	8.23	53	SW 38	14.63	7.62	3.5x2.54
DF-1	19.80	5.51	44	SE 41	21.34	3.66	2.74x1.52
PP-6	41.37	6.00	71	SE 42	10.67	5.18	5.51x2.74
PP-7	17.77	7.62	50	NE 66	15.24	11.58	1.52x1.68

Plot 3—792508
Picture #3 taken SW 50° at 100 feet
Slope 34%
Aspect NW 48°
BA 10 with CM 15
Spherical Densiometer Reading 15.24%

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
WL-1	60.41	10.06	104+	SW 14	40.23	10.36	2.13x3.05
DF-1	10.91	10.06	49	SW 10	7.01	2.74	1.37x.81
DF-2	9.39	8.84	60	SW 18	7.31	3.35	1.98x.91
DF-3	16.50	6.55	77	SW 43	10.05	4.88	2.59x1.22
DF-4	13.96	6.17	80	NW 44	8.53	3.05	1.83x2.13
DF-5	10.15	7.01	53	NE 61	6.10	2.13	.91x.61

Plot 4—792594
Pictures #4 and #5 taken SW 50° at 100 feet
Slope 16%
Aspect SW 50°
BA 10 with CM 15
Spherical Densiometer Reading 49.92%

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
WL-1	40.1	10.06	67	SW 17	19.20	16.46	2.74x2.95
PP-1	28.87	8.28	57	SW 25	12.50	5.18	2.03x1.22
PP-2	16.50	5.36	48	SW 52	17.37	6.40	1.85x1.52
WL-2	61.93	6.40	146+	W 90	31.10	24.69	4.01x3.81

Frog Management Unit
Plot 1—501411
Picture #9 and #10 taken SW 9° at 100 feet
Slope 7 %
Aspect E O°
BA 10 with CM 15
Spherical Densiometer Reading 67.55%

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
PP-1	30.46	8.61	73	NW 2	15.54	6.40	2.44x2.24
PP-2	22.08	10.56	59	NE 90	12.19	6.10	1.32x2.57
PP-3	40.10	5.21	77	SW 42	16.76	6.10	2.13x3.73
PP-4	33.25	9.45	77	SW 32	15.85	6.10	2.95x3.40

Plot 2—501301
Picture #11 and #12 taken NE 55° at 100 feet
Slope 8%
Aspect NE 70°
BA 30 with CM 15
Spherical Densiometer Reading 23.45%

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
WL-1	43.91	6.86	103	NW 84	17.98	9.14	2.92x4.47
PP-1	44.42	9.30	69	SW 10	17.37	8.53	2.97x4.95
WL-2	32.49	4.40	88	SE 88	16.76	7.62	1.57x4.11

Plot 3—501409
Picture #13 and #14 taken SW 84° at 100 feet
Slope 2%
Aspect NE 62°
BA 30 with CM 15
Spherical Densiometer Reading 22.21%

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
LP-1	9.14	3.15	37	SE 58	9.45	3.05	.74x.91
LP-2	12.94	5.69	48	SE 69	11.58	5.49	.91x1.57
LP-3	12.18	7.62	51	SE 76	11.28	6.40	1.65x1.32
WL-1	45.94	6.63	71	NE 37	18.59	10.97	4.98x4.01
PP-1	47.21	8.76	66	NW 40	17.98	10.67	4.29x2.79

Plot 4—501513
Picture #15 and #16 SE 18° taken 100 feet
Slope 28%
Aspect SW 40°
BA 20 with CM15
Spherical Densiometer Reading 20.96%

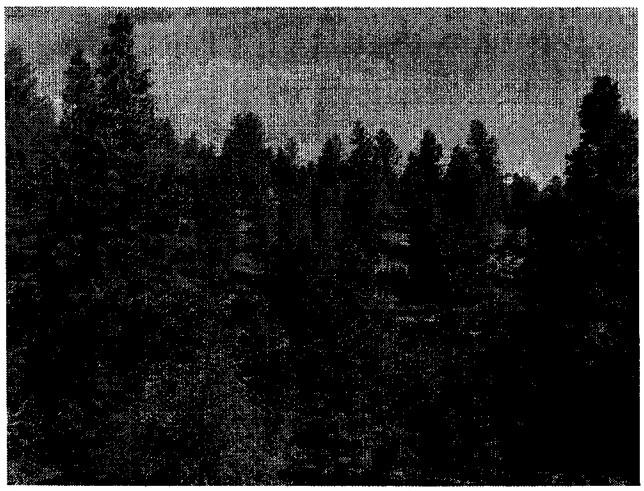
Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
DF-1	15.23	6.86	38	NW 2	7.31	6.40	1.83x2.13
DF-2	15.48	9.75	40	NW 22	10.97	9.45	2.49x2.77
PP-1	59.00	5.00	186	SW 43	22.25	14.32	3.10x2.87
PP-2	48.73	5.49	192+	SW 74	22.55	11.58	4.17x2.51
PP-3	9.39	9.25	24	NW 78	3.66	2.74	.61x1.27

Plot 5—502411
Picture #17 and #18 SW 20° taken at 100 feet
Slope 7%
Aspect SW 20°
BA 60 with CM 15
Spherical Densiometer Reading 34.69%

Species	DBH (cm)	D/C (m)	Age (yr)	Azimuth (°)	Height (m)	Crown (m)	Crown Shape (mxm)
PP-1	52.03	5.21	66	SW 48	15.24	10.06	4.50x3.73
DF-1	37.82	9.14	59	NW 70	14.93	10.06	3.25x3.89
PP-2	30.96	4.70	53	NW 41	14.32	10.06	3.48x2.03
PP-3	33.0	3.86	49	NE 22	14.02	17.72	1.52x2.18
DF-2	32.74	5.32	44	NE 8	12.19	7.31	3.05x1.90
PP-4	36.8	9.17	53	NE 29	15.24	8.53	5.18x2.31
DF-3	45.68	10.16	53	SE 37	19.51	14.93	4.95x2.57

APPENDIX IV

FOREST SURVEY QUESTIONNAIRE 2004

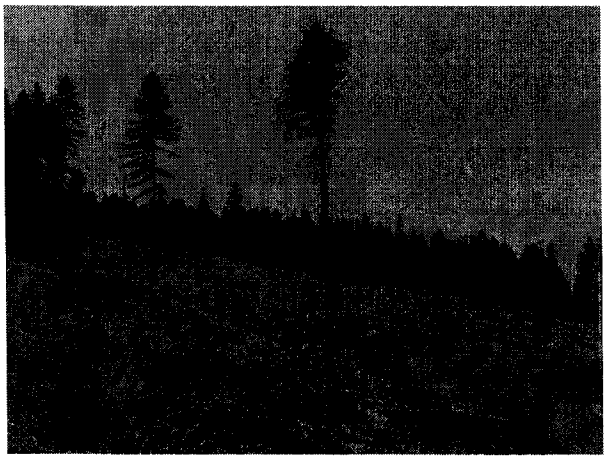


1. How **acceptable**, to you, is this harvest treatment? *(Circle the number that applies).*

Very Acceptable				Not Acceptable
5	4	3	2	1

2. What do you think about the purpose for this harvest treatment? *(Choose all that apply).*

- ☐ Creating open space for wildlife forage or for livestock grazing
- ☐ Reducing mistletoe disease
- ☐ Increasing hunting opportunity
- ☐ Increasing ponderosa pine and western larch regeneration
- ☐ Developing an assortment of standing trees
- ☐ Other purpose _____
  (Please specify)



3. How **acceptable**, to you, is this harvest treatment? *(Circle the number that applies).*

Very Acceptable				Not Acceptable
5	4	3	2	1

4. What do you think about the purpose for this harvest treatment?

- ☐ Creating open space for wildlife forage or for livestock grazing
- ☐ Reducing mistletoe disease
- ☐ Increasing hunting opportunity
- ☐ Increasing ponderosa pine and western larch regeneration
- ☐ Developing an assortment of standing trees
- ☐ Other purpose _____

(Please specify)

5. How **acceptable**, to you, is this harvest treatment? *(Circle the number that applies).*

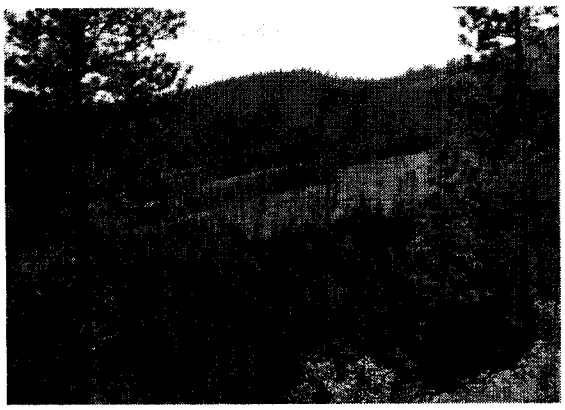
Very Acceptable				Not Acceptable
5	4	3	2	1

6. What do you think about the outcome of this harvest treatment?

- ☐ Creating open space for wildlife forage or for livestock grazing
- ☐ Reducing mistletoe disease
- ☐ Increasing hunting opportunity
- ☐ Increasing ponderosa pine and western larch regeneration
- ☐ Developing an assortment of standing trees
- ☐ Other purpose _____

(Please specify)

Picture 1



Picture 2

7. Of the harvest units above, which picture represents what you would like to see in the forest areas on the reservation? *(Circle the number of the Picture1 or Picture 2).*

8. How **acceptable**, to you, is the harvest treatment that you **didn't** choose?

Very Acceptable				Not Acceptable
5	4	3	2	1

9. Does the appearance of the forest landscape matter to you? *(Circle the number that applies).*

Matters Very Much				Matters Not at All
5	4	3	2	1

10. How old are you? _____

11. Are you a member of the Confederated Salish and Kootenai Tribe?_____

12. What is your gender?
- ☐ Female
- ☐ Male

13. Select the option that best describes your employment? *(Please check the square that applies).*
- ☐ Tribal natural resource
- ☐ Tribal wildlife biology
- ☐ Other Tribal
- ☐ Federal (BIA, BLM, USFS, etc.)
- ☐ State
- ☐ College or University
- ☐ Unemployed
- ☐ Agriculture
- ☐ Technology
- ☐ Private
- ☐ Ranching
- ☐ Other _____

14. What are the **main purposes** for your trips into the forest? *(Please check the squares that apply and insert the letter that represents how many times you go into the woods).*
- ☐ Native American Culture and Experience; _____
- ☐ Recreation/Pleasure; _____
- ☐ Job/Employment; _____
- ☐ Income supplement; _____
- ☐ Hunting/Fishing; _____

☐ Other _____;_____
(Please specify)

A = 4-7 days per week
B = 1 day per week
B = 2-3 days per month
D = 7-11 days per year
F = 2-5 days per year

15. Please check all the squares corresponding to **your main activities** for visiting the forested areas and how important is that to you on a scale from *Very Important = 5 to Not Important = 1* in the space beside activity)?

☐ Gathering cultural plants; _____
☐ Family/Friends; _____
☐ Wildlife hunting; _____
☐ Camping (primitive site); _____
☐ Camping (developed site); _____
☐ Fishing or fly-fishing; _____
☐ Mushroom/Berry harvesting; _____
☐ Post/Pole harvesting; _____
☐ Firewood gathering; _____
☐ Picnicking; _____
☐ Swimming (lakes or ponds); _____
☐ Forestry oriented jobs (thinning, planting, logging contracts); _____
☐ Other _____; _____
(Please specify)

16. Do you consider yourself to be Native American **cultural (traditional)**? ____

17. How important is this to you? *(Please circle the number that applies).*

Very Important				Not Important
5	4	3	2	1

18. How important, to you, does a belief in the environment as a family member, (i.e., 'Mother Earth'), encourage respect while in the forest?

Very Important				Not Important
5	4	3	2	1

19. What type of harvesting treatment would you like to see in the forests? *(Please check all that apply).*

☐ Leaving more trees per acre after treatment
☐ Leaving both tall and short size trees
☐ Leaving clumps of trees
☐ Taking trees that have disease
☐ Taking trees that are crooked
☐ Leaving trees that are large and tall
☐ Cleaning up the slash
☐ Taking all the trees
☐ Leaving large and tall trees with space between them
☐ Leaving smaller and shorter trees with space between them
☐ Taking only the larger and taller trees
☐ None of the above

20. What harvest treatment **best** describes, to you, caring for the land? *(PLEASE CHECK **ONE** SQUARE).*

- ☐ Leaving more trees per acre after treatment
- ☐ Leaving both tall and short size trees
- ☐ Leaving clumps of trees
- ☐ Taking trees that have disease
- ☐ Taking trees that are crooked
- ☐ Leaving trees that are large and tall
- ☐ Cleaning up the slash
- ☐ Taking all the trees
- ☐ Leaving large and tall trees with space between them
- ☐ Leaving smaller and shorter trees with space between them
- ☐ Taking only the larger and taller trees
- ☐ None of the above

If you have additional comments about any of the questions or topics, please write them here.

Again, thank you for taking the time to answer the survey. Special thanks to the Confederated Salish and Kootenai Tribal Forestry Department who recognize the importance and reliance of the tribal membership's views and values when managing the forested areas on the reservation.
The underlying research desire is to improve Tribal Forest Management by incorporating cultural values and ideals into forest management.

APPENDIX V

TRIBAL MEMBERSHIP COMMENTS TO QUESTIONS IN FOREST SURVEY 2004

Member Respondent with AGE/GENDER	COMMENTS TO QUESTION IN FOREST SURVEY. All comments taken verbatim from Forest Survey
60-Male	Question 4—Ok, if getting rid of diseased areas Question 13—Retired Additional Comments—Thinning pulp wood is also a good way to cleanup over grown areas.
54-Male	Question 2—Reducing bark beetle Question 4—Reducing bark beetle Question 6—Reducing bark beetle Question 13—Construction Additional Comments—As you know, the Mission Mountains have a lot of red and dead especially piss fir and others . . . I think they should log those areas and then burn those areas and replant with fir and larch
57-Female	Question 2—Prevention of soil erosion, giving timber room to grow Question 4—Take out as much timber as possible to make the fast $ Question 6—No young growth left to take place of the taller trees when they are harvested Question 13—Retired Additional Comments—Diseased growth should be eradicated. No clear cut. No cattle grazing let the wildlife prosper. Replant burn areas using young people (supervised).
62-Male	Question 2—Prevention of large devastating fires
50-Female	Question 13—Self-Employed/Home Question 14—Berry picking and Mushroom gathering Question 18—Not Important, but I do believe we are to be good stewards of the land Additional Comments—I also believe that spacing out the trees would protect from forest fires. The health and proper management of our reservation forest is very important to me, along with tribal members being able to make a living even if only part time (firewood, picking and selling berries and mushrooms) from our forests. When logging is done we should be getting top $ for our wood and hiring tribal members only for the jobs.
77-Male	Question 2—Remove diseased or bug infested trees. Salvage in burn areas. Question 4—Seed tree for recruitment too slow quality root stock bottom if you can minimize mortality. Question 13—Retired Question 15—Just being in the woods seeing, smelling, feeling (all good). Additional Comments—Limit clear cuts to small size. No harvests on steep hillsides. Watch for erosion. Stay out of the creeks. Minimize roads to remove after harvesting. Salvage trees left from fires when possible. Encourage fish and wildlife habitat. Do good planning before letting any

	scale of large sales.
Member Respondent with AGE/GENDER	COMMENTS TO QUESTIONS IN FOREST SURVEY. All comments taken verbatim from Forest Survey.
46-Female	Question 13—Dishwasher Question 14—Beauty and Fresh air. Additional Comments—I believe in what the tribes are doing. It is rather funny but places when I was younger don't look the same—they look better, thanks.
35-Male	Question 4—Reducing forest disease not just mistletoe Question 6—All are proper reasons Question 7—Both pictures are good. Pictures are harvest treatments acceptable in the 1970's. You need to research why it was done. I know it was done because of disease and blow-down because I live here. Both are chosen. Question 19—Proper harvest techniques for this landscape, not AZ or NM. Healthy is the key, who cares if they are large and tall if they can't survive. Additional Comments—Proper silviculture, forestry personnel who are university trained and have field experience in this landscape, not AZ or NM. This would mean more if it was conducted by a Pend O'reille, or Kootenai, and/or Salish tribal member. Also same one with field experience working in CSKT forest landscapes.
55-Female	Question 4—Destruction Question 7—Neither one!
70-Male	Additional Comments—This survey is very best, absolutely no good.
53-Male	Additional Comments—I feel a lot of roads need to be closed certain times of season, for growth of trees, protection of wildlife during fawn/calving seasons and cattle destroy feeding areas and water contamination where wildlife will not eat or drink water. Plus during hard winters, many of winter ranges are over eaten by cattle, no food for wildlife.
48-Male	Additional Comments—Try not to build new roads. Leave more smaller trees. Clear cuts and seed tree blocks stick out like Custer at a Pow-Wow in 1800's. Stop Art Caye and Frany Cachoon cutting big yellow trees.
0-Female	Question 3—Very poor practice. Money has been the main factor of clear cuts. No thought towards animal life. This drives animals away. Question 6—Only done to make more money on this sale. Question 7—Neither one. Clear cutting is what I object to. Question 14—Very seldom go to the forests. I at one time loved just driving into the mountains to observe scenery and various animals. The forest always a beautiful place to be when one wanted to be alone or with family to fish and have a picnic or pick berries of various kinds. Question 15—Field trips (only on occasion). The woods are no longer an interest to me. Its sights are devastating. The clear cuts have nothing but thistle, weeds and not pleasant to see how machinery tore up vast areas and leaving few trees. How the standing trees are up right today when so many blow over because of poor management. I don't enjoy seeing this. Question 19—I'd prefer leaving more trees, cleaning up slash by hand. Making sure piles are away from the good trees left so as not to burn them. Having small piles to burn in the fall was good practice. Machines do too much damage to the ground and wash down in the springs and long spells of rainy weather. Additional Comments—Our forests have to be left alone to restore itself. Our forests are being replanted from seedling and are becoming (?). Planters seem to plant more along the roadways than on the hillsides. (I know this happens because the ground was loosened by machinery and just washes down). It's a shame.

33-Female	Additional Comments—Leave our forests alone! Mother Nature takes care of it. I think littering in our forest is more of a concern.
54-Male	Question 2—Fire suppression Question 4—Clearcuts
Member Respondent with AGE/GENDER	COMMENTS TO QUESTIONS IN FOREST SURVEY. All comments taken verbatim from Forest Survey.
28-Female	Question 2—Fuel reduction for fires Question 4—Fire break Question 6—Fuels reduction (again) Question 14—Other=fire fighting Question 15—Wildland fire fighting Additional Comments—First of all, thank you for wanting to hear my people's voices and giving us all an opportunity to share. I'm on district fire crew near here and enjoy the project work given to us by loggers. Next, I appreciate your time and effort in doing this survey. I hope this helps. We love you. ANON—
62-Male	Question 2—Appease tree huggers Question 4—rid of diseased trees Question 6—Other disease trees Question 7—Some are acceptable Question 13—Business Owner
48-Male	Question 2—Severely lowered wildfire risk Question 4—Raping the forest Additional Comments—I have worked the woods throughout my life. As a child, I learned to love them and care for them. My belief is in maintaining a healthy forest and wildlife habitat. Fire is a natural thing and has a place. This past suppression has lead to the wildfire problems we now have. This would not happen in a properly maintained forest. Prescribed thinning leads to sustainable yield, while maintaining habitat. The sight of a clearcut is devastating to me and to the forest. They should be abolished. While I do not currently work the land or woods, I maintain my land and will return to it when I retire. It is being maintained in the above described manner in my absence.
32-Female	Question 4—I don't think there is any good reason for clearcutting Question 15—Teaching my children about how important the environment is to us as both humans and Native American people Additional Comments—I am not for clear cutting. I hate the way it looks and I don't think it's a good method of forest management. Clearcuts that were done in the Arlee area when I was a child are still huge, ugly scars on the mountain sides. Selective thinning seems to be more effective and is more aesthetically pleasing.
47-Male	Additional Comments—I believe that we have areas that need clearcut because of disease trees. I also don't believe that it should be left to fire because that causes more damage to good trees. Then again, we need to have fire control certain diseases and help with brush. We need to control the fuels on our forest beds. If we don't control our forest, mother nature will in ways that is very destructive.
45-Male	Question 2—Taking for money—mined old growth trees Question 4—Lazy timber management
50-Male	Question 4—Easier and cheaper for logging company Additional Comments—Good dissertation topic! Please publish result in Charkoosta. Items 14 and 15 may need to be separated into 2 questions each. Check reliability with and without them. Not sure how #18 relates to survey. Traditional folks may not be familiar enough with surveys to make the above items reliable. Good study though! Worthy of research.

69-Male	Question 6—Reduce fuel for fire Question 14—Wood cutting
32-Male	Question 6—Money Additional—I would like to see more survey with issues affecting membership.
72-Female	Question 14—Gather Cultural Plants
Member Respondent with AGE/GENDER	COMMENTS TO QUESTIONS IN FOREST SURVEY. All comments taken verbatim from Forest Survey.
59-Male	Question 4—Beetle infestation Question 6—Beetle infestation Question 14—Food gathering, wood cutting Question 15—Other=praying Additional Comments—I want to see tribal wildlife officers in the woods/mountains, not on Hwy 93!
53-Female	Question 16--#3 somewhat Additional Comments—Schwartz (1992) notes that in every culture he studied regarding values there was substantial individual variation in response to every value. He went on to note that "one cannot derive the normative ideals of a culture from the average of individual responses." (Page 51.)
50-Male	Question 2—Develop all age stand Question 4—Control root rot or cut shallow root trees (LPP, ES, GF, AF) Question 6—Fire break treatment Question 15—For Experience
33-Female	Question 20—I don't think caring for our land can be attained with one check box. I think there needs to be a strategic plan to address health, well-being, and sustainability.
73-Male	Question 2—Off reservation Question 4—Ruin the forest Additional Comments—My grandpa was the biggest timber man in the state and on the reservation in the Euro Area. He cut all trees on the land and left stumps. Of course, he did not know what he was doing in the 1910's and the 1920's. He wanted to make a living for his family. With all we know about what the forest brings to the reservation. Please keep up for future generations to be proud of.
71-Female	Additional Comments—Have permit loggers clean up their mess. Someone should check on them. Many of the permit loggers leave big trees on ground. They should be held responsible for clean it up. Some loggers seem to want all the permits. They have no respect for our beautiful forest. They just want to reap all they can!!
53-Female	Question 4—Filling pockets with money Question 6—Poor. Money. Additional Comments—If the forest is left alone it would be better than trashing it and then spending it on junk and greed. Poor management is o reason to harvest timber.
69-Male	Additional Comments—Visual = sometimes unacceptable or unpleasant views must be tolerated to provide long term and acceptable forest practices. Harvest = decisions to cut or leave any tree should meet a prescription of proper forest management and not be based on arbitrary categories that you have shown. Cleaning up all the slash should never be a goal. Harvest should promote vigorous and healthy trees (forest) regardless of how many are cut or left.
47-Female	Question 4—Cheaper harvest experience Question 6—Less expensive harvest experience Additional Comments—I'm not opposed to harvesting—I know our tribal

	economy depends on it. I do oppose clear cuts and selling our trees when the timing is wrong. It seems we never get top dollar for our timber, creating waste.
47-Female	Question 2—Logging and $ Question 3—Terrible and Sad! Question 5—Too much thinning, Shouldn't be so sparse Question 7—Neither Picture 1 or Picture 2 Additional Comments—I hate clear cutting, thinning is fine—if it isn't too extensive. I feel the forest should still look like a forest after it's been thinned.
46-Male	Question 4—harvest economics Question 6—Reduce wildfire danger
Member Respondent with AGE/GENDER	COMMENTS TO QUESTIONS IN FOREST SURVEY. All comments taken verbatim from Forest Survey.
50-Male	I'm just glad that you took interest in forestry and how people like to see the forest to be. Thank you.
52-Male	Question 2—Maintain forest as close to it's natural state as possible (practiced?) Question 4—Generate revenues to pay salaries for white foresters and managers and department heads Question 6—It will come back in about 50 years in the meantime, animals, humans, environment suffers Question 14—Picture 1 comment—this is a disgrace. Any Indians who had anything to do with this should be ashamed. Additional Comments—We are getting a lot of diseased and dying trees. I believe this is caused at least partially by human encroachment, logging practices over the decades, over grazing, air pollution. Could these larger sections of diseased areas be burned? Initiating a natural defense
46-Male	Question 4—This type of treatment is created for livestock only Question 6—Decreases hunting opportunity Question 13—Cultural Resource Preservation, Tribal Employee Additional Comments—If after a timber harvest you leave very few trees wild big game will not be present for the next 2 years at least. Maybe if you leave ¾ of the healthy trees out there the wild game will come back the following year. Also, I like the idea of leaving a 200 yard strip regardless of forest health in all selected blocks for wild game.
60-Female	Additional Comments—#3, #5, #7 would be very acceptable to me if it would be to control disease. I would like the Tribal Council to allow Tribal Forestry to manage using the best forestry management practices without allowing special interest groups swaying them (Elders, loggers, other natural resource departments). I just want a healthy forest and if something needs to be done with Mission wilderness, South Fork of Jocko, Mill Creek to meet this—Tribal Council needs to allow the Forestry Department to do what is necessary.
59-Female	Question 4—Getting as much wood as you can Question 7—Looks like the same to me only taken at different places = no choice Additional Comments—We need helicopter harvesting in the Mission Mountain range to clear up the tinder box mounds we have there that are a potential fir hazard that we have so for been blessed not to have had a major fire in 30+ years.
50-Female	Question 2—No, I detest cattle in the woods! Question 3—Sometimes with careful implementation clear cuts can be beneficial. However, never as the OLD BIA practice used them Question 14—My own mental health! Gathering wood Additional Comments—I am very concerned about proper thinning activities

	in the wilderness area and especially in the buffer zone. Fire would take everything because the trees are so thick. I appreciate and applaud your work.
66-Male	Question 2—This type of logging is what the forest service and private sectors have done to the western part of Montana in the last half of the 20th century. A person only has to fly over western Montana to see the results of over logging. If we (western Montana) had more moisture to help in the regrowth of the forests like in the cascades or alone the coast it would be different. Also in the past few years with the wind becoming more of a problem the few tall trees left blow down. Additional Comments—I believe that logging of our forests is a must but here on our reservation we do not get enough moisture for the forests to come back after clearcutting. Selective logging as we done in the early 1900's was a far better method than today's clearcutting.