Project Statement: Status of Black Bear, *Mkwá,* in Northwestern Counties of Michigan's Lower Peninsula – L3-04-014

Needs Assessment:

The Little River Band of Ottawa Indians (LRBOI) 1836 and 1855 Reservations and Tribal ceded territories are located within the northwestern portion of Michigan's Lower Peninsula primarily in Mason and Manistee counties.

Traditionally the LRBOI relied on this land and water to provide the foods, medicines, tools, and shelter necessary for everyday life. Long ago the Gitchi Manitu (Creator) offered the clan system to provide leadership and to care for these needs. There were seven original clans and each clan was known by its animal emblem. The animal emblem symbolized the strength and duties of the clan. The bear is of the west, the place of darkness, dreams, and the home of the Thunder Beings. "Strong of body, heart, love, and spirit." The medicine of the great bear is among the strongest, and most endurable, known to our people. The bear is among the survivors of the great deluge, at the beginning of time as we are told.

Bear medicine is that of the herbal knowledge, of patience, understanding, and learning.

Although the bear may seem slow, awkward, and unintelligent, unfortunately for those who see only with their eyes, the bear is neither slow, awkward nor unintelligent, as any genuine hunter will testify. The bear wastes nothing. He is an avid hunter and fisherman when hungry; a clown when he feels it, and a good parent and provider for his family. The bear is a powerful friend with very positive medicine, and a dangerous enemy to those who would abuse him. He does not intimidate those who seek his medicine in a right and respectful manner. He willingly teaches. Those, who seek his medicine for ill purposes, seek great and fatal danger for themselves.

Bear has great healing power given by Creator, which we are capable of learning. We must first learn, how to learn from our four leg brother, and then we must learn how to apply that knowledge in a healing way. We must allow ourselves, our spirits, and our bodies to be healed. Thus, we gain the medicine to help others.

Our brother, the bear, lives his life in a natural way, with great love, respect, integrity, and honor for all living things. He knows that there is time enough for everything in his life, and there is enough of everything in life for everyone, gifted to us all by the Creator. Perhaps, herein lies part of the great secret of bear's medicine, or prolonging all life. Bear's power comes from the understanding that he has no control of many things, yet, lives in balance with all things. He knows to seek shelter of his lodge when the Nimkeek (thunder) people walk upon our Mother Earth. He gathers and stores what he needs in the late summer and fall, relaxes in the winter, and awakens to a new and vibrant world in the spring. We can learn much from this which prolongs life (Pamela Medacco, 1998).

This research will allow for the continued practice of these traditions by maintaining and improving resources within Tribal Reservations and on ceded territories.

Resource Management:

A primary concern of the Little River Band of Ottawa Indians (LRBOI) is the status of black bear in the northwestern counties of Michigan's Lower Peninsula. There is limited current or historical data compiled on the status of black bears in these areas. This project will allow the LRBOI to gather important baseline data and compile information in order to collaborate in scientifically based management decisions on Tribal Reservations and ceded territories. Wildlife management is broadly defined as "the collection and application of biological information for the purpose of obtaining optimum levels of wildlife within an ecosystem and maintaining those levels". If black bears are to be conserved and maintained for future generations, management actions of many kinds must be accepted and undertaken to ensure the success of this goal.

Special concern to the LRBOI is the continuing loss and fragmentation of suitable black bear habitat (particularly in the northern Lower Peninsula) due to human development. Nowhere on this planet, and certainly nowhere within the range of black bear, do wildlife and their habitats exist beyond the influence of humans. Reduction and fragmentation of habitat due to increasing and expanding human populations have lead to major problems for black bear populations in parts of the eastern United States (Cowman 1972, Maehr 1984). It is well documented that fragmentation of habitat can reduce the abundance and distribution of wildlife populations (Saunder et al. 1991). These changes to the landscape pose challenges to black bears, which may require large expanses of unbroken habitat for survival (Rogers 1987) or habitats that are connected via appropriate long-term habitat conditions.

For the past four years the LRBOI Conservation Department has conducted a black bear bait station survey in Mason, Manistee, and Lake counties to estimate population trends. These surveys are conducted in June and consist of 100 bait stations placed 1 mile apart. A mesh bag with 1 pound of bacon is placed in a smooth bark tree 7 feet above the ground and 2 feet from the trunk of the tree. Each bait station is checked for bear visitations after 14 nights. A station is considered "visited" by bears if claw marks are discovered. Data from the bait station survey indicates very low densities of bears within the study area. The four-year average visitation rate is 5.25%. However, bait station indexes only monitor bear trends; therefore, more in depth research needs to be conducted to accurately assess bear populations within the Tribes ceded territory.

From 1991 – 2002 the Michigan Department of Natural Resource (MDNR) conducted research in Michigan's Northern Lower Peninsula to determine the demographics of bears. The MDNR radio-marked and monitored 126 bears and concluded; sub-adult dispersal was 95% for males and 32% for females, mean home range for males was 867 km^2 and females 131 km^2, sows bred earlier (2-3 years of age) and had fecundity rates of 2.6 cubs/sow (MDNR, UFSF, 2002). The MDNR bear population model predicted a pre-hunt Northern Lower Peninsula yearling and adult population of 1,302 bears for 2002. From 1990 - 2001 the MDNR conducted the bait station survey into the Northern Lower Peninsula. The MDNR bait station survey was concluded in 2001 and the LRBOI does not have the results of this study.

In 2002, a genetic mark-recapture study of the number of bears in the Northern Lower Peninsula was started in cooperation with Michigan State University. The MDNR and Michigan State University established 202 baited hair snares throughout the Northern

Lower Peninsula. A total of 20 hair snare stations were set-up within the LRBOI proposed study area. An insufficient number of hair snare stations were set in the proposed study area to accurately obtain population numbers. Bears visited 118 snares and 1,368 useable hair samples were collected. Results of the research indicated a genetic mean black bear population of 1,321 animals in the Northern Lower Peninsula.

Over the past 10-15 years, indices such as bear sightings, nuisance bear reports, and an annual bait survey indicate an increasing and expanding black bear population in Michigan's Lower Peninsula (MDNR, UFSF, 2002). Reduction and fragmentation of suitable bear habitat, an increasing and expanding bear population, and an increasing and expanding human population pose potential problems for black bears and the constituents of Michigan (MDNR, UFSF, 2002). The LRBOI's goal of managing wildlife is to maintain optimum populations and ensure viability and sustainability of suitable ecosystems across the 1836 Ceded Territory. The process of establishing population viability starts by determining the bear population status within each management unit.

In recent years, the Michigan Department of Natural Resources has opened additional counties to black bear hunting in the northwestern Lower Peninsula within the LRBOI 1836 Reservation and Tribal ceded territories. In most areas, bears reproduce relatively slowly and reduced populations recover slowly. The MDNR black bear model predicts a sustainable harvest of approximately 23% or 300 bears of the population annually (MDNR, UFSF, 2002). In 2002, the MDNR harvested 362 bears in the Northern Lower Peninsula, 20.6% higher than the MDNR sustainable harvest model allowed. In 2003, the MDNR harvested 404 bears in the Northern Lower Peninsula, 34.6% higher than the MDNR sustainable harvest model allowed. Management for sustained yield must be carefully controlled to avoid over harvest situations. Previous LRBOI bear surveys have indicated low numbers of bears within the LRBOI proposed study area. Over harvest in these areas will have detrimental effects on the sustainability of black bear populations. The LRBOI goal is to ensure long-term viability of black bears through comprehensive research, monitoring, management, and education. This goal can only be reached with more in-depth research and population estimates.

Objectives:

- To estimate with confidence intervals, black bear population size and genetic diversity in northern Lower Peninsula counties within the LRBOI 1836 and 1855 Reservations and on Tribal ceded territories.

- To build the Tribes capacity to make scientifically based management decisions in order to maintain healthy and sustainable black bear populations within the LRBOI 1836 and 1855 Reservations and on Tribal ceded territories that ensure continued cultural use, wildlife viewing opportunities, and subsistence harvesting opportunities.

- To compile information on black bear habitat use to determine ecological health on reservation lands and on lands ceded to the United States in the Washington Treaty of 1836.

Materials and Methods:

Study Site:

The project study area will consist of the Baldwin bear management unit and Mason County. The Baldwin bear management unit consists of Leelanau, Grand Traverse, Benzie, Manistee, Wexford, Lake, Osceola, and the northern half of Newaygo counties.

Study Design:

Recent advances in molecular biology have resulted in increased use of genetic markers to estimate population size (Woods et al. 1996, 1999; Taberlet et al. 1997; Mowat and Strobeck 2000, Dreher, Michigan State University, 2004). Small quantities of tissue, scat, or hair can provide sufficient DNA to identify individual animals (Morin and Woodruff 1996), and mark-recapture techniques can be used to estimate population size. Such non-intrusive sampling techniques are particularly attractive because they may be more efficient and less biased than live trapping and can be applied over larger geographic areas compared with traditional mark-recapture sampling. Our objectives are to apply mark-recapture models to capture history data obtained by genetic sampling to estimate black bear population size and density and to assess genetic diversity.

Hair Trapping:

Otis et al. (1978) suggested that population studies be designed so that animals have $\geq$ 4 traps in their estimated home range. Mean home-range size in the northern Lower Peninsula for male black bears = 867 km^2 and female black bears = 131 km^2 (MDNR, 2002). Barbed wire enclosure traps will be place at selected sites to collect black bear hair samples. Enclosure trap placement will be subjective within those spacing guidelines and amount of Tribal and public lands within the study area. Enclosure traps will be numbered, locations will be recorded by GPS, and habitat information collected. Once a hair sample is collected and all information is recorded on the data sheet, the hair sample will be sent to the lab.

DNA Analysis:

Hair samples will be submitted to Michigan State University for analysis. The genetic analysis of hair samples will indicate recaptures, siblings, half-siblings, and parental origins.

Statistical Analysis:

Black bear population size will be estimated using mark-recapture models in program CAPTURE (White et al. 1982). Models will be selected based on tests preformed by CAPTURE (Otis et al. 1978), simulation results from other studies (Mowat and Strobeck 2000), and our knowledge of bear behavior.

Ecological Integrity Monitoring Program

Black bears are one of the top predator species in Michigan's Lower Peninsula and will be identified as a keystone indicator species for assessing and monitoring overall ecosystem health. Data will be compiled from various sources, including past graduate work, United State Forest Service, and the State of Michigan, to evaluate habitat and corridor use. This information will be used to make recommendations and management decisions for biodiversity conservation that focuses on the need to conserve dynamic, multi-scale ecological patterns and processes that sustain the full complement of biota and their supporting natural systems. A growing appreciation of the enormous complexity and dynamic nature of ecological systems led to the concept of ecosystem management, wherein success is best assured by conserving and managing the ecosystem as a whole (Christensen et al. 1996).

Goals:

This project represents a unique opportunity for the LRBOI to gain valuable information relating to the status of black bears in the northwestern counties of Michigan's Lower Peninsula. To our knowledge, this project is the only one of its kind within the designated study area. The data collected from this project will build upon past Michigan State University work and allow for increased understanding of black bear populations in the northwestern Lower Peninsula. The data collected will play an integral part in determining long-term management of black bear. The long-term goals of this project are to develop accurate and efficient methods to determine and monitor black bear populations, as well as, establish baseline information regarding the status of black bear in Michigan's Lower Peninsula.

We believe that detailed monitoring from various perspectives described above will provide the LRBOI with the quality data imperative to future management efforts. In essence, we are proposing that a process of adaptive management be taken. The end result is the best possible scientific management of black bear – a goal that should directly benefit the Tribe both culturally and economically.

Determine black bear population size in the northwestern counties of Michigan's Lower Peninsula.

- Use a non-invasive method using DNA from captured hair to estimate population size with confidence intervals

Determine degree of genetic isolation of black bears in the northwestern counties of Michigan's Lower Peninsula.

- Examine DNA micro satellite information to determine the degree of genetic isolation

Evaluate genetic components to determine amount of parental contribution to the black bear population and determine black bear core areas in northwestern counties of Michigan's Lower Peninsula.

- Use genetic markers to determine genetic histories of black bears in Michigan's Lower Peninsula
- Calculate probability of offspring having the same genotype as a parent

Build the Tribes capacity and ability to manage its own natural resources.

- Identify current status of black bear
- Provide information regarding black bear habitat for conservation and protect of those habitats.
- Obtain materials for ongoing wildlife research
- Establish collaboration among diverse agencies and institutions

Deliverables:

- Baseline data on black bear population size and genetic diversity.
- Development of scientifically based management plans.
- Publish in peer-reviewed literature.
- Sharing of all data collected between various Tribal governments, government agencies, and universities.

This project comprehensively addresses all USFWS ranking criteria for the Tribal Landowner Incentive Program in the following manner.

Criteria 1: *Benefit*. There are numerous benefits that this project would provide. This project will provide the Tribe baseline data on black bear populations essential for scientifically based management decisions. This project would also compile information on black bear habitat use to determine ecological health of reservation lands and on lands ceded to the United States in the Washington Treaty of 1836. The Tribes capacity would increase to make scientifically based management decisions in order to maintain healthy and sustainable black bear populations. This project would also allow for the continued protection and management of critical habitats ensuring continued cultural use, wildlife viewing, enjoyment, and subsistence harvest opportunities of black bear. Finally, research conducted throughout this study will address the Tribal resource priority to ensure long-term viability of black bears through comprehensive research, monitoring, management, and education.

Criteria 2: *Performance Measures*. This project will provide numerous obtainable and quantifiable performance measures. During the first part of this project, Tribal personnel will gain valuable experience in wildlife research techniques and management. Final reports, maps, and management plans will be constructed during the second part of this project. These documents will greatly benefit the Tribe by providing skills and knowledge for long-term management, continued monitoring, and evaluation of black bear within Tribes ceded territory. This project will also provide valuable information used to make recommendations and management decisions for biodiversity conservation that focuses on the need to conserve dynamic, multi-scale ecological patterns and processes that sustain the full complement of biota and their supporting

natural systems. The completion of this project will provide the tools and knowledge to ensure long-term management and viability of black bears.

Criteria 3: *Work Plan*. Project tasks and deliverables clearly support the Tribal goals and objectives of preserving and conserving the natural resources on Tribal lands for the perpetual use, benefit, and enjoyment of Tribal members. This project would begin in 2005 and gather data through previously stated methods. In 2007, data analysis would generate final reports as well as maps to conclude this project. This information will allow the Tribe to continue monitoring and reevaluate data, as well as collaborate with other Tribes, Federal, and State agencies for long-term management of black bears.

Criteria 4: *Budget*. The project entails unique wildlife research approaches, including intensive field surveys, statistical analysis, and DNA analysis. To complete this project numerous items will need to be obtained including, vehicles, GPS equipment, trapping supplies, remote cameras, and personnel. The analysis of DNA will be contracted to Michigan State University and the costs are reasonable. The budget narrative accurately reflects and clearly defines all costs, including Tribal matching funds associated with this project. Without financial assistance, this project would be extremely difficult to conduct.

Criteria 5: *Capacity Building*. This project will greatly increase the Tribes capacity to manage wildlife. The study designs and habitat analyses designed from this project will provide the Tribe with methods and procedures to conduct scientifically based research in the future. Establishing the current status of black bears will allow the Tribe to develop management plans. With the development of Tribal management plans, the Tribes Natural Resource Commission will be able to construct as well as enforce various scientifically based ordinances and regulations to promote long-term viability of black bears and protection of critical habitats. This project will broaden the Tribes infrastructure; such as purchasing vehicles, remote cameras, genetic sampling equipment, and remote sensing equipment. All of which can be used for future wildlife research.

Criteria 6: *Contributions and Partnerships*. Several partnerships will be developed on this project, including Grand Traverse Band of Ottawa and Chippewa, Little Traverse Bay Bands of Odawa Indians, and the United States Forest Service. The Grand Traverse Band of Ottawa and Chippewa Indians will contribute staff time and equipment for the data gathering portion of this project.

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