

# Mongolian Argali

EXPEDITION BRIEFING

Dear Earthwatch Volunteer,

On behalf of all of the Argali Ecology and Conservation project staff I would like to thank you for choosing to help us and to welcome you to Mongolia – the “Land of Blue Skies.” We believe that you will enjoy your stay in Mongolia while assisting us with an important conservation project.

While in Mongolia, you will experience both city and country life. We hope you will take advantage of your two nights in the capital, Ulaanbaatar, to experience some of the ancient, fascinating, and enjoyable culture that Mongolia has to offer. For the remainder of your two week stay, you will be in the gorgeous Ikh Nartiin Chuluu Nature Reserve, far from the nearest human settlement. On the train ride to our study site, you will travel from the taiga covered mountains of the north, through the forest steppe and true steppe, to the semi-desert steppe. Enjoy Mongolia’s vast landscapes that remain largely free of fences and paved roads. At our research camp you will have the option of staying in a camping tent or a traditional Mongolian tent, called a ger or yurt (we recommend that you choose a ger, as they are quite comfortable). While in the countryside you will also experience a number of Mongolian traditions. Don’t worry about making mistakes, we will help you along the way and Mongolians are incredibly hospitable.

At Ikh Nart you will enjoy bright blue skies (only rarely does it rain or snow) and spectacular sunsets and you will see argali, ibex, foxes, cinereous vultures, eagles, hawks, wheatears and other Eurasian birds, toad-headed agama and racerunner lizards, and, if you are lucky, Mongolian or goitered gazelle or even a grey wolf. Aside from the natural beauty, you will help us with a wide variety of tasks, including capturing and radio-collaring animals, radio tracking collared animals, collecting behavioral data, collecting fecal and vegetation samples, and monitoring cinereous vulture nests. You will also help us manage our data. We will train you to help you help us. And if you are ever uncomfortable performing a task, just let us know and we’ll find something more suitable but equally important for you to do. There is ample work to go around! We will also ask you to assist with chores around camp, such as retrieving water, washing dishes, and helping us keep the equipment and living quarters clean.

We have a saying about Mongolia, “It’s not just a country; it’s an adventure!” We truly hope that your adventure will be enjoyable, educational, and productive! Let us know if there are any ways we could improve your stay, your experience, or our project.

With best regards,



Rich Reading, Ph.D.

Conservation Biology Director

# Mongolian Argali

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# RESEARCH PROPOSAL

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POSITION / TITLE: 1) Director of Conservation Biology  
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PROJECT TITLE: Ecology & Conservation of Argali Sheep  
(*Ovis ammon*) in Mongolia

RESEARCH SITE: Ikh Nartiin Chuluu Nature Reserve,  
Dornogobi Aimag, Mongolia

TEAM SIZE: Minimum: 6 Maximum: 10

## Abstract of Proposal

Argali (*Ovis ammon*) are the largest mountain sheep in the world. Little is known about the species, although they are declining and listed as threatened internationally and in Mongolia. Argali population declines appear to be primarily a result of poaching and conflicts with domestic livestock production. We initiated research projects in an attempt to better understand the species' taxonomy, ecology, and population dynamics. Our overall objective is to understand argali sheep ecology well enough to develop a long-term conservation management plan for the species. Our broad-based research project attempts to understand the ecology of a poorly understood species. As such, we employ a wide variety of methods to answer a number of ecological questions, including:

- (1) mortality
- (2) habitat utilization
- (3) behavioral ecology
- (4) reproduction.

To begin to understand these variables we employ a variety of methods, including radio telemetry, behavioral observations, collection of biological samples, vegetative sampling, and fecal analyses. As a side project, we are collecting data on the nesting success of cinereous vultures, a globally threatened species.

We will use volunteers to assist with all of our data collection methods, including:

- collecting radio telemetry data
- collecting behavior data

- collecting vegetation samples
- collecting fecal samples from argali and domestic livestock
- assisting in netting argali sheep
- collecting data from netted animals (August/September teams only)
- capturing and collecting data and samples from lambs (April/May teams only)
- collecting data on cinereous vulture nest success rates.

Tasks vary in the skill level required, and we envision that different volunteers will perform slightly different tasks. However, given the large amount of work available, every volunteer should be able to contribute meaningfully to the project. In addition, we will provide appropriate training, including field training, and each volunteer will work with a project researcher to continually improve their skills. The results of this work will hopefully enable us to better conserve these magnificent animals. We will use the data we collect to help develop conservation management recommendations to the appropriate Mongolian government agencies, other biologists, and non-governmental organizations working to conserve and recover the species in Mongolia and elsewhere. Already, we have discovered new information pertinent to conservation management. We are also using our findings to work with local people to try to induce changes in livestock husbandry practices that will benefit argali.

# RESEARCH PLAN

## 1. THE PROJECT

Argali (*Ovis ammon*) are the largest mountain sheep in the world, with some males in Mongolia weighing over 200 kg/440 lbs and sporting impressive, spiraling horns that reach over 165 cm/65 in length (Schaller 1977, 1998, Valdez 1982, Mallon *et al.* 1997). Argali have relatively long, thin legs and compact bodies, built for running speed. As such, they prefer rolling hills, plateaus, steppe hills, and gentle slopes to rugged mountainous terrain (Schaller 1977, Amgalanbaatar and Reading 2000). Argali inhabit the cold, arid grasslands of mountains, steppe-covered valleys, and areas with rocky outcrops in Central Asia, including portions of Mongolia (Shackleton 1997). Currently, their populations are patchily distributed in the northwestern and western Altai Mountains, the central Khangai Mountains, the Trans-Altai Mountains and the mountain massifs and rocky outcrops of the Gobi Desert in southern Mongolia (Reading *et al.* 1998, Schaller 1998, Amgalanbaatar and Reading 2003). A few argali survive in the mountains near Lake Khovsgol in the north. Two putative Mongolian subspecies are described in the literature, the Altai and Gobi argali (Tsalkin 1951, Dulamtseren 1970, Sopin 1982, Zhirnov and Ilyinsky 1986, Geist 1991), although recent research suggests that these animals only represent a single subspecies (Tserenbataa 2003). The northern and northwestern of these populations are contiguous with Russian argali populations, while the southern and southwestern populations are connected to populations in China (Mallon *et al.* 1997).

Little is known about argali, although it is clear that the species is declining and it is listed as threatened internationally and in Mongolia (Shiirevdamba *et al.* 1997, Amgalanbaatar and Reading 2000). Despite this, some researchers suggest that argali are relatively widespread and not threatened. These different opinions are based on population estimates that vary from 10,000- 50,000 animals (see review in Amgalanbaatar *et al.* 2002). More systematic, rigorous, and comprehensive surveys for and ecological research on argali are clearly required.

Mongolia's Argali Wildlife Research Center, the Denver Zoological Foundation (DZF), and the Mongolian Academy of Sciences (MAS) are cooperating on several argali sheep conservation and research projects in Mongolia. We initiated research projects in an attempt to better understand the species' taxonomy, ecology, and population dynamics. The results of this work will hopefully enable us to better conserve these magnificent animals.

### **Status and Threats**

Although argali appear to be declining, accurate population estimates are difficult. Most biologists agree that the species is experiencing marked population declines and fragmentation (Mallon *et al.* 1997, Amgalanbaatar *et al.* 2002). As such, argali are listed as Threatened in the Mongolian Red Book and as "Rare" by the country's newly enacted Law on Fauna (Shiirevdamba *et al.* 1997). Both this law and the Law on Hunting permit hunting pursuant to obtaining a permit from the Ministry of Nature and Environment. They are also included on Appendix II of the Convention on International Trade of Endangered Species (CITES); designated as Threatened on the US Endangered Species List; and listed as Vulnerable on the 1996 IUCN Red List of Threatened Animals (Nowak 1993, Baillie and Groombridge 1996).

Argali population declines appear to be primarily a result of poaching and conflicts with domestic livestock production (Mallon *et al.* 1997, Reading *et al.* 1997, 1998, 1999a, Amgalanbaatar *et al.* 2002). Traditionally, most poaching was subsistence hunting (shooting animals illegally for food), but increasingly people are poaching commercially to supply an increasing demand for argali horns to be used in Traditional Chinese Medicine. Conflicts with nomadic herders include competition and direct argali mortality by domestic dogs (especially during winter when animals are in a weakened condition) kept by pastoralists to herd livestock and protect them from wolves. Argali compete for forage, water, and mineral sources with domestic livestock and are displaced by domestic animals and herders.

Mongolia's transformation to a democracy and free market economy in the early 1990s led to several changes with ramifications to argali (Bruun and Odgaard 1996, Reading *et al.* 1999a). As law enforcement became increasingly lax, poaching activity increased and continues to grow (Lushchekina 1994, Amgalanbaatar *et al.* 2002). Today, many local people readily admit to shooting argali for meat. In addition, livestock numbers increased dramatically following privatization of herds from 26 million head in 1992 to 33 million head in 1998 (Amgalanbaatar and Reading 2000). As the nation's human and livestock numbers increase, over-grazing and displacement by livestock reduces and degrades argali habitat (Sheehy 1996, MNE 1996; Reading *et al.* 1999a). Solutions are difficult, as many nomadic herders live a marginal existence, barely able to feed and clothe their families. On a more positive note, most Mongolians also want to conserve nature and wildlife, which they view as part of their cultural heritage (Myagmarsuren 2000).

Trophy hunting of argali is a contentious issue both locally and internationally (Reading *et al.* 1998, 1999a, Amgalanbaatar and Reading 2000, Amgalanbaatar *et al.* 2002). Most local people and many international conservation organizations oppose trophy hunting, expressing concern for the status of the species and disdain for rich foreign hunters (Amgalanbaatar and Reading 2000). Despite the relatively small number of animals officially killed each year by trophy hunters (usually around 25, although the actual number may be as much as twice that number), many local people blame trophy hunters for argali declines. Fewer Mongolians (mostly in hunting guide companies) and foreign trophy hunters argue that trophy hunting may provide an important source of income for argali conservation, as well as local communities. Indeed, argali are greatly sought by foreign trophy hunters, who spent over US\$20 million to harvest 1,630 rams in Mongolia from 1967-1989 (Lushchekina 1994). However, a tiny fraction of this money went to the local communities or the conservation and management of argali (Amgalanbaatar *et al.* 2002).

Under the Mongolian Hunting Fee Law of 1995, revenue generated from argali trophy hunting was divided among the federal government's general funds (70%), the local Sum (or county) government (20%), and the hunting organization (10%) (Reading *et al.* 1999, Wingard and Odgerel 2001, Amgalanbaatar *et al.* 2002). Very little, if any, of that money goes directly to conservation and the government does not actively manage argali (Amgalanbaatar and Reading 2000, Amgalanbaatar *et al.* 2002). In addition, a new law requires that 50% of all resource use fees be redirected to conservation. Directing resources from trophy hunting to conservation and management of the species seems to provide a win-win-win situation, as it would benefit trophy hunters, the government of Mongolia (through the revenue generated), and, most importantly, argali and the ecosystems they inhabit (Amgalanbaatar and Reading 2000, Amgalanbaatar *et al.* 2002). Indeed, local hunting companies have recently expressed an interest to help support conservation activities.

We have been involved with argali conservation and management since 1996, working on determining the range of the species, a better understanding of argali ecology, genetic analysis of putative subspecies, behavioral assessments, and a comparison of the diets of argali sheep and

livestock. Prior to our research, very little was known about argali biology and ecology, and we still have a great deal to learn. We will use the data we collect to help develop conservation management recommendations to the appropriate Mongolian government agencies, to other biologists, and to non-governmental organizations working to conserve and recover the species in Mongolia and elsewhere. Already, we have discovered new information pertinent to conservation management (e.g., before our research conservationists did not know that domestic dogs were a significant source of argali mortality). And we continue to work with local and federal officials to try to instigate more active argali conservation management and influence what limited actions do occur. We are also using our findings to work with local people to try to induce changes in livestock husbandry practices that will benefit argali.

## 2. RESEARCH OBJECTIVES

### Overall Objective

Our overall objective is to understand argali sheep ecology well enough to develop a long-term conservation management plan for the species. Data collected will include sources of mortality, home range size, movement patterns, behavior, forage preferences and habitat use, competition with domestic livestock, reproductive rates, and more.

### Specific Research Goals

- Capture 5 – 10 adult and 8 – 10 lamb argali sheep/year and fit them with radio collars
- Track collared argali and collect data on mortality, movement patterns, habitat use, and more
- Compare habitat use and forage plants of argali sheep, domestic sheep, and goats
- Collect argali biological samples and morphological measurements for genetic, disease, and other analyses
- Observe argali to collect behavioral data, especially during the rut
- Collect data on other species of conservation concern or ecological significance

### Specific Conservation Goals

- Use the data collected from our research to develop a conservation management plan for argali sheep and their habitat in Ikh Nart. This plan should ensure the persistence of argali and maintenance of the ecosystem's health
- Use the knowledge gained at Ikh Nart to assist in developing a conservation management plan for argali nationally
- Train Mongolian biologists, protected area managers, and conservationists to conduct rigorous research and to apply the findings to pressing conservation issues using argali as a case study
- Assist in creating conservation infrastructure in Ikh Nart (and Mongolia in general) and long-term funding sources to better ensure the persistence of long-term conservation activities for argali and other species



### 3. METHODS

Our broad-based research project is attempting to understand the ecology of a poorly understood species. As such, we will employ a wide variety of methods to answer a number of ecological questions, including:

- (1) mortality: sources of mortality (e.g., predation, disease, poaching, and hunting), age-specific mortality rates
- (2) habitat utilization: foraging preferences, dietary overlap with domestic livestock, displacement by people and domestic livestock, important limiting resources like water and mineral licks, inter- and intra-specific competition
- (3) behavioral ecology: home range size, movement and migration patterns, courtship and mating behaviors, daily activity patterns, maternal care, anti-predatory behaviors
- (4) reproduction: age-specific fecundity rates, recruitment rates

We are also doing genetic research as a separate, but complimentary study. These data are necessary for developing effective conservation management programs for the species. To begin to understand these variables we are employing a variety of methods, including radio telemetry, behavioral observations, collection of biological samples, vegetative sampling, and fecal analyses.

#### **Argali Capture**

Each year we work to capture 5-10 adult and 8-10 lamb argali sheep and fit them with radio telemetry collars. We employ several methods to capture argali.

Drive Nets. First, we use 2 sets of parallel, overlapping drive nets approximately 3 m x 30 m to create 2 net barriers extending approximately 300 m in the bottom of a shallow, dry stream bed. Nets are constructed of soft 7 mm braided synthetic rope knotted into a 15 cm mesh and are held up with 6 cm x 6 cm x 2.5 m poles on alternating sides every 5 m, with two poles holding up each end. The nets are hung loosely from a top suspending rope that is weaved through the netting, passed over the end of the notched poles and secured to the ground with rocks. Approximately 30 cm of net lay on the ground to easily entangle the legs of running argali. Rocks hold the bottom of the nets down in high winds.

We employ 3-6 local herders on horseback and part of our field team on horses or motorcycles or in vehicles to locate and drive adult argali sheep toward the nets. People and scarecrows extend past the edges of the net to ensure that the animals run into them. Other team members hide next to the nets to more quickly reach and restrain netted animals. As many people as possible are equipped with hand-held 2-way radios tuned to 1 of 2 frequencies, 1 for English and 1 for Mongolian. One native Mongolian and 1 native English speaker act as central coordinators, and are stationed on a high point. Upon hitting the nets and becoming entangled, the volunteers and field team rush to physically restrain captured animals (see Figure 1). In all cases, 1-2 researchers first restrain the netted animal before volunteers assist. As such, while some volunteers assist in actually handling animals, this assistance will not require great strength or previous animal handling experience. Other volunteers record data and ensure that people and animals are safe from rocks, equipment, or other hazards. Finally, some volunteers photo-document the process. Additional assistance is necessary to hood, untangle, hobble (tie the legs together), and process the animals. After capture, we place hoods over the animals' heads to cover their eyes (once hooded, captured animals tend to remain quite calm), hobble their legs to better control them,

take a series of body measurements, collect biological samples, and attach traditional radio collars. The entire process lasts only 7-15 minutes.

Lamb Capture. We employ researchers and volunteers to locate and capture newborn argali lambs, usually in association with other data collection methods, like radio telemetry (see below). Argali lambs are approachable for 1-3 days after birth, at which time they can be slowly approached and grabbed by hand. Lambs are extremely cryptic and difficult to detect, but using cues from ewes, we are able to identify areas where lambs likely occur. These we search thoroughly. Upon finding a lamb, the person who finds the animals radios or calls other team members who circle it. The ewe will run off when humans approach. A researcher approaches slowly from behind, grabbing the animal when close enough. We are able to capture some animals that can outrun us using this technique. After capture, we place hoods over the lambs' heads to cover their eyes, take a series of body measurements, collect biological samples, and attach expandable, drop-off radio collars (they stay attached ~ 9 months). Again, volunteers will help record data, measure restrained animals, take photos, and assist researchers. The entire process lasts only 7-10 minutes to help minimize stress to the lambs and the ewes.

Darting. Volunteers will not participate in the third and final technique that entails darting argali sheep using a mixture of dangerous immobilizing drugs. We use a remote delivery system developed by Pneu-Dart, Inc. We utilize Pneu-Dart® rifles with laser or red dot scopes. For darts, we use either 1 or 2 ml 50 caliber type C Pneu-Dart darts that have a 3/4 inch barbed needles. Anesthetic darts and reversals are prepared in advance for an average sized female argali sheep (~ 90 kg) using the bighorn sheep as a model (Kreeger *et al.* 2002a, b). For anesthesia with a 2 ml dart we use a mixture of 4 mg of the opioid carfentanil citrate, 50 mg of the  $\alpha$ -2 adrenergic agonist xylazine, and 100 mg of the dissociative anesthetic ketamine (lyophilized by a compounding pharmacist and reconstituted at 200 mg/ml). The anesthetic mixture for a 1 ml dart was 2 mg carfentanil, 25 mg xylazine, and 50 mg of ketamine.

Darted argali are repositioned from lateral to sternal recumbency as soon as possible to avoid bloating and respiratory compromise. We apply a hood to cover the eyes. If there is any evidence of life-threatening respiratory or cardiovascular compromise we are prepared to administer doxapram hydrochloride i.v. to stimulate those functions. Carfentanil is reversed with 100 mg of naltrexone hydrochloride administered intravenously and 400 mg administered intramuscularly; the xylazine is reversed with 15 mg of yohimbine hydrochloride administered intravenously. The recommended dose of naltrexone is 100 mg per 1 mg of carfentanil. We give an additional 100 mg naltrexone to minimize the possibility of re-narcotization in a free-ranging animal. We give yohimbine at a rate of 0.1 mg/kg body weight. Since reversals were prepared in advance we could potentially abort an immobilization prematurely if an animal got into trouble and other supportive efforts were unsuccessful. For simplicity we are prepared to reverse the 1 ml darts with the same reversal protocol.

We are forced to approach to within 50 m of target animals, given the ballistics of the darting equipment. This requires hiding in blinds near water sources or sneaking up on unsuspecting animals. To facilitate both, we use spotters with two-way radio communication. This enables the shooter to remain hidden for as long as possible. We range potential targets using laser rangefinders, as accurate ranging is critical to accurately deliver the dart to a target. Darted animals are monitored closely (see below). The entire darting to reversal process takes about 10-20 minutes.

Animal Handling. For all animals we capture, we place hoods over their eyes, weigh them, take a variety of morphometric measurements, collect biological samples (i.e., hair, blood, fecal, parasites), and monitor temperatures, pulses, respirations (TPRs). We take care to keep noise to a minimum during captures and avoid undue handling. We keep moisturizer for the eyes on

hand. We use a pocket weather tracker to monitor some meteorological parameters during capture events.

### **Radio Telemetry**

Radio-collared argali are tracked using a traditional receiver; a yagi, hand-held, 3-element antenna; and a global positioning system (GPS). We track collared animals throughout the year, taking daily fixes while in the field (minimum of 2 weeks each month), and ensure that we do not bias our fixes by influencing argali movements. We do this by monitoring the strength of the signal, hiding behind rocks and ridges, and using binoculars and spotting scopes to locate and identify animals at a distance. Animals that respond to trackers are no longer tracked during that day. Focal animals are tracked continuously during the course of the day (if the observers go undetected or do not disturb or influence the animal). We use these opportunities to collect behavioral data (see below). We note the location that we first observe each animal and later collect the GPS position. We only follow sheep that move from our field of view, repeating our technique. Tracking teams contain 1-2 volunteers and 1 researcher.

All collars are equipped with mortality signals to permit us to quickly locate the animal and determine the cause of death. More detailed data, collected on an opportunistic basis, allow us to better evaluate habitat use and behavior. We incorporate our telemetry data into a geographic information system (GIS) to help us understand habitat use, home range sizes, and movement patterns.

### **Dietary Overlap**

Fecal Analysis. We collect fecal samples from argali, sheep, and goats for subsequent forage species analyses. We select grazing areas utilized by both argali and livestock and randomly collect samples from these areas during every season. Identification of forage plants consumed and determinations of the relative proportion of each species will be conducted in a U.S. laboratory, due to the lack of technical capacity (laboratory) in Mongolia.

We collect 10 separate samples for each species (argali, sheep, and goat) for each grazing area selected during each season. Each sample comes from a different animal. Samples are stored in zip lock bags, labeled as to species, date, time, and GPS location. Samples are frozen in a portable dry ice cooler that we retain in the field and then in freezers in Ulaanbaatar. We transport the samples in coolers with dry ice to the U.S. To assess the level of overlap between livestock and argali, we will use a variety of indices of niche overlap, including simple percent overlap (Schoener 1970), Pianka's index (Pianka 1974) and Morisita's index (Morisita 1959). We will perform these analyses on argali versus sheep, versus goats, and versus sheep and goats combined.

Foraging Analysis. We observe argali, sheep, and goats in the field to determine which plants and which parts of selected plants they choose as forage using binoculars and spotting scopes. Ten samples of each plant that each species consumes is collected for each season (i.e., 10 samples x 3 species x 4 seasons x the number of plant species; or 120 samples per plant species). We compare selected forage plants with random samples of all vegetation within the study area. Random Daubenmire plots are established in the study area to sample vegetation from the entire study area (Daubenmire 1958). Plot locations are recorded using a GPS. All plants within each plot are identified and collected for nutritional analyses. Data collected include names of all plants, number of each species, and canopy coverage estimate (at the grass/forb and shrub level). We stratify sampling across vegetative communities in our study site. Samples are analyzed by Dr. Nancy Irlbeck's nutrition laboratory of Colorado State University for nutritional composition.

## **Behavioral Analyses**

Behavioral analyses will help us understand the basic behavioral ecology of the species, understand courtship rituals, and determine if argali and domestic sheep and goats spend similar amounts of time foraging in relation to other activities, such as vigilance for predators.

We conduct focal animal observations to quantify argali behavior, to develop a complete ethogram (or description of the behavioral repertoire of the species), and to compare the behavior argali with domestic sheep and goats. Observations focus on individual animals and last 15 minutes/animal, with a 2 minute break between animals. In larger groups, only 3-4 individuals representing different age groups will be selected for observation. Observations are conducted using binoculars and spotting scopes. We immediately cease collecting data on animals that react to the presence of observers. We have begun the construction of an ethogram of argali behaviors that we will continue to expand as we gather more data on rare behaviors. An initial list of behaviors is appended. We will use the data to assess diurnal activity cycles and to compare with domestic animals and, in future years, data from argali at other sites.

## **Cinereous Vulture Nesting Success**

As a side project, we are collecting data on the nesting success of cinereous vultures, a globally threatened species. These largest of the Old World raptors nest in high densities in our study area. Indeed, our study area may represent one of the most important remaining nesting sites for the species in the world (for example, we recorded 45 nests in just a 25 sq km portion of our study site in 2003). We hope to better understand some of the factors associated with vulture nesting success by tracking nests over time. We record all active nests we encounter and then re-visit the nests through the field season. After the single egg hatches (if it survives that long), we record body measurements of chicks, including weight, body length, and wing length. Chicks are easily approachable and can be handled with ease until just prior to fledging. Just prior to fledging, we exercise care to ensure the chicks do not jump from the nests and try to fly prematurely. We also record the nesting substrate (i.e., tree or rock) to compare relative nesting success rates. We remain in and near the nests for very short periods of time (< 10 minutes) to avoid adversely impacting survival.

## **4. APPLICATION OF RESULTS**

The results of this research will be utilized in a variety of ways. First, and most importantly, the results promise to have important management implications for the Ikh Nartiin Chuluu Nature Reserve, for argali sheep in the Reserve, in Mongolia, and throughout their Central Asian range. Since so little is known about these magnificent animals the data we collect will help managers develop better conservation management plans. We have already begun to facilitate this process and are working on plans. Specific management recommendations are provided in our reports and team members participate in the National Working Group on Argali Management put together by the Mongolian Ministry for Nature and Environment.

We also hope to influence conservation management of argali by the dissemination of our results and ideas in a variety of forms:

- Scientific Reports. We write scientific reports of our findings and share these with our funders, appropriate managers and politicians, colleagues, and local people.

- Scientific Articles. We write scientific papers for publication in appropriate journals and newsletters of scientific organizations. We have already published several papers and will publish more (see attached).
- Popular Articles. We write popular articles in Mongolian, English, and other languages for appropriate magazines, journals, newspapers, and other fora. We have already published popular articles in Mongolian, English, and Russian on our work (see attached).
- Scientific and Popular Presentations. We present our findings at conferences, as part of lecture series, to universities, and other interested people. We have already made a large number of presentations to a wide variety of audiences.
- News Stories. We solicit newspaper and radio stories about our work. We have already given a number of radio interviews in Mongolian and helped get newspaper stories published in Mongolian and English about our work.

Finally, we are actively training local biologists and conservationists in wildlife ecology, plant ecology, community ecology, and conservation. This cadre of trained professionals represents our most important contribution, as these people will apply what they have learned to their national context far better than any foreign professional. In addition, they will continue to train other professionals and help engender a culture of rigorous conservation that will hopefully continue to grow and strengthen over time. We have already trained a large number of professionals, including short visits and training by over a dozen students, 4 Mongolian Masters students working at 2 U.S. universities and 1 Mongolian university and 2 Mongolian Ph.D. students working at Mongolian universities.

## 5. FIELD TRAINING

Field training includes:

- proper use of radio telemetry equipment
- use of global position systems (GPSs)
- use of 2-way radios, the importance of remaining unseen (to the extent possible) by target animals
- collecting behavioral data and definitions of the various behaviors on data sheets
- proper animal handling techniques
- vegetative and fecal sampling methods
- brief introduction to the methods we will use to analyze the data

Each volunteer will work with a project researcher to learn the appropriate skills. That researcher will assess the volunteer and determine when (and if) the volunteer is ready to collect data without direct supervision (we envision that the necessary level of supervision will vary). Tasks vary in the skill level required (from simply recording times or assisting a researcher in handling an animal to judging the location of animal using radio telemetry in a rocky area with substantial signal bounce), and we envision that not all volunteers will display the skills necessary to perform all the tasks unassisted. However, given the large amount of work available, every volunteer should be able to contribute meaningfully to the project. During the train ride to the field site, volunteers will be provided with an informal lecture on Mongolian customs and traditions. These will be re-enforced in the field. Field training will include exercises to develop pertinent skills as well as assess volunteer capacities. Prior to beginning actual field work, we will review what volunteers have learned and answer any lingering questions. Volunteers will not proceed with actual field work until they are comfortable doing so. Similarly, during visits to

nomadic families in the field we will remind volunteers of the most important customs and traditions.

## 6. VOLUNTEER ASSIGNMENTS

Earthwatch volunteers will provide crucial assistance to our field research project. The percentage of time each volunteer will spend on each task is an estimate, but will likely vary considerably.

Volunteers will assist researchers in a variety of field activities, including:

- (1) collecting radio telemetry data on previously collared argali sheep - 15-25%
- (2) collecting behavior data on focal animals - 15-25%
- (3) collecting vegetation samples from the study site - 15-20%
- (4) collecting fecal samples from argali and domestic livestock - 15-20%
- (5) assisting in directing argali sheep toward drive nets, restraining and handling captured animals, collaring, and collecting data and samples from netted animals (August/September teams only) - 25-30%
- (6) locating, corralling, handling, collaring and collecting data and samples from captured lambs (April/May teams only) - 25-30%
- (7) collecting data on cinereous vulture nest success rates and nestling morphometric data - 5-10%.

Most of these tasks include photographic components to document our activities. Volunteers will have the opportunity to vary their tasks according to their desires, and within the limits of that required by the project (i.e., obviously not everyone can only perform one of these tasks!). Task difficulty will vary from simple data recording (on data collection sheets) to actual radio tracking in areas with rocky outcrops (difficult because of signal bounce). This variety should ensure that everyone can contribute meaningfully to the project.

Skills that would be particularly valuable to our project would include:

- experience with radio telemetry (it is really more of an art!)
- plant identification skills
- animal handling skills
- experience identifying different behaviors
- photographic skills
- orienting with a map and compass or Global Positioning System (GPS)
- data management skills, especially using a GPS

All volunteers should have some familiarity with hiking and camping, be willing to work as part of a team, and enjoy working in remote locations.

## 7. PROJECT STAFF

### PRINCIPAL INVESTIGATORS

**Principal Investigator: Richard P. Reading, Ph.D.** Dr. Reading is the Director of Conservation Biology at the Denver Zoological Foundation and Associate Research Professor at the University of Denver. Rich holds a Ph.D. in wildlife ecology from Yale University and has been working in Mongolia since 1994. He will be present for the entire field stay of all volunteers, and likely assist with travel to and from Ulaanbaatar.

**Principal Investigator: Ganchimeg Wingard, M.S.** Ms. Wingard is a Research Associate with the Denver Zoological Foundation and holds 2 Master's degrees, including a recent degree in Wildlife Ecology from the University of Montana, where she studied argali and domestic livestock feeding relationships. Ganaa speaks excellent English and has experience leading ecotours in Mongolia. She will be the main host for all groups of volunteers.

**Co-Principal Investigator: Sukhiin Amgalanbaatar, M.S.** Mr. Amgalanbaatar is a Research Biologist with the Mongolian Academy of Sciences and President of the Argali Wildlife Research Center, a Mongolian NGO. He has been studying the status and ecology of argali since the late 1980s. Amгаа will be present throughout the entire field stay of all volunteers. He speaks decent English.

### FIELD ASSISTANTS

**Investigator: Tuya Tserenbaata, M.S.** Ms. Tserenbaata is a Research Biologist with the Mongolian Academy of Sciences and holds a Master's degree in Biology from the University of Denver where she studied argali genetics. Tuya speaks excellent English and will act as the secondary host for at least 2 groups of volunteers.

**Investigator: B. Mandakh, Ph.D.** Dr. Mandakh is a Research Biologist with the Mongolian Academy of Sciences. Her Ph.D. from the Mongolian National University examined plant ecology in the steppe region of Mongolia. She has worked on argali-plant relationships in Ikh Nart since 1998. Mandakh speaks rudimentary English and will be present for the field stay of all volunteers.

**Investigator: David Kenny, V.M.D.** Dr. Kenny is the senior veterinarian at the Denver Zoological Gardens. Dave has vast skills in exotic animal immobilization and health and has handled the veterinary aspects of the argali research project since 2000. He will be present for portions of all 4 groups of volunteers.

**Investigator: Tony DeNicola, Ph.D.** Dr. DeNicola is an animal capture specialist with White Buffalo, Inc. Tony received his Ph.D. from Purdue University and has been working in Mongolia since 2001. Tony has vast experience in capture of a wide variety of ungulates. He will be present for portions of all 4 groups of volunteers.

**Investigator: Yo Onon:** Ms. Onon is a Wildlife Biologist with the Mongolian Academy of Sciences and has a Master's degree in Biology from the Mongolian National University. Onon has studied argali in Mongolia since 1999 and speaks limited English. Onon will likely be present for 2 of the teams.

**Camp Manager/Ranger: Otgonbayar.** Mr. Otgonbayar is the camp manager and ranger of Ikh Nartiin Nature Reserve. Before taking this position, Otgoo was a herder who assisted with the first drive net captures of argali in 2002. He does not speak English.

**Driver: Batorshikh:** Mr. Batorshikh has been working as a driver for the Denver Zoological Foundation since 2000, and has experience capturing argali lambs and adults in drive nets. He assists with numerous other tasks around camp and in the field. Orshkoo speaks very little English.

**1-2 Mongolian Graduate Students:** We generally employ 1-2 Mongolian graduate students from the Mongolian National University or the Mongolian Pedagogical University to assist us in the field and to gain important field experience. Most graduate students speak at least some English, with some being quite proficient.



# FIELD LOGISTICS

## 8. RESEARCH AREA

Ikh Nartiin Chuluu Nature Reserve (Ikh Nart) was established in 1996 to protect 43,740 ha (108,080 ac) of rocky outcrops in northwestern Dornogobi Aimag (Myagmarsuren 2000). The region is a high upland (~1,200 m or ~4,000 ft) covered by semi-arid steppe vegetation. Permanent cold-water springs are available in some of the several, shallow valleys draining the reserve. Climate is strongly continental and arid, characterized by cold winters (to -40 °C/°F), dry, windy springs (to 25 mps or ~55 mph), and relatively wet, hot summers (to 35 °C or 95 °F). Humidity is extremely low. Precipitation is low and seasonal, with most precipitation falling in the summer. Weather varies considerably, even within seasons.

The flora and fauna are representative of the semi-arid regions of Central Asia, with a mix of desert and steppe species. Vegetation is sparse. Xerophytic and hyperxerophytic semi-shrubs, shrubs, scrub vegetation, and turf grasses dominate, including *Haloxylon ammodendron*, *Sympegma ergelli*, *Anavasis brevifolia*, *Ephedra prjewaliskii*, *Ilynia regeli*, *Stipa glareosa*, *S. orientalis*, and *Reumuria songarica*. Different plant communities can be found around oases and streams, on rocky outcrops, and other localized areas. Large mammals in the region include argali (*Ovis ammon*), ibex (*Capra sibirica*), goitered gazelles (*Gazella subgutturosa*), Mongolian gazelles (*Procapra gutturosa*), and wolves (*Canis lupus*), several of which are locally or globally threatened. Common avifauna includes cinereous vultures (*Aegypius monachus*), saker falcons (*Falco cherrug*), steppe eagles (*Aquila rapax*), upland hawks (*Buteo hemilasius*), Black Kites (*Milvus migrans*), little owls (*Athene noctua*), pied wheatears (*Oenanthe pleschanka*), white wagtails (*Motacilla alba*), horned larks (*Eremophila alpestris*), Guldenstadt's redstarts (*Phoenicurus erythrogaster*), red-billed choughs (*Pyrhacorax pyrrhacorax*), and Daurian partridges (*Perdix dauurica*). Of the many small mammals and reptiles, volunteers are likely to see Tolai hares (*Lepus tolai*), Pallas' cats (*Felis manul*), red foxes (*Vulpes vulpes*), corsac foxes (*Vulpes corsac*), Mongolian gerbils (*Meriones unguiculatus*), several species of voles, and jerboas, toad-headed agamas (*Phrynocephalus versicolor*), Mongolian Racerunners (*Eremias argus*), Central Asian vipers (*Aqkistrodon halys*), and Pallas' colubers (*Elaphe dione*).

Mongolia is a fascinating country that provides a great cultural experience for those that visit. Mongolia remains largely undeveloped, with very few paved roads (no paved road crosses the country), almost no fences (other than along the railway, the landscape remains wide open), and people outside of cities still live a nomadic existence. The main mode of transportation outside of the capital is horseback. People in the countryside still live in traditional tents (called gers or yurts) and wear traditional clothing. Most Mongolians are Khalkha Mongols, who speak Khalkha Mongolian (or simply Mongolian). Few Mongolians speak English, although the number learning the language grows each year. Mongolia is also one of the world's poorest nations, with average incomes at less than US\$1/day, yet there is little abject poverty. The people are shy, but friendly and extremely hospitable—you can walk into any ger without knocking and the residents will serve you milk-tea and snacks, if not a complete meal!

Mongolia was the world's second communist country, officially becoming a communist nation in 1924. Contrary to what many people believe, Mongolia has remained independent of both Russia and China since before that date. Once the center of the world's largest empire ever (founded by Genghis Khan and ruled by Kublai Khan at its height), the Mongolians are also a fiercely

independent and proud people. Any presumption of inferiority due to their nation's monetary poverty or any other reason, is met with a strong, negative reaction (justifiably!). Prior to becoming communist, Mongolia was an overwhelmingly Buddhist nation. A strong Buddhist tradition of love and respect for nature continues among most Mongolians today. Indeed, the Mongolian constitution guarantees every Mongolian the right to a healthy environment and the government recently adopted a formal goal of protecting 30% of its land base! Although most people remain atheists, since the end of communism many people are re-discovering their Buddhist past. Thus Buddhist traditions from the Yellow Sect (Tibetan Buddhism) predominate. Even the words "Dalai Lama" are from the Mongolian language (meaning: Dalai = great or ocean; Lama = priest) and the name was given to the Dalai Lama by Mongolians centuries ago. Associated with this style of Buddhism and the animist traditions that pre-dated it are a multitude of customs, taboos, and superstitions. Luckily, most people do not get offended if these are violated, especially by foreigners.

The large number of customs, traditions, taboos, etc., create an interesting cultural experience about which many volunteers will undoubtedly want to learn. We hope to provide opportunities by visiting nomadic families and inviting local nomads to visit us (we will also work with local nomads during the summer sheep drives). Mongolians are fond of giving and receiving small gifts. As such, we encourage volunteers to bring small gifts, but also to be aware that expressing too much praise for an item may result in it being presented as a gift (these can be costly items that are difficult to replace). Still, once a gift is offered, it should usually be accepted. This is also true of food and drink, although if someone really does not want to eat or drink, a simple taste (or even fake taste) usually suffices.

Mongolia today is a Parliamentary democracy (they have both a president and a prime minister). Freedom of speech allows people to speak freely and criticize openly. Still, volunteers should be aware that most Mongolians are proud of their country and generally react poorly to excessive criticism of it. They usually frown on people taking photos of the poor, dirty conditions, pollution, etc. In addition, they are mostly shy and often will say little, especially when they are just getting to know someone. Being Asian, losing "face" is a serious issue in Mongolia and volunteers should work to help a Mongolian regain lost respect if they cause a loss of "face." For this reason, criticisms are usually preceded by vast amounts of praise in Mongolia (e.g., You are so wonderful, marvelous, and generous, but . . . !)

Importantly, we try to maintain a dry research camp. Most Mongolian men like to drink, but they are all genetically predisposed to alcoholism. As such, we try to keep drinking to a minimum, although guests occasionally do bring gifts of alcohol. There are several rituals surrounding drinking alcohol in Mongolia that should be followed. Again, we will brief volunteers about these traditions should the need arise.

Overall, the atmosphere in Mongolia is quite relaxed. Indeed, occasionally things are more relaxed than our research team would like! Delays, therefore are common (don't expect the train to be on time!) and should be accepted with a Zen-like attitude! Most people will try to help someone in need of assistance, especially in the countryside and will likely be curious (e.g., what I call the "fish bowl effect" is common in small towns, where local people will surround you and actually press their noses to your windows to look into your vehicle! A simply smile and wave usually brings a smile!).

## 9. TRAVEL PLANNING

### **Visa Information**

Americans do not require visas to visit Mongolia for stays under 90 days. People from the UK, Australia, Japan, and other countries generally require a 30 day tourist visa. If staying for more than 30 days, visitors must register with the Immigration, Naturalization, and Foreign Citizens Agency in Ulaanbaatar during the first week after arrival. Visa acquisition is usually easy and straight-forward. It generally takes 14 days for the Mongolian consulate to issue a visa, but by paying an additional fee, the visa service can be expedited. Passports must be valid for at least 6 months after date of departure from Mongolia.

Citizens of countries other than the U.S. should check with their travel agent or a visa agency for specific visa and entry requirements. A useful website for visa requirements is:

<http://www.embassyworld.com>

Note: Please be aware that if traveling through China or Russia on the way to Mongolia, even if only through airports, visas may be required and should be arranged well in advance of travel.

### **Here are some Frequently Asked Questions about visas:**

#### **What kind of visa do I need?**

Those Earthwatch volunteers who require a visa for entrance, will need a tourist visa. The Principal Investigator/researcher will have the research permit or permission for the project.

#### **How do I obtain a visa?**

You can obtain a tourist visa by contacting the Embassy or Consulate of the country to which you are traveling. If you choose to obtain a tourist visa by directly contacting the country's embassy, please be sure to leave plenty of time, at least 6 weeks. If you have less than 6 weeks or wish to save yourself trouble, we strongly recommend using a visa agency, which can both expedite and simplify the process. The average cost of a visa is approximately US\$40--\$100 but varies country to country and can potentially cost up to US\$180. A visa agency will charge an additional fee (depending on the amount of time it takes to process the application), which you can inquire about directly.

#### **What information do I need to provide?**

You will need to send your passport, an application form, 2 to 4 passport-size photos plus payment to the embassy or visa agency (if applicable) at least 6 weeks in advance of departure. Please be sure that your passport is valid for at least 6 months beyond your stay.

#### **What do I write on the visa application form as the "purpose of my visit?"**

The purpose of your visit is for vacation, holiday, or travel. Foreign immigration officials do not always understand the concept of a "working vacation" or even "volunteering." Words such as "working/volunteering," "research" or a "scientific expedition" can raise questions concerning the country's foreign labor laws and/or prompt questions about official scientific research permits and credentials, etc. to which volunteers on their own will not be equipped to respond.

All required research permits for the project are in place and have been approved by the proper authorities.

**What do I write on the immigration form as the “purpose of my visit?”**

The purpose of your visit is vacation, holiday, or travel.

**What should I write for the place where I will be residing?**

List the address of the hotel or project accommodations where you will be staying.

**Where can I find more information on visas?**

Please see “Helpful Resources” for several web site links related to the visa process.

**Visa Agencies**

**IN THE UNITED STATES**

Passport Visa Express.com  
1911 North Fort Myer Drive, Suite 503  
Arlington, VA 22209  
Tel: 888 596-6028, +1 703 351-0992  
Fax: +1 703 351-0995  
Email: [info@passportvisaexpress.com](mailto:info@passportvisaexpress.com)  
Website: <http://www.passportvisaexpress.com/>

**IN EUROPE**

The Visaservice  
Tel: +44 (0) 20 7833 2709  
Fax: +44 (0) 20 7833 1857  
Website: <http://www.visaservice.co.uk>

Thames Consular Services Ltd  
Tel: +44 (0)20 8995 2492  
Fax: +44 (0)20 8742 1285  
Website: <http://www.visapassport.com>

**Travel Agencies**

The following agency is familiar with Earthwatch projects and can assist you in making travel arrangements and booking hotels:

**FOR US VOLUNTEERS**

Tai Holidays has ample experience arranging flights to Mongolia.

Tai Holidays  
523 West Sixth Street, Suite 369  
Los Angeles, CA 90014, U.S.A.  
Tel: +1 213-688-0073, +800-421-8908 except California

Fax: +1 213-624-1785  
Email: [travelservice@taiholidays.com](mailto:travelservice@taiholidays.com)  
Website: [www.taiholidays.com](http://www.taiholidays.com)  
Ask for Sally.

#### **FOR EUROPEAN VOLUNTEERS**

Wexas International  
London, UK  
Tel: +44 (0) 20 7581 8761  
Fax: +44 (0) 20 7581 7679  
Email: [southern@wexas.com](mailto:southern@wexas.com)  
Quote code: EWE01/02

STA Travel  
Oxford, UK  
Tel: +44 (0) 1865 792800  
Fax: +44 (0) 1865 792911  
Email: [manager.oxford@statravel.co.uk](mailto:manager.oxford@statravel.co.uk)  
Quote code: EWE01/02

For discounted student and youth fares, we recommend the following agencies which specialize in student discounts:

STA Travel  
U.S.: 800 781-4040  
U.K.: +44 (0) 1865 792800  
Website: <http://www.statravel.com>

#### **FOR AUSTRALIAN VOLUNTEERS**

The recommended travel agent is familiar with Earthwatch projects, is in contact with the Australian Earthwatch coordinators and gives a discount where possible to Earthwatch volunteers. She is able to organise travel and travel insurance for volunteers Australia-wide.

Carlene Harlock  
Shop 2, 250 Flinders Street  
Melbourne, Vic 3000  
Tel: +03 9663 6266  
Fax: +03 9663 5100  
Email: [carlene\\_harlock.vic@flightcentre.com](mailto:carlene_harlock.vic@flightcentre.com)

If you notify your Earthwatch Coordinator prior to contacting this travel agent, your rendezvous information will be forwarded.

#### **Cancellation Insurance**

We highly recommend trip cancellation insurance which will help cover your airfare if you are unable to travel, or the expedition is cancelled. Earthwatch does not reimburse airfare or costs associated with cancelled flights. See the enclosed forms.

#### **Other Advice / Information**

*Local Currency:* Mongolian Tugrug

*Electricity:* 220 Volts, 2 prong, European style plugs

*Time Zone:* GMT +8

*Personal Funds:* We recommend that volunteers bring about U.S.\$200-500, depending on whether or not they intend to buy gifts, souvenirs, cashmere, etc. We recommend bringing cash in the newest possible US\$100 bills (they usually bring the highest exchange rate). There are very few ATMs in Mongolia and they rarely function. Visa and MasterCard are increasingly being accepted in restaurants and shops, but the majority of establishments still do not accept either. Travelers' checks are difficult to spend in Mongolia and you will be charged a fee to use them (in addition to the fee you pay to acquire them). If you bring travelers' checks, you will probably have to change them in a bank.

*Additional Information:* The best place to change money is in a money exchange shop in Ulaanbaatar, as they have the best rates. We will take volunteers to such a location upon arrival. Mongolians generally do not tip. If service is good, you might want to leave 500 or 1,000 tugrugs, but generally no more. In Ulaanbaatar, any car will serve as a taxi, but be careful, as theft is on the increase. To be safe, we recommend only official taxis. You can call a taxi to pick you up or hail one by extending your arm and pointing your finger toward the ground. If you get a normal car and decide to take it, the rate is 250 tugrugs/km. Very few, if any of the taxi drivers speak any English. You can direct the taxi using these simple phrases: Chig-ar-ray = straight; Zuun Gar Teesh = left turn; Ba-ruun Gar Teesh = right turn, and Zoks = stop. Crime, especially theft, is on the increase in Ulaanbaatar, so guard against pick-pockets and people who might cut your bags to get at items inside. Try to never walk around alone, especially after dark.

### **Volunteers Under 18 Years of Age**

In an effort to prevent international child abduction, many governments have initiated procedures at entry/exit points. These often include requiring documentary evidence of relationship and permission for the child's travel from the parent(s) or legal guardian if not present. Having such documentation on hand, even if not required, may facilitate entry/departure.

In addition, airlines may also have documentation requirements for unaccompanied minors. Parents of minors are responsible for checking with each airline that their child will utilize to insure sufficient documentation. This could include a copy of a birth certificate or a notarized letter stating that the minor has his or her parent's permission to travel alone.

## **10. ITINERARY**

Volunteers will have free time in Ulaanbaatar at the beginning and end of their stay in Mongolia. There will also be a short amount of free time while in the field. When in the field, there is no transportation available from the field site, so that time will likely be spent hiking or relaxing around camp. During their stay in Ulaanbaatar, volunteers may wish to visit museums or other cultural attractions. Volunteers will be expected to pay their own costs for these events (museums are usually no more than a couple of US dollars, while cultural events may be as high as US\$20).

**All Teams:**

- Day 1: Rendezvous at the airport, settle into hotel, optional cultural activities, group dinner. The time after hotel check-in represents free time!
- Day 2: Train ride to Shivii-Gobi (~7½ hours) and drive to field site (~1 hour), settle in.
- Day 3: Half day orientation and get acquainted with the field site.

**Team I (August 30 – September 13, 2004):**

- Day 3: Second half of day collecting radio tracking, dietary, and vulture nesting data.
- Days 4-5: Collecting radio tracking, dietary, and vulture nesting data.
- Day 6: Morning radio tracking animals, afternoon and evening traditional Mongolian BBQ. The BBQ is not required and this afternoon serves as free time for volunteers.
- Day 7: Setting up drive nets and drive netting argali.
- Days 8-9: Drive netting argali, optional: collect radio tracking, dietary, and vulture nesting data.
- Day 10: Half day taking down drive nets, optional: collect radio tracking and vulture nesting data.

**Team II (September 16 – 30, 2004):**

- Day 3: Second half of day setting up drive nets.
- Days 4-6: Drive netting argali, optional: collect radio tracking, dietary, and vulture nesting data.
- Day 7: Morning taking down nets, afternoon and evening traditional Mongolian BBQ. The BBQ is not required and this afternoon serves as free time for volunteers.
- Days 8-9: Collecting radio tracking, dietary, and vulture nesting data.
- Day 10: Half day collecting radio tracking, dietary, and vulture nesting data.

**Teams III (April 1 – 15, 2004) and IV (April 19 – May 3, 2004):**

- Day 3: Second half of day radio tracking animals, searching for lambs.
- Days 4-6: Searching for lambs, collecting radio tracking, dietary, and vulture nesting data.
- Day 7: Afternoon and evening traditional Mongolian BBQ. The BBQ is not required and this afternoon serves as free time for volunteers.

- Days 8-9: Searching for lambs, collecting radio tracking, dietary, and vulture nesting data.
- Day 10: Half day searching for lambs, collecting radio tracking, dietary, and vulture nesting data.

**All Teams: Pack in afternoon, leave for Shivii-Gobi in evening to catch overnight train to Ulaanbaatar**

- Day 11: Arrive and settle into hotel, optional cultural activities, group dinner. The day and evening after hotel check-in represent free time to explore UB!
- Day 12: Breakfast and departure to airport to catch flight home.

Volunteers should consult a travel guidebook for information on local attractions. See "Helpful Resources."

## 11. DAILY SCHEDULE

Volunteers should be aware that schedules can and do fluctuate. Weather and work conditions can affect the daily schedule. Should this situation arise, your cooperation and understanding are appreciated.

All times approximate:

7:00 am	Rise
7:00-7:30 am	Breakfast and wash-up
7:30-8:00 am	Collect gear, break into teams, and receive quick briefing on the day's tasks.
8:00 - 10:00 am	Field Work
10:00 - 10:30 am	Break and snack
10:30 am - 1:00 pm	Field Work
1:00 pm - 2:00 pm	Break and Lunch
2:00 - 3:30 pm	Field Work
3:30 - 4:00 pm	Break and snack (occasionally this break is longer and will occur at camp to let people shower during the heat of the day).
4:00 - 6:00 pm	Field Work
6:00 - 7:00 pm	Wash-up, prepare dinner, data reduction
7:00 - 7:45 pm	Dinner



7:45 – 8:30 pm	Data reduction (if necessary), cleaning dishes, and additional wash-up
8:30 pm – 11:00 pm	Free Time
11:00 pm – 7:00 am	Quiet Time

## 12. TEAM DEVELOPMENT

There is generally a strong *esprit de corps* among team members. The Mongolians demand that team photos are taken each time a new team works in the study area. We will encourage such activities and try to develop camaraderie by sharing almost all tasks including cooking (although we will hire a cook), cleaning, and getting water, rotating groups of people that work as small field teams for data collection, eating our meals as group, holding periodic Mongolian bar-be-queues, and more. In the evening there is usually a game of Mongolian cards that can get quite spirited! We also periodically visit local herders and often have local herders stop by to visit us (this is very common among the nomadic herders in Mongolia and requires no advanced warning – you, or they, just show up!). Mongolians also love to sing and will often break out in song, requesting their guest to sing for them as well! Finally, Mongolians tend to be very generous and will often share gifts with visitors. As such, it is a good idea for volunteers to bring small gifts as well (something that represents themselves or where they are from is most appreciated, such as pins or calendars). I try to give gifts even when I receive none (remember, this is one of the poorest nations on Earth, but also a very proud nation). There are a large number of rituals and taboos associated with nomadic living in Mongolia that our Mongolian hosts will strive to educate the volunteers about. It is O.K. to make mistakes, but the Mongolians really appreciate visitors who strive to learn and use their customs. We will provide brief training and educational material to assist with this process.

## 13. ACCOMMODATIONS

Accommodations consist primarily of camping in tents or traditional Mongolian gers (also known as yurts). There is a fresh water spring that emanates near camp and runs year-round as a stream that is variously above and below ground. We currently have 2 gers at our research camp and hope to acquire a third using support from Earthwatch (note: we like to reserve one ger for office and kitchen use). Each ger can comfortably accommodate about 6-8 people. More privacy is available through the use of camp tents that sleep 2-3 people comfortably. For more privacy, couples can move further from the main camp area with a camp tent. Volunteers should bring sleeping bags; lighter summer bags for the summer teams (Teams I & II) and winter bags for the spring teams (Teams III & IV), sleep pads, and towels. We have simple sun showers that should enable volunteers to shower every other day or so (volunteers may wish to bring additional sun showers), weather providing (it is usually sunny, but can be cool at times). We have limited electricity provided by solar panels, but much of this energy is required to re-charge equipment. Thus, volunteers may bring electronic equipment, but other than items used for the project, they will unlikely be able to use the solar power to recharge their items. Still, there will be lights in the gers for reading, etc. We have no refrigeration. We currently have a double stall outhouse and

hope to construct one more this year. Otherwise, volunteers will be following the traditional nomadic custom of using the great outdoors!

## 14. FOOD

Volunteers will likely not assist in shopping, but will be expected to assist in preparing meals (although we will hire a cook) and cleaning up after eating, as are all members of the research team. Meals are generally prepared and eaten together. These are the times for camaraderie and to distill lessons learned and information gleaned.

We will endeavor to hold one ceremonial Mongolian bar-be-queue for each team. This is actually not a BBQ at all, but entails the ceremonial killing of a goat (sometimes a sheep) – note, volunteers obviously do not have to watch or participate, and heating up hot rocks. The rocks and meat are placed in a kind of pressure cooker. The meat is consumed off the bone and the rocks are supposedly great for your health and should be handled while still hot! The offal is cleaned and boiled for an added treat for those that dare! Volunteers might want to bring protein bars or some other favorite snack food for the field.

Here is a sampling of the foods you might expect in the field. Please bear in mind that variety depends on availability. This list is intended to provide a general idea of food types. It is very important that volunteers be flexible.

- Breakfast: Mongolians generally eat leftover dinner for breakfast, but the foreign contingent usually consumes oatmeal, cereal, yoghurt, or rolls and jam, as well as juice, coffee (cowboy style!), and tea.
- Lunch: We usually eat lunch and snacks in the field. Lunch usually consists of peanut butter and jelly, tuna fish, cheese, or salami with bread.
- Dinner: Dinner is the main meal of the day and usually eaten as a group (even if some team members are late in returning!). It is usually some kind of mixed vegetable and meat stew, although a vegetarian option is possible (we have managed vegan meals as well). Often more traditional Mongolian meals are cooked. These usually emphasize meat and fat (!), and contain little vegetables.
- Snacks/Other: Chocolate, cookies, and traditional Mongolian baked goods comprise the snacks.
- Beverages: We maintain a dry camp (no alcohol), as Mongolians are highly susceptible to alcoholism (much like Native Americans). However, we occasionally have the opportunity to imbibe airag (fermented mare's milk). This drink is only mildly alcoholic (less than beer) and is often used ceremonially (caution, it often causes the diarrhea, especially in first time consumers!).

### Special Dietary Requirements

Note: Please alert your Earthwatch Expedition Coordinator to any special dietary requirements as soon as possible (e.g., diabetic, lactose intolerant, etc.). Accommodating any special diets is not guaranteed and can be very difficult due to availability, location and local conditions.

Special note to vegans and strict vegetarians: Please be aware that it is often difficult to accommodate strict vegetarians and vegans. It is possible to get meatless meals, but vegans and strict vegetarians may have a problem avoiding animal products altogether. If this poses a problem, then participation on an Earthwatch expedition should be seriously reconsidered.

## 15. PHYSICAL CONDITIONING

*Please show this section to your physician when he/she is completing your health statement.*

### **To the examining physician:**

Your patient has volunteered to join the field research team which has specific physical demands of which you and your patient should be aware. **We need your accurate evaluation of your patient's ability to meet the conditions detailed below in order to safeguard his/her health and safety, and ensure that s/he can participate fully and effectively.**

### **Overview**

#### **General Conditions**

Humidity	low		
Temperature Range	Aug/Sep (summer)	Lows from 40s-60s°F (5-20°C)	Highs from 60s-80s°F (15-30°C)
	Apr/May (spring)	Lows from 30s-50s°F (0-15°C)	Highs from 40s-60s°F (5-20°C)
Altitude	~1,200 m / ~4,000 ft		
Rainfall	Precipitation is low and seasonal, with most precipitation falling in the summer.		

### **Climate and terrain of the research site**

Temperatures range considerably, even from day to day, with dry, windy springs (to 25 mps or ~55 mph), and relatively wet, hot summers.

Ikh Nartiin Chuluu Nature Reserve (Ikh Nart) was established in 1996 to protect 43,740 ha (108,080 ac) of rocky outcrops in northwestern Dornogobi Aimag (Myagmarsuren 2000). The region is a high upland covered by semi-arid steppe vegetation. Permanent cold-water springs are available in some of the several, shallow valleys draining the reserve.

### **Physical Demands**

Tasks required of volunteers require a basic level of physical fitness. To a certain extent we can accommodate volunteers of varying strength and endurance. All volunteers should be willing and able to walk several miles (2-4) each day with a light day pack that carries water, food, and basic field gear (binoculars, radio collars or antennas, scales, etc.). Packs will remain relatively light (< 10 pounds and usually < 5 pounds). Because of the diversity of activities and the number of animals we have collared, some volunteers will be able to put in relatively light days (only 2-3 miles of hiking), while others will be requested to walk substantially further (10-15+ miles). No volunteer will be asked to exert more than they are comfortable doing and all teams will have radios in case a volunteer becomes tired and requires or would like a ride back to camp. Restraining argali requires a moderate degree of strength, but since a researcher should always be the first person to restrain an adult animal, because we will usually not have volunteers restraining animals, and because we will have several people per animals, the level of effort required should not be great. In all cases, a researcher will direct volunteers in assisting with animal handling.

	<b>Workload/Intensity</b>	<b>Time</b>
Sitting		
Bending		
Walking/hiking	2-15 miles	per day
Carrying	packs will remain relatively light (< 10 pounds and usually < 5 pounds).	while walking/hiking

### **Medical Conditions of Special Concern**

- Allergies to grassland pollens or dust (especially in spring) would likely make working conditions uncomfortable without appropriate medication.
- Sensitivity to direct sunlight and/or dry conditions. Volunteers may spend most of the day working in direct sun. Even when temperatures are cool, high SPF sunscreen should be applied and protective clothing worn.
- Any condition which would require immediate attention or specialized care, as medical facilities in Mongolia are quite limited and the research site is relatively remote.

### **Potential Hazards**

There is only one venomous animal, a small viper, in the study site. Otherwise the working environment is relatively safe. Volunteers should be wary of all domestic dogs, although most are successfully scared away by simply bending over to pick up a rock without even throwing it! Some volunteers might find the relative isolation uncomfortable (we will likely have very limited communication with the outside world (just a satellite telephone that we will turn on every night for 1 hour to receive calls from 8:00 – 9:00 pm).

Diseases occurring in Mongolia include rabies, tuberculosis, HIV/AIDS and hepatitis, with occasional outbreaks of Foot and Mouth disease, meningitis, and isolated cases of bubonic plague associated with marmots.

Respiratory Syndrome (SARS). SARS is a respiratory disease caused by a coronavirus, which can be spread through close contact from person to person. It has been well contained since the

original outbreak, which spread from China, Mongolia, and SE Asia, and to North America and other areas as well. Only a few cases have been reported in 2004 to date, none in Mongolia. There are no travel advisories regarding SARS at this time. Volunteers should be aware that some countries may conduct SARS screening at their airports in which passengers are checked for SARS symptoms including coughing and high fever.

There have been cases of avian influenza reported in Mongolia in 2004. Avian influenza (also known as bird flu) is a widespread infectious disease, previously found in birds and pigs. It has recently spread to humans via direct contact with bird fecal matter. There have been no cases to date in which the disease has been transmitted from human to human, making the risk of contracting avian flu extremely low for tourists and travelers. It is safe to eat cooked chicken and eggs. To contain the disease and prevent further outbreaks, many chickens have been culled in affected countries, including Mongolia. Travelers are cautioned to avoid poultry farms, contact with animal fecal matter, and animals at live food markets.

There are few paved roads outside of Ulaanbaatar and urban and rural roads are not usually well-maintained. Fast driving, lack of safety standards, and traffic controls are not uncommon.

There are ticks in the research area which may transmit tick fever disease, similar to Lyme disease. They are more prevalent during wet seasons. They are relatively large and easy to spot.

### **Proximity to Medical Care**

Is there a physician, nurse, or EMT on staff?

No, but we will have a veterinarian on hand for part of the time.

Staff certified in CPR (Cardiopulmonary Resuscitation), First Aid, or other safety training (i.e. Wilderness First Responder, Water Safety, etc.)?

R. Reading has undertaken several CPR and First Aid training course, but the certifications are currently lapsed.

What is nearest hospital location?

Several hospitals in Ulaanbaatar, depending on the type of injury. There is also a clinic 1 hour away staffed by a trained nurse.

Time to reach?

6-7 hours by vehicle on 2 track dirt roads.

## **16. MEDICAL ADVICE**

### **Inoculations**

The following are recommendations only. Health conditions around the world are constantly changing, so keep informed and consult your local travel health clinic, the U. S. Center for Disease Control ([www.cdc.gov](http://www.cdc.gov)) or the World Health Organization ([www.who.org](http://www.who.org)) websites. Medical decisions are the responsibility of each volunteer. Please consult your physician, your local Public Health Department, or the resources listed below for the latest health information for travelers.

	Required for Entry	Recommended for Health Reasons
<b>Tetanus</b>		<b>X (up to date)</b>
<b>Diphtheria</b>		<b>X</b>
<b>Yellow Fever</b>	<b>X - if traveling from countries or region where it is endemic, a Certificate of Vaccination is required.</b>	
<b>Hepatitis A</b>		<b>X</b>
<b>Cholera*</b>		
<b>Measles</b>		<b>X</b>

Is Malaria present at the research site? No

\* Cholera may be present in the research area. In 1973 the WHO, recognizing that immunization cannot stop the spread of cholera among countries, deleted from the International Health Regulations the requirement of cholera immunization as a condition of admission to any country. In 1990 the WHO stated that immunization against cholera was not effective and they do not recommend it. In 1991 the WHO confirmed that certification was no longer required by any country or territory.

Tuberculosis (TB): The World Health Organization (WHO) estimates that one third of the world's population is infected with the bacterium (*M.tuberculosis*) that causes tuberculosis (TB). Incidence of tuberculosis is higher in developing countries, particularly in Asia, Africa, the Caribbean and Latin America. In general, approximately 10% of persons infected with *M. tuberculosis* are at risk for developing active TB during their lifetimes. TB is considered highly treatable with medications that are of relatively low toxicity and cost. Volunteers returning from developing countries are encouraged to have a (PPD)-tuberculin skin-test to screen for potential infection.

These recommendations are for this project site only. Please consult your physician for guidance on inoculations if you intend to travel to other parts of the country.

### Resources

Earthwatch recommends that you consult your local public health department or one of the following resources for the latest health information for travelers.

#### US ONLY

Centers for Disease Control  
Atlanta, GA, U.S.A.  
Phone: 800 311-3435 or 888 232-3228  
Website: <http://www.cdc.gov>

#### UK ONLY

Hospital for Tropical Diseases Healthline  
Phone: 0906 1 337733 (within UK)  
(calls are charged at 50p per minute)

MASTA Travelers' Healthline  
Phone: 0906 8 224100 (within UK)

#### **AUSTRALIA ONLY**

The Travel Doctor – clinics Australia wide  
Travel Doctor Hotline: 1300 658 844 (within AU)  
Website: <http://www.tmvc.com.au>

#### **GENERAL INFORMATION**

Disease Outbreaks:  
<http://www.who.int/disease-outbreak-news/>  
or  
<http://www.istm.org/news.html>

## **17. EMERGENCIES IN THE FIELD**

We have yet to experience a medical emergency. Our actions would obviously depend on the scope of the emergency. For life threatening emergencies, we would use the satellite phone to call the Central Mongolian Airlines and contract a helicopter to retrieve the sick or injured person and transport them to Ulaanbaatar. We would use Medivac to evacuate such a person to the nearest and best hospital outside of Mongolia (likely either Seoul, Beijing, Tokyo, or Hong Kong, depending on the nature of the illness/injury). In the case of less threatening emergencies we could still fly people to Ulaanbaatar, drive them in one of our vehicles (we will always have 1, and usually 2 vehicles available), or put them on a train with one of the PIs to Ulaanbaatar to be treated at the appropriate hospital (many of the hospitals specialize). For more minor emergencies we will treat the person in camp or at the health clinic in Shivii-Gobi (about 1 hour away by car). In all cases, we will treat the person to the extent possible in the field with our first aid supplies.

**Emergency contact number at Earthwatch headquarters in the U.S.: +1 978 461-0081.**

After business hours, leave your message with our answering service. State that you have an emergency communication and leave a clear message with the name of the expedition, your name, location you are calling from, and if possible, a phone number where you can be reached. An Earthwatch staff person will be paged and will respond to your call.

#### **International Evacuation Insurance**

##### **UNITED STATES OFFICE:**

The travel medical and evacuation insurance, coordinated by ISIS Assistance, is mandatory for all Earthwatch volunteers while they are on an Earthwatch expedition anywhere in the world. The insurance covers volunteer travel medical risk, including medical expenses and medical

evacuation, while you are traveling with Earthwatch overseas or on an expedition within your home country. ISIS Assistance will also facilitate evacuation from the project site in the event of an emergency. Without insurance, the costs of such measures can be on the order of US\$20,000 to \$50,000.

A detailed description of the Earthwatch Volunteer Travel Medical Insurance Program policy will be sent with this briefing. The policy is summarized in a user-friendly questions answer format. Please contact your Expedition Coordinator if you have further questions.

Earthwatch Institute's insurance provider, ISIS Assistance, provides a 24-hour emergency hotline for the use of insured persons under the Earthwatch program. ISIS Assistance can help with medical emergencies, doctor and hospital selection, obtaining additional medical options, or medical translation problems. ISIS Assistance is backed by International SOS and Global Medical Management, who provide emergency medical evacuation and rescue services. The Earthwatch policy certificate number is US 011300. In addition, each individual policy is identified by the volunteer's Earthwatch ID number, shown above your name on your team list.

In an emergency - If you are calling from **outside of the US**, the number to call is: +44 (20) 8762 8015. You may call this number collect.

In an emergency - If you are calling from **inside the US**, the toll-free number to call is: 888 422-4747.

Basic coverage is valid in the country of your Earthwatch expedition, and during international travel to and from your expedition. For volunteers on Earthwatch expeditions in their own country, coverage begins when your group forms for the expedition, and ends when the group disbands. Options are available for volunteers who would like to extend the period of coverage, increase insurance amounts or purchase additional cancellation or baggage insurance.

#### **EUROPEAN OFFICE:**

Earthwatch Europe offers travel and medical insurance provided by Royal & SunAlliance. In the event of medical assistance or an evacuation being necessary, ISIS Assistance will be notified. ISIS Assistance will coordinate the evacuation in conjunction with International SOS.

#### **FOR ALL OTHER VOLUNTEERS:**

In addition, our affiliate offices in the Australia and Japan have recommendations for their volunteers. Please contact your nearest Earthwatch office for more information. You may also try the following website which lists several travel insurance providers. Click on the "Travel Insurance" link, which is located on the right in a box called "Healthy Travel Store" (just under the Visa sign). Website: <http://www.travelhealth.com/home/>

## **18. WHAT TO BRING**

Note: Do not bring more luggage than you can carry and handle on your own. We recommend that you pack a carry-on bag with an extra set of field clothing and personal essentials in the event that your luggage is lost and/or takes several days to catch up with you.

Duffle bag style luggage is preferred. Please try to limit your baggage to 70 lbs (32 kg) total.



## **Cultural Considerations**

Please see section 8 'Research Area'.

### **Extreme weather**

Spring: It can be quite cold (can drop into the 20s°F or -5°C). We have even had snow. There can also be strong winds and dust storms

Summer: We can get severe thunder storms, occasionally with hail.

Temperatures may vary greatly at any time of year. Volunteers should pack accordingly, bringing clothing that can be layered. Cold weather could occur on any team.

### **Required**

#### Clothing/Footwear for Fieldwork

- Quick drying, long-sleeved shirts and trousers
- Hat (broad brim is best)
- Sturdy hiking boots
- Rain gear (windproof jacket for spring)
- Sweater/jumper (all teams)
- Cold weather gear – warm jacket, gloves, hat (spring only)

#### Clothing/Footwear for Leisure

- One set of clothing to keep clean for end of expedition

#### Field Supplies

- Daypack/rucksack
- Drybag or plastic sealable baggies (good for protecting equipment such as camera from dust, humidity, and water)
- Insect repellent
- Water bottles (minimum 2, 1-liter bottles)
- Duffle bag luggage

#### Bedding and Bathing

- Sleeping bag
- Sleeping pad
- Pillow (a rolled-up sweater/jumper may suffice and saves on space)
- Towel

### Personal Supplies

- Personal toiletries (we recommend bringing biodegradable soaps and shampoos)
- Roll of toilet paper (optional: if you want soft tissue, as Mongolian TP can be rough!)
- Antibacterial wipes or lotion (good for “washing” hands while in the field)
- Personal first aid kit (anti-diarrhea pills, antibiotics, antiseptic, itch-relief, pain reliever, bandages, moleskin, etc.) and personal medications
- Sunscreen lotion with SPF 30 or higher
- Sunglasses (optional)

### Miscellaneous

- Spending money, we recommend bringing cash (see above), but money is not needed while in the field, only for Ulaanbaatar.
- Camera, film, extra camera battery
- Binoculars

### **Optional**

- Flashlight/torch or headlamp with extra batteries and extra bulb
- Comfortable footwear for camp
- Reading material
- Work gloves
- Camp chair
- Playing cards
- Small gifts for Mongolians
- Insulated cup
- Spotting scope
- Daily journal
- Sun showers
- Global Positioning System (GPS)
- Compass

## 19. HELPFUL RESOURCES

- Useful Visa Information website: <http://www.embassyworld.com>
- Airport Codes Worldwide: <http://www.logisticsworld.com/airports.asp>
- Lonely Planet travel guidebooks and online travel site: <http://www.lonelyplanet.com>. Their guidebooks can be purchased from their website.
- The Rough Guide travel guidebooks and online travel site: <http://travel.roughguides.com/>
- Cheap Flights: <http://www.travelix.com/> or <http://www.discountair.com/> (worldwide)
- Country Reports. Country information from around the world. Website: <http://www.countryreports.org>
- National Geographic Map Machine. Website: <http://plasma.nationalgeographic.com/mapmachine>
- U.S. Travel Clinic Directory: <http://www.astmh.org/scripts/clinindex.asp>
- Travel Health website: <http://www.mdtravelhealth.com> is a resource for healthy travel. Covers country-specific risks and diseases, suggested immunizations, and health recommendation, and locating a travel clinic near you.
- U.S. State Department: <http://www.state.gov/>
- UK Foreign Office travel advice: <http://www.fco.gov.uk/travel>
- World Time Server: <http://www.worldtimeserver.com/> [time worldwide with GMT/UTC] or <http://worldbuddy.com/> or <http://www.hilink.com.au/times/>
- Currency Converter: <http://www.xe.com/ucc/>
- Telephone Dialing From and To Anywhere: <http://kropla.com/dialcode.htm>
- Online Unit Conversions: <http://www.onlineconversion.com/>
- Worldwide Weather: <http://www.worldweather.com/> or <http://www.wunderground.com>
- ATM Locator:  
[http://visaatm.infonow.net/bin/findNow?CLIENT\\_ID=VISA](http://visaatm.infonow.net/bin/findNow?CLIENT_ID=VISA)  
<http://www.mastercard.com/atmlocator/index.jsp>
- Heat Index (temperature, dewpoint and relative humidity): <http://www.weatherimages.org/data/heatindex.html>
- Exhaustive List of Weather Resources: <http://cirrus.sprl.umich.edu/wxnet/servers.html>
- Third World Traveler – offers many links for useful travel information: [http://www.thirdworldtraveler.com/Travel/Travel\\_Links.html](http://www.thirdworldtraveler.com/Travel/Travel_Links.html)

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