

Tibet Wild

*A Naturalist's Journeys
on the Roof of the World*



GEORGE B. SCHALLER

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For my companions on these many journeys into the wild

This center of heaven

This core of the earth

This heart of the world

Fenced round with snow

The headland of all rivers

Where the mountains are high

And the land is pure

— Tibetan poem, eighth–ninth century

Whatever happiness is in the world has arisen from a wish for the welfare of other beings.

Whatever misery there is has arisen from indulging in selfishness.

— Buddhist precept

The World is sacred,

It can't be improved.

If you tamper with it,

You will ruin it.

If you treat it like an object,

You will lose it.

— Laozi, Chinese philosopher, sixth century BCE

I am myself and

What is around me,

And if I do not save it,

It shall not save me.

— José Ortega y Gasset, Spanish philosopher, twenty-first century

The chestnut by the eaves

In magnificent bloom

Passes unnoticed

By man of this world.

— Basho, Japanese poet, seventeenth century

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Introduction

For nearly four decades my wife, Kay, and I have lived on North America's East Coast beside a forest of maple and pine. Our house is a converted barn once used to stall cattle and dry tobacco. One half of the house consists of a huge, high room with the original barn beams still in place. It is our living room and the loft in it is lined with bookshelves crammed with travelogues, memoirs, histories, and expedition accounts about countries in which I have worked. But mainly it is a room of artifacts of casual items acquired for their beauty, interest, or merely because they resonate in our hearts, each a memento of exploration and desire.

Wooden masks from the Congo and Nepal hang on a wall, as does a Masai shield of buffalo hide from Tanzania. A Dayak head-hunting knife from Sarawak is suspended from a beam beside an intricately woven basket from Laos used for collecting edible plants, land crabs, and other items for meal. A shelf holds a stone adze from Brazil, a chunk of dinosaur bone from Mongolia, and a walrus tusk from Alaska with scrimshaw of seals and a polar bear. Against a wall stands a carved wooden chest from Pakistan's Swat Valley. A brass bucket from Afghanistan holds firewood, and there is a lamp with a bronze base from India, and a photograph of Marco Polo sheep that reminds me of my studies in Tajikistan.

Of all the countries in which I've worked, I spent far more years on projects in China than anywhere else. In 1980, I was invited to join a team of Chinese scientists in a four-year study of giant pandas, a venture arranged by World Wildlife Fund. After the conclusion of that project, I began field research on the high Tibetan Plateau of western China, and I continue with it still, drawn to the luminous landscape, the wildlife, and the Tibetan culture. Tibetan rugs cover the floor of our room. A large *thangka*, a scroll painting of Tara, the deity of loving kindness and compassion, covers part of our wall. Seven lacquered *tsampa* bowls, lovely in shape and design, used for storing barley flour, cover one table. On a shelf rests a prayer wheel, a tiny temple bell with crystalline sound, a cup for butter tea, and an incense box with two carved snow lions, their turquoise manes flowing, reminding us of Tibet's snowy mountains. A large black-and-white photograph, taken over a hundred years ago, shows the Potala, the Dalai Lama's former home, on its hill overlooking fields and mountains beyond Lhasa.

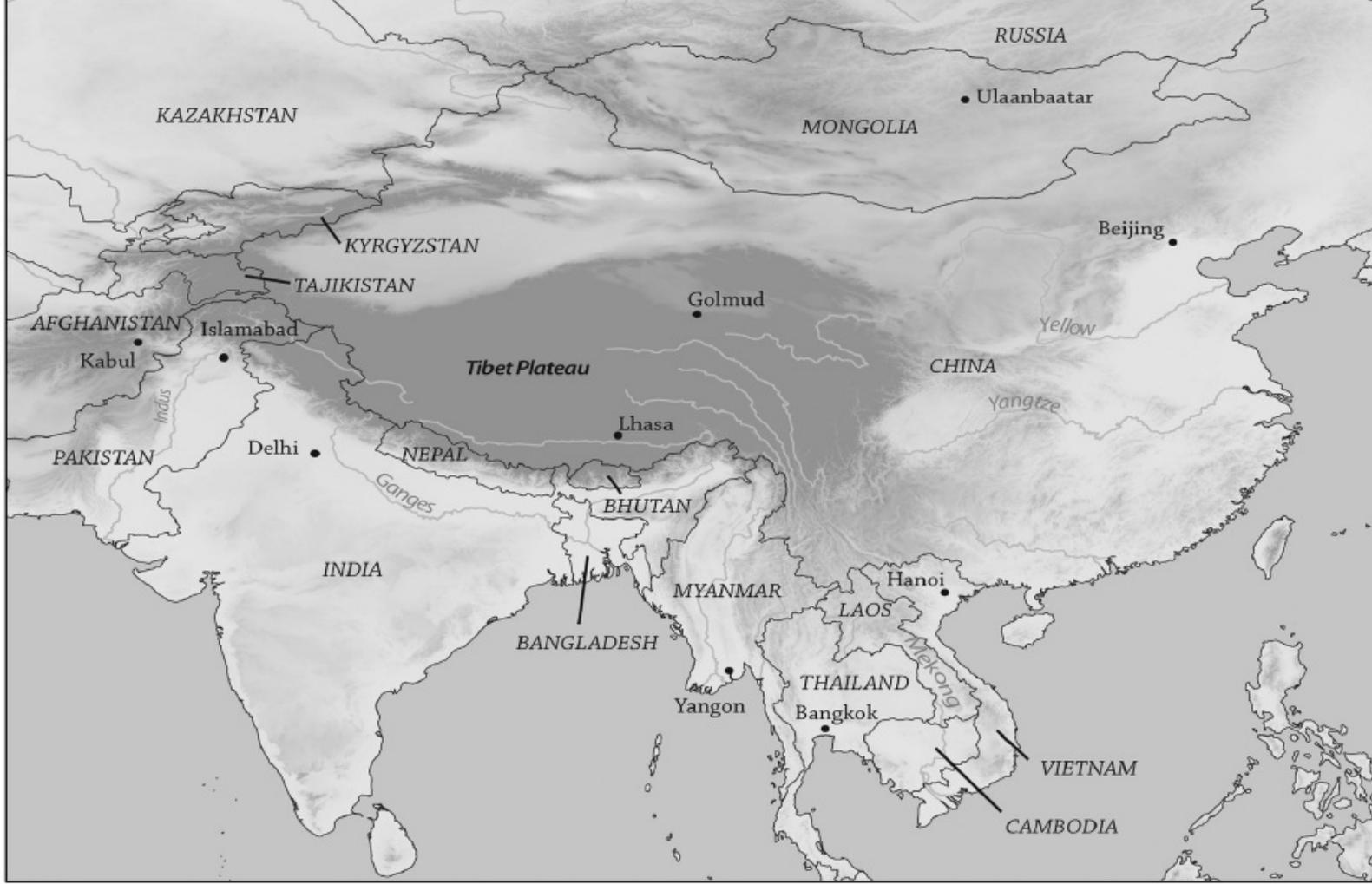
The Tibetan Plateau has infected me, particularly the Chang Tang, the great northern plain. Chang Tang. The name enchants. It conjures a vision of totemic loneliness, of space, silence, and desolation—a place nowhere intimate—yet that is part of its beauty. Even years before my first visit, I had long wanted to explore its secrets and, intrigued by the accounts of early Western travelers, I traced and retraced their journeys with a finger on a map. The Chang Tang was forbidden to foreigners, devoid of roads, and almost uninhabited; its inaccessibility enhanced its allure. In 1984 I finally had the opportunity to penetrate its vastness, an area which covers not just the northern part of the Tibetan Autonomous Region, but also western Qinghai Province, and the southern rim of the Xinjiang Uygur Autonomous Region. By 2011, I had made twenty-six journeys to the Chang Tang for a total of about forty-one months, not counting wildlife surveys I've also made in eastern Tibet and the Pamir Mountains of southwest China.

Though drawn to remote and little-known places by inclination, I also knew that the Chang Tang, northern Tibet and other parts of the Tibetan Plateau harbored a variety of large mammals, none of them studied, their lives still a mystery. Years of political turmoil had decimated China's wildlife, as I had noted during the panda study, and I wondered about the current status of various other species. Mainly I wondered how certain species of the Tibetan Plateau had fared. I wanted to delve into the

lives of the Tibetan antelope (or chiru), the Tibetan wild ass (or kiang), the wild yak, and other members of the unique mammal community on these uplands. Initially the State Forestry Administration (called the Ministry of Forestry at the time) in Beijing suggested that I survey the distribution of snow leopard. This I did, but soon my attention shifted to chiru. The species intrigued me with its wanderings, here today and gone tomorrow. To know about the movements of an animal is a first step in protecting it. Little did I realize how many years it would require, at what cost in comfort and funds, and how many miles of uninhabited terrain we would have to traverse to obtain even a general idea of the chiru's migratory patterns.

I approached the project as a scientist, more specifically as a biologist focused on conservation. This involved collecting facts, many of them, because they are the only reliable tool of science, and it is upon facts that conservation must ultimately be based. I do not mistake numbers and measurements and statistical detail for meaning, but I hoped to collect enough scattered facts to discover from them certain patterns and principles which underlie the Chang Tang ecosystem. But nothing remains static, neither a wildlife population nor a culture, and I knew my efforts would represent just a moment in time, a record of something that no one has seen before and never would again. My information offered the landscape an historical baseline, drawn over a three-decade period from which others working in the future can reclaim the past and compare it to their present. Because the Tibetan Plateau is being rapidly affected by climate change, the accumulation of such basic knowledge has now become especially timely and urgent.

To learn as much as possible about chiru became a personal quest, almost an indulgence, and it gave direction and coherence to much of my work on the Tibetan Plateau. To save one of the last great migrations of a hoofed animal in Asia, surpassed in number only by the million Mongolian gazelle on the eastern steppes of Mongolia, is important for itself, as well as to China and the world. And no one else at the time had devoted themselves to the task. By happy coincidence the chiru offered me an opportunity to explore terrain which few had ever seen and at the same time to study a little-known species. I am less a modern field biologist devoted to technology and statistics than a nineteenth-century naturalist who with pencil and paper describes nature in detail, though with little desire to collect specimens, as was then in vogue; instead I strive to observe species and protect them.



The Tibetan Plateau in China and the adjacent countries where our wildlife conservation work was done.

To become familiar with an area that is still healthy, productive, and diverse, one still unspoiled by humankind, has a special appeal. It is not a matter of surveying the last orangutans in Sarawak or searching for saola in Laos, as I have done, but of conserving vigorous populations of all animal and plant species in an ecosystem. Conservation has in recent decades focused on rain forests with their great diversity of species, whereas attention to rangelands, which cover 40 percent of the earth's land surface, has languished. Yet rangelands too display biological treasures in beauty, variety, and uniqueness. The Serengeti savanna or Mongolian steppe offers an unsurpassed sense of place; it invites a feeling of empathy for the landscape, including the pastoral cultures of the people who dwell there. Here in the Chang Tang was a neglected area of over 300,000 square miles, a third of the land area of the United States, uninhabited, an area twice the size of California, or the size of France and Italy combined. Here one could address the conflicting demands of conservation, development, and the livelihood of its pastoral people, and here conservation would not need to be confined to a protected area of modest size but could involve a vast landscape, one larger than many countries. Good management options persisted, and solutions to problems could be applied based on solid science, sound policy, and local support, drawing on the knowledge, interests, and participation of the area's communities.

Changes in the Chang Tang, already under way in the 1980s when I first visited, have been accelerating with more roads, more households, more livestock, and more fences, which, together with new land-use policies, have had a major impact on the land and its wildlife. As economic conditions have improved, most families have settled into permanent houses instead of nomadic tents, and have exchanged horses for motorcycles. Livestock is often kept in fenced private plots instead of herded

communal pastures, leading to overgrazing and hindering the movement of wildlife. The conservation goal now, as before, is to manage the rangelands, livestock, and wildlife in dynamic stability, to maintain ecological wholeness. Changes over recent decades have made this more difficult. Modern perceptions and actions have had to change as well. As the human population grows there and elsewhere, one has to confront the necessity of limits, of regulating the use of the landscape. Some parts should be wholly protected, closed to human intrusion, where plants and animals can seek their destiny. Much of the northern Chang Tang is such a place, one still mostly devoid of people, and it requires such full protection. Other parts need to be managed in cooperation with the local communities, limiting livestock to sustainable numbers, managing wildlife to reduce conflict, strictly regulating development, and the like. When I now return to the Chang Tang, I can still see the past in the present because relatively little land has so far been degraded by human action. My mission, indeed my passion, is to help the Chang Tang endure for decades and centuries to come in all its variety and beauty through careful, intelligent management.

My dream is that communities will learn to treasure and manage their environment for no reason other than to keep it healthy and beautiful. How can I graft my knowledge and feelings onto the beliefs, emotions, and traditions of others? As His Holiness the Dalai Lama said: "Ultimately, the decision to save the environment must come from the human heart." The Buddhist religion stresses love and compassion toward all living beings, and this predisposes its followers to be receptive to an environmental message, more there than elsewhere. Humans seem to have a kind of mental glaucoma as they obsessively destroy nature, tearing it apart, even while seeing the ever-increasing damage that threatens their future. Conservation remains an ideological and psychological minefield through which everyone who hopes to preserve something must blunder. Nevertheless I see progress on the Tibetan Plateau and keep a positive spirit.

Conservation is a long journey, not a destination, something to which my years in and around the Chang Tang can attest. Chinese expeditions had done important initial work by making lists of species and plotting their distribution, but my Han Chinese and Tibetan coworkers and I came with a different agenda. We came not just to learn but also to inform and inspire, to reveal the richness of the Chang Tang and other places in this region of the world. We became witnesses who tried to alert those around us to what was being lost. We promoted the establishment of nature reserves, more accurately termed conservation areas because pastoralists with their livestock live in most of them. Much of the Chang Tang area is now officially protected in such nature reserves, a glowing achievement for China. We alerted the government to the mass slaughter of chiru for their fine wool in 1990, and this has led to much better protection of the species. Above all, the environment of the Tibetan Plateau has become a major concern of the government at all levels, of nongovernmental organizations, and of many communities. I had only a small part in this, but I have been an admiring observer, and have remained active in further conservation efforts there.

"But what has been has been, and I have had my hour," wrote the seventeenth-century poet John Dryden. Indeed I have. But I hate to acknowledge this. I cannot resist returning to the solitude of the vast uplands. With each expedition, I slough off my past like a snake skin and live in a new moment. Marooned in mind and spirit, I have no idea when my work there will end; I continue to plan new projects. But like all good ventures it will end someday without heroics.

In recent years, I have neglected to publish much on our work. There have been occasional scientific papers and popular articles, mostly in Chinese publications such as *Acta Zoologica Sinica* and *China's Tibet*. My two most recent books are the popular *Tibet's Hidden Wilderness* (1997) and the scientific *Wildlife of the Tibetan Steppe* (1998), both also available in Chinese translation. But so much has been learned since then. I have made annual trips to China, to the Chang Tang, to southeast

Tibet, and to the Pamir mountains of western China and adjoining countries.

This book, built on these explorations, is part observation and part evocation. Eight of the fourteen chapters deal with the Chang Tang, a number of them devoted primarily to chiru. By the mid-1990s when I wrote my previous books, I had failed to find any calving grounds of the migratory chiru populations, a principal goal and a critical one in their conservation. Ultimately we reached two of them, and the travails of travel and the exultation of finding the newborns deserve accounts. In the chapters, I have tried to bring out not just the discoveries and excitements of fieldwork, but also what happens in the day-to-day course of our work. I thus emphasize some of the difficulties, of vehicles bogging down in July mud time after time and digging them out at 16,000 feet, of snowstorms in the summer, of winter temperatures in a frost-encrusted tent at -30°F , and the daily tedium of moving camp for weeks on end. I could only view my Tibetan, Han, and Uygur companions on the various journeys with respect for their fortitude and dedication under such conditions.

A struggle for conservation all too often confronts greed, and so it was with the chiru, whose fine wool, when woven into shahtoosh shawls, had by the late 1980s become a fashion statement of the world's wealthy. The slaughter of this species and its consequent decline, the developing effort to protect it, and its subsequent slow recovery, is a tale of desecration and redemption. My chapter on this shows how a species' circumstances can almost overnight change from seeming security to being threatened with extinction. It is a lesson that nothing is ever safe, that if a country treasures something it must monitor and guard it continually.

Of the 150 or so mammal species on the Tibetan Plateau, I studied the chiru in greatest detail. I had also wanted to make more observations on the rare wild yak, the ancestor of the abundant domestic yak; to me the presence of wild yaks sanctifies the Chang Tang as wilderness. But chiru drove me either to places where yaks have been exterminated or to habitat unfavorable to them. I have, however, written here about three other species of the Chang Tang. The small and endearing pika, whose presence is so vital to the ecosystem yet is being widely poisoned, is the subject of one chapter. Another is on the powerful and uncommon Tibetan brown bear, which has come into increasing conflict with humans. And a third chapter is on the snow leopard, ever present but seldom revealing itself, whose enigmatic presence has haunted me over the decades.

We have also conducted wildlife surveys in the southeastern part of the Tibetan Plateau. With its maze of forested mountains and the world's deepest canyon, eastern Tibet is wholly different from the Chang Tang, and it fascinated me by its contrasts. There I experienced the close attentions of leeches in the humid warmth and learned about the hidden land of Pemako, sacred in Buddhist geography. We trekked through the region on two lengthy trips to check on the status of wildlife and evaluate it as a possible reserve.

An uncommon animal on the Tibetan Plateau is the Tibetan argali sheep. I saw it seldom and learned little about its life but much about its death. Trophy hunters have an inane desire to kill rams with the longest possible horns, and I tell a story, in which I played but a minor part, of what happened when four American hunters returned home with their trophies: it turns into a cautionary tale, a sordid saga of sloppy science, deception, and political intrigue that damages the credibility of various persons and institutions.

The Tibetan Plateau is often considered the Roof of the World, and the Pamirs to the west are, in effect, its veranda. The precipitous terrain of the Karakoram and Kunlun Mountains between the Tibetan Plateau and the Pamirs has affected the distribution of wildlife. The snow leopard ranges throughout these mountains and Tibetan people once did, too. Kiang, chiru, and Tibetan gazelle failed to reach the Pamirs. Tibetan argali inhabit the Tibetan Plateau, whereas a unique argali subspecies, the Marco Polo sheep, lives in the Pamirs. This magnificent animal, the grandest of all wild sheep, roams

across several international borders. To protect and manage it requires cooperation between Pakistan, Afghanistan, Tajikistan, and China, something best achieved by the creation of a four-country International Peace Park or Trans-Frontier Conservation Area. My efforts to promote this goal after working in each of the four countries, some of them politically volatile, provide me still with some useful lessons, about patience and persistence above all.



For a naturalist there is conflict between a life of comfort, companionship, and security at home, and one of hardship among mountains and plains. Observing undisturbed Marco Polo sheep fills me with delight, and waves of pleasure surge through me. Hearing that a government has protected an area that I had recommended is a balm to the soul, giving meaning to my life. But I renounce so much by seeking wilderness—a settled life, friends, and contact with those I love. There is usually no one other than my wife, Kay, in the field in whom I can truly confide during days of adversity. For years my family was with me in the field: first only Kay in the Congo, then also our two children in India, Tanzania, and Pakistan, and, when these had grown up, only Kay again in China and Mongolia. She was not just my coworker and one who greatly enjoyed camp life, but she also edited my manuscripts (including this one), raised our two sons, of whom I am immensely proud, and contributed innumerable other ways. But Kay did not join me on most of the journeys described in this book except in my heart, because her health did not permit it. I missed having her with me, always helping, encouraging, renewing my excitement in the work, and sharing memories. Love is the only bridge connecting us during lengthy separations. There is the knowledge that my return is awaited, a gift of happiness from someone who is part of myself. We each carry a different burden of hardship when separated. Nevertheless our lives keep going, round and round, together and apart, a mandala of love and compassion.

The various projects described in the chapters that follow have depended on many persons and institutions for support since the mid-1990s, and with deepest gratitude I acknowledge their generous assistance. Most are in China, the focus of this book, and I owe that nation an immense debt for hosting me so generously over the years. I particularly would like to mention the splendid cooperation of director Abu and Drolma Yangzom in the Forestry Department, Tibet Autonomous Region; of director Li Sandan and Zhang Li¹ in the Forestry Department, Qinghai Province; and of director Zhen Fude and Shi Jun of the Forestry Department, Xinjiang Uygur Autonomous Region. I also refer to my work in a number of other countries, particularly those bordering China, among them Afghanistan, Tajikistan, India, Bhutan, Nepal, Myanmar, Mongolia, Vietnam, and Laos. I thank all countries collectively, and extend my special appreciation to the many individuals, from herder to farmer and from government official to scientist, who so graciously extended their hospitality to us. Most of the individuals who took direct part in our journeys since the mid-1990s are mentioned in the text.

The support of three institutions has been critical. For over half a century I have been affiliated with the Wildlife Conservation Society in New York; WCS also has an office in Beijing directed by Xi Yan. William Conway and John Robinson, among others at WCS, gave me the freedom to fulfill my dreams in the world's wilderness, doing work on behalf of conservation that enriched my life. In 2000 I also joined Panthera, a nongovernmental organization devoted to the conservation of the world's wild cats that is directed by Alan Rabinowitz, an old field colleague of mine. I have in addition an adjunct position with the Center of Nature and Society at Peking University in Beijing, which is directed by Lu Zhi. All research in China was done with the full cooperation of the State Forestry Administration in Beijing. The Tibet Plateau Institute of Biology and the Tibetan Academy of

Agricultural and Animal Sciences in Lhasa also provided fruitful collaboration.

The project has in recent years depended for any success on various foundations and individual donors, and I am deeply indebted to all for their faith in our efforts. Among these are the L. Claiborne-Art Ortenberg Foundation, the Armand Erpf Fund, the Judith Mc-Bean Foundation, the Patagonia Company, the John D. and Catherine T. MacArthur Foundation, the Hoch Charitable Learning Trust, and the National Geographic Society. The European Union-China Biodiversity Programme through the Wildlife Conservation Society, funded a project in Tibet in which I took part. Editors Ed McBean, Anne Pattee, and Darlene Anderson, among others, also helped us generously.

Three individuals have accompanied me on several journeys, and they deserve special mention for their valuable contribution to the projects, as well as for their companionship, dedication, adaptability, and tenacity, often under most difficult conditions. Kang Aili, a coworker on six of my trips during the past decade, is affiliated with the Wildlife Conservation Society–China office and coordinates its field program in western China with great ability and persistence. Lu Zhi, director of both Peking University's Center for Nature and Society and the Shan Shui Conservation Center, a nongovernmental organization, has with initiative and deep insight established several community conservation projects on the Tibetan Plateau. We worked together on two trips in the Chang Tang and two in southeast Tibet, and she also supervises the Tibetan brown bear program. Beth Wald, a photographer, added outstanding value to two expeditions in Afghanistan and two in Tajikistan by documenting the mountains, wildlife, and local people in glorious detail, something that greatly helped to promote our work and raise awareness of these areas.

With exceptional editorial skill, insight, and interest, Jonathan Cobb meticulously edited the manuscript on behalf of Island Press, and I owe him a great debt of gratitude for improving it so much. I also extend my deep appreciation to Kathy Zeller for preparing the maps, and to Michael Fleming for superbly copyediting the manuscript. Most persons who contributed to my conservation efforts are mentioned in the text, but, in addition, I thank Luke Hunter, David Wattles, Rebecca Martin, Margarita Trujillo, Lisanne Petracca, Sun Shan, and Donna Xiao.

This is a personal book of science, conservation, and exploration based on my observations, experiences, and feelings. Sometimes I sound churlish and at other times exhilarated. My companions would no doubt write somewhat different accounts. But I want to stress that we worked as congenial teams. No matter what tribulations confronted us, we surmounted them and returned in good health with solid information, and with many bonds of friendship intact.

George Schaller
Roxbury, Connecticut
December 22, 2011

A Note on the Text

I have used the English system of weights and measures in this book. The conversions into the metric system are as follows:

- 1 inch = 2.54 cm
- 1 foot = 0.305 m
- 1 mile = 1.6 km
- 1 square mile = 2.59 km²
- 1 ounce = 28.35 g

1 pound = 0.45 kg

¹ Throughout this book, Han Chinese names are given in their traditional manner with the family name first and then the given name

A Covenant with Chiru

WE'RE TRAVELING SOUTH on the highway from the city of Golmud in Qinghai Province on a bitter October day in 1985 when I see chiru (Tibetan antelope) in the distance, mere specks in the immensity of white, and ask our driver Ma Shusheng to stop the Land Cruiser so I can get out. Snow covers plains and hills to the edge of vision, and a veil of luminous cloud shrouds the sky. One hill floats like an iceberg on a low layer of fog. I plow through the snow adrift in space, the chiru and I the only visible life, bound to each other by the desolation. In front of me a herd of male chiru plow mutely past in single file through knee-deep snow, the animals imposing in their black-and-white nuptial coats and with their long, slender horns rising almost straight up from the head. I am in a dream landscape of unicorns, of Tibetan horsemen with lances, of antelopes from the Serengeti plain transported high into winter. Here is a place to give wings to the imagination.

This, my first meeting with chiru, comes only five days after a blizzard has covered this part of Qinghai with a foot of snow, the heaviest such snowfall in years. We have just completed a snow leopard survey in the north of the province, and we have come to check on the status of wildlife along the highway, not realizing the seriousness of conditions in the storm's wake. The highway from Golmud winds over the Kunlun Mountains and crosses the eastern edge of the Chang Tang before continuing into Tibet. Our leader is Guo Gieting, a pleasant, low-key official from the Forestry Department, in his early fifties. Qiu Mingjiang and Ren Junrang, two biologists in their early twenties, have also joined me, as they did during previous research work.

We are traveling in a Toyota Land Cruiser and a pickup truck across the desert of the Qaidam Basin and up into the hills, climbing steadily past sharp-edged peaks until, after eighty-seven miles, we surmount Kunlun Pass at 15,600 feet and descend into rolling plains beyond. I have seen a pair of ravens, for me a good omen.

In the evening I write into my field journal:

A crystal-clear space so vast needs a place to rest the eye. We scan ahead and to the sides and see black dots scattered in clumps and singly. Under binocs and scope they become wild asses [kiang]. We count, drive on a little and count others. In one sweep of the scope resting on the hood of the Toyota I count 262 asses. Further on are more herds, most standing in the snow half a mile or more from the road, sometimes seen only in silhouette and others with a golden tan in the lowering sun. A few near the road are skittish and trot off when our two cars stop to photograph.

Then I see some chunky tan antelopes: female Tibetan antelopes, the first I've ever seen. For 2 km we are always within sight of animals, so easily visible against the snow that I can spot them 2 km or more. We casually count about 525 asses and as many as 700 antelope. . . . A wonderful wildlife afternoon; for once reality lives up to anticipation and hope.

I write these notes in a mud-walled room in Wudaoliang where we stay overnight, a desolate cluster of buildings at 15,000 feet, a truck stop with a few small restaurants, shops, and a military post. The room has hard beds, each with two folded quilts, and a stove we crowd around and constantly stoke with sheep droppings from a bucket.

The Land Cruiser does not start the following morning, even though it is only -5°F , probably because of water in the gasoline, but a pull from the pickup gives it life. Continuing south we encounter little wildlife, only a few herds of chiru and kiang and several forlorn gazelles struggling through the snow. The kiang, powerful and horse-sized, expose grass with such vigorous sweeps of foreleg that they've abraded the back of each foreleg into a bare, bloody patch. The chiru also paw craters in search of grass tufts. None of the species here have broad hooves like caribou have, adapted for walking on snow. Usually they don't need them, because winter winds tend to expose the ground quickly after a storm, but this time it is unusually calm and cold and the snow deeper than the usual inch or two. Walking through snow and digging again and again to obtain just a few stalks of coarse dead grass expends the valuable energy an animal needs to conserve for the long, harsh winter months ahead. A Tibetan man sits on a kilometer stone, bicycle beside him, rifle in hand, watching for a gazelle drift closer. We halt and chase the gazelle away. In the afternoon we reach Tuotuohe on the banks of the upper Yangtze River, another truck stop. We rent a room in a government barracks where we spend more noisy nights than we anticipated hearing trucks arrive and being started at intervals to keep the engines from freezing.

Tuotuohe with its transitory population of a few hundred reminds me of a small Alaska community on a winter morning with stovepipes emitting plumes of smoke into an ice fog of glittering crystals. But rather dissimilar are the Tibetan pilgrims crowded in the backs of open trucks headed for the holy sites of Lhasa, swaddled like mummies in thick sheepskin *chubas* and almost hidden by piles of bedding and sacks of belongings. Truckers heat their diesel tanks with blow torches and build fires with wood splinters beneath the engines to warm them. Flocks of horned larks and rufous-necked snow finches searching for food hop over exposed ground and packed snow tinged with urine and blood from slaughtered animals. A goat eats a cardboard box. We report ourselves to the local community leader, who tells us that livestock are starving and that most of the nomads remain isolated in scattered households and will need outside help. The snow is too deep for us to drive cross-country in our vehicles to survey wildlife, and horses cannot be used because there is no fodder for them.

Mingjiang, Junrang, and I walk away from the settlement to observe chiru. We see many of them stream northeast in ragged lines, some consisting only of males and others only of females and young. I tell my companions that I want to continue alone to photograph. A dip in the terrain provides cover after my careful approach and I kneel there. About 600 chiru are scattered over the plain. A herd of males gathers near me, a veritable forest of horns. When looked at from the side, the horns blend so that the animal appears to have only one horn like a unicorn. The anthropologist Toni Huber has noted that the name *chiru* may have come from the Tibetan *bse ru* (pronounced "siru"), meaning "rhinoceros," perhaps because the horns of both species are used for medicine; they certainly are not similar in appearance. Another herd wanders to within 150 feet of me. Two males face each other with lowered heads, rapier horns ready for conflict. Then they clash. I wonder why they waste energy on testing dominance when their survival in this deep snow is at stake. Clouds suddenly engulf us, everything vanishing in a white-out, and I stand there in driving snow as ghost creatures pass, still drawn toward the northeast. Where have they come from and where are they going?

"We know too little of high Tibet to be able to draw maps of the occurrence of big game and its wanderings with the seasons." So wrote the Swedish explorer Sven Hedin in his book *Southern Tibet* published in 1922. More than sixty years later, we still don't know. What a challenge for us, especially now, with wildlife drastically reduced and the chiru and several other species listed as threatened with extinction!

Before the snowstorm engulfs me, I look west with longing toward Tibet, over 150 miles away, the

direction from which the chiru are coming. Subconsciously I have made a covenant with the species help it by unraveling its mysterious life—its travels, its numbers, its habits. Whenever I do research an area, I select a totem animal in which my heart can rest, an animal of beauty and interest and need of conservation, such as the mountain gorilla, the tiger, or the giant panda. Here in the Char Tang the chiru will be that totem. When plains and hills emerge again from the clouds, I admire the chiru and look at their tracks scribbled in the snow like a script of their own, and then head back elated.

The drivers Ma Shisheng and Xiao Rijing cook mutton soup for breakfast. It is a chilly -13°F , the road is icy, and fog imprisons us until ten o'clock. Again we drive south, our surveys confined to the highway. Many pikas, the tiny relatives of rabbits weighing a mere four ounces or so, sit on the snow puffed up fur balls with dark eyes. Waiting to feast on unwary pikas are upland buzzards, saker falcons, and ravens perched on mounds and telephone poles. A Tibetan hare, a species unique to the plateau, sits in the snow drawn deeply into itself, then hops off slowly as we approach on foot to take a photograph. As it reaches the highway, a passing truck suddenly stops, the driver leaps from the cab and grabs the hare by the ears in anticipation of a meal. Mingjiang quickly retrieves the weak animal from the driver, and we return it to the plains to die in peace. I regret that we disturbed it. Nearby lies the carcass of a kiang female with hind-quarters chopped off for its meat, and beyond her lie three gazelle someone has killed, gutted, and dragged to the road. Farther on, we come across signs of the desperate leaps of animals in the snow, along with splattered blood, shell casings, and the drag marks of five bodies toward the road. A little distance away is a female chiru, dead for at least a day, with snow partly drifted over her. We weigh her—forty-eight pounds—and examine her viscera. There is not a trace of fat; no doubt she starved to death.

As we drive north from Tuotuohe for a day-trip the following morning, I spot a raven hacking at something, a dead female chiru. It has been ten days since the blizzard and more animals are dying from starvation. This female had reclined in the brutal cold, her body melting enough snow to create a bare patch around her, and then she died lying on her side, her legs twitching and scrabbling in the snow. She weighs fifty-five pounds and is lactating. Near her body is another female with two young pawing in the snow. She barely pauses in her digging to look at me as I approach, her long eyelashes glimmering with snow. When she moves away only one of the young follows her; the other drifts away alone. A chiru herd suddenly bolts and bunches up, a mastiff dog at its heels. The dog grabs a lagging calf and shakes it. As we draw near the dog flees, leaving its victim dead and bloody with a lacerated throat and neck.

When we return to Tuotuohe that evening, Guo Gieting informs us that the governor of Qinghai Song Rui Xiang, wants to see us. He is here to look into the snow emergency, and we meet him at the military post. A forceful person, he gives orders and queries those around him about the situation. We suggest that illegal hunting of wildlife along the highway be stopped. He tells us that instead he will have hay put along the highway for the wildlife and send helicopters to kill wolves. I demur, and Guo Gieting later explains that these are political decisions about which we can do nothing. To check on the condition of the nomads and the wildlife, the People's Liberation Army, we are told, will send a truck and tractor-pulled wagon filled with food and fuelwood, and we are invited to go along.

The vehicles are expected imminently. Three days pass. We eat in huts adorned with deep-blue flags out front proclaiming that they are restaurants with names like "Sichuan Flower." Inside each one is a table or two, and on the table is a tin can with wooden chopsticks and perhaps a pot of ground red pepper. On the menu is a sole dish of noodles, rice soup, or meat and vegetable soup, depending on the place. Mingjiang, Junrang, and I decide to take more walks to observe wildlife. Driver Ma is surely wanting to go back to Golmud, just as driver Xiao has done with the pickup, and not ferry us around

when requested. When I inquire of Mingjiang why a driver can determine our work, he replies: “Ma on the same level politically as Guo. Therefore, Guo is in no position to give orders.” But the waiting is cold, and altitude are affecting us all. Junrang is more withdrawn than usual, Mingjiang wanders off alone without informing us, and my temper has become short.

It is -30°F as we once again head into the whiteness, the crusted snow crunching underfoot. We see chiru just standing, backs hunched, too weary now even to dig through the hardened snow. Ahead are several dark mounds and near them two dogs, very shy as we draw near. Of the four chiru bodies, two have shredded throats and two have starved. We look for more bodies in order to collect such vital statistics as weight, sex, and age based on tooth wear. We crack open a long bone and look at the marrow. If the marrow is a thick, fatty white, the animal still had some body reserves; if it is a blood jelly it meant all reserves were depleted. By afternoon our body count is ten, seven killed by dogs. When we report this to the community leader, he exclaims, “*Leng*” (“Wolf”). After we convince him otherwise, he notes that these dogs belong to a nearby road camp. When Guo Gieting adds that driver Ma has a shotgun, the leader suggests that we shoot dogs that are killing wildlife. We stop at the road camp to ask its headman to please tie up the dogs. A lone brown-headed gull flies over as we return to our Spartan room.

Driver Ma agrees to drive us along the road to look for more dead animals to autopsy. Just north of Tuotuohe two large black mastiffs and a half-grown pup sit by four chiru they have killed. Ma shoots the two adults but permits the pup to flee toward some nearby huts. I understand the killing lust of these dogs when prey, usually so fleet and shy, is suddenly defenseless. In general, carnivores will kill far more than they can eat when given an opportunity, as I have observed in the Serengeti with spotted hyenas and lions. Wolves, lynx, and snow leopards enter corrals where they may kill a dozen or more domestic sheep where one would do. And of course there are ample published accounts of trophy hunters mindlessly shooting and shooting when given a chance. I feel dejected—my heart is with the chiru in their struggle for survival. Four more dog-killed chiru and more bodies are in sight, but just then the long-awaited army truck and tractor pass us and we return to Tuotuohe. Yaks are being slaughtered because there is no fodder for them. The air is heavy with the steam of their bodies and the odor of blood.

Our counting of bodies, no matter how seemingly morbid, does produce useful information of a kind not usually obtained. In a sample of twenty-two dead chiru there were nine young, six adult females, two yearling (one-year-old) females, and five yearling males. Of these, thirteen were killed by dogs and nine died of malnutrition. Since our counts of living chiru showed that there are over twice as many females as young; the young were proportionately more vulnerable than the others. No adult males are among the dead. Their large size enables them to dig more easily for forage and to plow through snow with less energy than others. A large male has a lower metabolic rate and lower nutritional requirements per unit weight than a female and especially a calf. In addition, males have stored much fat while lounging around during summer, whereas females enter the winter lean from months of pregnancy and then lactation.

It is now October 31, and we are ready to start our cross-country trip into the white void in an orange tractor with wide treads pulling a wagon and an army truck with worn tires and a large red-and-white sign proclaiming in Chinese characters: “To Contribute to the Rescue Work.” We carry eight barrels of diesel fuel, a pile of firewood, and a pile of army coats and boots to hand out. The team members include four soldiers and several Tibetans from Tuotuohe; of the latter two are community doctors and one a mathematics teacher. One of the Tibetans, Zhi Mai, is the leader. He wears a fox skin hat and carries a .762 rifle. I join the Tibetans in the open wagon so that I can count the wildlife along our route. An hour after leaving, the truck breaks through the ice of a shallow pond hidden

beneath the snow. After we laboriously unload the truck, the tractor can finally pull it out and we continue at our modest pace of about four miles per hour. The sun vanishes shortly after six o'clock and winter asserts its grip. We stop in darkness at eight o'clock and erect one tent of heavy green canvas, large enough for us all. With two blowtorches roaring, the Tibetans melt snow and prepare instant noodles and tea. It is -30°F inside the tent at night. I am chilled through and my feet numb, in spite of wearing all my clothes inside the sleeping bag.

In the morning, the inside of the tent is thick with frost as we have tea and a frozen bun for breakfast. The tractor has idled all night to keep from freezing. The truck again does not start, and even when pulled by the tractor its wheels will not turn. The all-purpose blowtorches are then used to heat the engine and wheel bearings so we can get under way. As we travel, I take notes on wildlife within 300 m on each side of our route—one male gazelle, six male chiru, three female chiru, and two young chiru. By noon we reach a tent surrounded by bloody sheep hides laid out to dry, a pile of sheep heads, and viscera dragged onto the ice of a nearby stream. The soldiers leave armloads of wood and several pairs of shoes for the family, though I doubt that they need this. The inhabitants are dressed more warmly than we are, and mounds of yak dung near the tent provide ample fuel. With 1,500 sheep, this family is quite wealthy. But sixty have so far died, and many more will probably starve too. We pass another tent, cross a low pass, and enter a broad valley with a jagged range ahead. The tractor breaks through the ice of a shallow lake, but by ramming the ice again and again it finally reaches shore. To warm my feet, I walk ahead on the lake, crossing a vast bed of ice flowers gleaming in the last lingering light, until I come upon a female gazelle lying in this great emptiness, awaiting death. Even when I pass within six feet she does not move. Ahead, at the base of a hill, are four tents. It is dark when we reach them.

Zhi Mai, Mingjiang, and I are invited to stay in a small family tent. Our host is a young man wearing sunglasses, his eyes sore from a touch of snow blindness; he and his wife and two girls, ages five and seven, are all wearing thick sheepskin *chubas*. A baby has been so tightly wrapped in a quilt and stuffed into a yak-skin basket that it can only follow life inside the tent with its eyes. We crowd around the large iron stove. Near it hang two massive horns of wild yak, used as milk pails. Our dinner is a noodle and mutton soup with butter tea—a hot, nourishing meal. We sleep on the floor in a corner of the tent, grateful for this family's hospitality. Our hostess rises early to start a fire; the two girls remain hidden in their nest of sheepskins but I can hear them giggle. A porridge made of *tsampe* mixed with tea is our breakfast.

Guo Gieting comes by and says, "*Jintian xiuxi*" ("Today rest"). We then join the others in a large tent. Blue sheepskins serve as rugs. Posters on the walls show Buddhist deities, lamas, and Chairman Mao. I write notes by the stove while others play cards, chat, and drink endless cups of butter tea. As I'm told, there are four families here, including seventeen children. Collectively they have 3,100 sheep, of which 200 have died so far since the storm, and none from wolf predation this year, I'm told.

When the Russian explorer Nikolai Przewalski traveled through this region in 1872, it was uninhabited and storms were just as severe. He wrote in his 1876 book *Mongolia, the Tangut Country, and the Solitudes of Northern Tibet*:

There is no regular road anywhere in the Tibetan deserts, nothing but the tracks of wild animals in all directions. The caravans take a straight course, guiding their march by the salient features of the country. . . . In February 1870, a caravan which left Lhasa 300 strong, with 1,000 beasts of burden, was overtaken in a violent snow-storm, followed by severe cold, lost all the animals and fifty men besides.

The following day we come to another tent. As usual, the Tibetan men greet each other by first shaking hands and then touching right cheek to right cheek. We leave some firewood and two pairs of

boots and continue. While crossing low hills, we spot two argali sheep, a young male and female fleeing in panic. A female gazelle lies dead near our route. We stop and I weigh her at twenty-nine pounds, an unusually light and lean animal. The next household has two tents, one of which generously vacates for our night's stay. The soldiers with us—Li, Wang, Jing, and Dai—work hard and are uncomplaining, no matter how miserable the situation. They take the truck to haul some yak droppings back from a distant site for the family. Later, I sit by the tent and watch a trusting groundpecker pulling bits of fat from an old sheepskin near my feet. As at Tuotuohe, flocks of small birds seek food near human habitation. Suddenly there is a fusillade of shots. Li and one of his companions, back from their errand, are bored and the birds offer target practice. Their bag: one injured groundpecker—a small light-brown bird with a curved bill—and one dead snow finch. Protest but words from a foreigner are considered irrelevant.

We continue on our way. I shiver in the open wagon and try to burrow further into the baggage. The others, too, are mute and disengaged, trying to ignore the cruel situation. Many pikas are here and vanish into the snow as we pass. By a marmot burrow a manul cat is curled up in the sun. Built like a squat house cat but with a pug-like face and long, grizzled hair, the manul is rare and seldom seen. One of the Tibetan doctors, Qin Mei Dao Ji, picks up his rifle and motions the tractor to halt. “*Be no!*” I yell, waving my arms. The cat vanishes into the marmot burrow, and Qin mutters something. “The cat was resting so peacefully in this beautiful land that it was not the right moment to die,” I say calmly, but my scowl conveys my feelings. At a small range broken by rock pinnacles are three stag donkey-sized and dark brown with large ivory-colored antlers. They are MacNeill's deer, a subspecies of red deer, the first I ever encountered, surprisingly far from their usual home in the forests to the east. By a rock outcrop are several small herds of blue sheep and I learn from one of the Tibetans that a few snow leopards persist in the area. Seeing these animals revives my spirit—until we reach the next tent, a slaughterhouse. I count seven blue sheep males, five kiang, two chiru, and one gazelle. Eight dogs are tied up, hunting dogs used to chase blue sheep onto a cliff where they are cornered while the hunter shoots at leisure. Nearby is another tent with an old man, an old woman, two young women, and several children. The belongings in the tent are worn and scant, and the fire is almost out. Wood from our wagon soon warms us and we brew hot tea. I have sympathy for this poor family and do not begrudge them the wildlife they kill for subsistence. With the death of their sheep this winter they will be destitute. We erect our tent nearby. It is at least -40°F in the night; the thermometer will not register any lower. I have a sore throat and the others sniffle and cough, not surprising given our closeness and the habit some of them have of spitting and blowing their noses almost anywhere.

November 5 is memorable because the truck, in which I am riding that day, suddenly sinks into the ground beneath the snow. The driver guns the engine, the wheels spin, and the truck sinks deeper. The tractor has gone ahead to another encampment and we have no way to contact it. The wheels quickly freeze solidly into the ice. We huddle together in the truck like hibernating marmots, covered with army coats. For dinner we gnaw on chunks of frozen bread. The tractor carries all the fuel and so we cannot even make a fire for hot tea. The others return at noon the next day after a three-hour drive from the encampment where they had spent the night. Junrang reports that he saw two MacNeill's deer and a cluster of twelve dead Tibetan gazelle along the way. Before leaving again for the encampment of the previous night, the team tries to dig around the wheels of the truck and the tractor repeatedly yanks it with a cable but it does not budge. We prepare to spend a second night here. We make a smoking dung fire and soon have hot tea to replenish our dehydrated bodies. From a frozen sheep carcass we've bought from a household, we cut slivers of meat, impale them on a wire, and roast kebabs. Usually one relishes a hard life afield even while complaining of discomforts such as the cold and the wet. Here we have too great a measure of both. However, in future years I may well recall this journey with a touch of nostalgia.

The tractor returns at noon the next day. There is some desultory digging, more out of principle than expectation, and then the soldiers, all good mechanics, discover that something in the gearbox is broken. The truck cannot continue. Three Tibetans will stay with the truck while the rest of us head west to the highway for help: the rescue team has to be rescued. A kiang lies dead in the snow and another stands beside it as if guarding the body. At our approach it does not flee but merely circles its dead companion.

The next day we see trucks ahead moving south, seemingly adrift on snow. We are nearing the highway. There has been little wildlife along our eight-day route, a meager 154 animals, mostly gazelle, chiru, and kiang. Where have the large herds of chiru gone? In the 250 miles or so of our travel, we've passed a mere dozen households. So far only 3–4 percent of the sheep have starved according to what families have told us, but the future looks grim. Some animals are already being slaughtered for cash so that new ones can be bought in spring. Interestingly, only one household has lost sheep to wolves this year, a mere three animals, and we have not spotted a single wolf in our travels. The helicopter wolf hunt the governor proposed may not achieve much, fortunately.

The beginning of our study of chiru and other wildlife in the Chang Tang has been depressing. But the days have also provided an invaluable lesson in showing how just a single and rare weather event may have a drastic impact on the wildlife in this harsh and high land, no matter how well the animals are protected from the depredation of humans. Now, whenever I rejoice that a species is increasing in number, I am also apprehensive that a catastrophe can wipe out any gains.

We finally reach the highway with the last glimmer of sun. Tuotuohe is twenty miles to the south, several hours by tractor. Eager to get back, we flag down a truck and the driver agrees to take four of us. We climb into the back of the covered truck only to face two kiang carcasses. With perverse luck we are in the one truck among hundreds which collects bodies along the highway for converting to glue. Two more bodies are added to our count. I sit on the back of a frozen kiang as we return to Tuotuohe, our three-week survey completed.



A year later, in November 1986, we returned for ten days to the Tuotuohe area to check on the fate of the wildlife and that of the pastoralists and their livestock. Two-thirds of the sheep and goats and half of the yaks had died for lack of fodder, we were informed, and many households face extreme hardship still. Compared to the previous year, there was little wildlife near the road. However, the plains were almost free of snow and we could drive anywhere in search of them. One of our routes was upriver from Tuotuohe, where chiru had been so abundant just after the blizzard. This time they were still present—but as mummified bodies encased in brittle hides. We tallied 193 carcasses.

In his book *Across Tibet*, the explorer Gabriel Bonvalot wrote that, while crossing the Chang Tang on January 12, 1890, he found “a valley strewn with the bones of animals,” including argali, kiang, and chiru—probably a situation similar to the one we came across now. To the north, away from the road, were scattered chiru herds—we saw a total of 1,380 animals—with the males in rut, displaying by strutting and bellowing to the females. Few females were accompanied by a youngster, probably because after having been in such poor physical condition the previous winter, they failed to conceive or aborted, or produced weak newborns that soon died. In addition to the chiru, our counts showed 40 kiang, 83 gazelle, and 14 wolves, including a pack of eight. These were among the survivors which would replenish the Chang Tang, and I looked forward to meeting them and their descendants in the years ahead.

We had been witness to the extremely harsh conditions which the Chang Tang can offer chiru and

other species, as well as the human intruder. Rare natural events such as the blizzard of 1985 may have a varied and long-lasting impact on life at these high altitudes, a valuable lesson for me. More than ever, my mental compass was focused westward toward the Chang Tang in Tibet with its vast blank on the wildlife map. Any quest such as ours ends with more questions to answer than it began with. I wondered, for example, about the chiru's annual migrations, not just movements driven by hunger, as I had witnessed. Like the chiru, I now also wandered, making annual visits to the Tibetan Plateau, to the northwest part in Qinghai, the southern rim in Xinjiang, and finally also to Tibet, trips described in *Tibet's Hidden Wilderness*. Each trip added useful fragments of knowledge about the chiru's faraway life, but I needed to know much more, especially about the chiru's secret calving grounds. The search for these and my efforts to protect them and the chiru's future spurred me on for the years ahead.

Riddle of the Calving Ground

IN 1988, I BEGAN FIELD WORK in Tibet's Chang Tang, the vast region that extends from the western border of Qinghai about 550 miles westward past the magnificent basin with the lakes Aru and Memar Co (co means "lake" in Tibetan) toward the border with India. By 1994 I had made several wildlife surveys in that region alone with staff of the Tibet Forestry Department and the Tibet Plateau Institute of Biology. Kay often accompanied me, and range ecologist Daniel Miller joined us on two journeys to evaluate pasture conditions. Except for occasional forays north into the desolate desert steppe, much of which lies at 16,000 feet and higher, our research concentrated in alpine steppe at somewhat lower elevations (around 14,500 feet), the broad band of grassland where chiru, kiang, Tibetan gazelle, and other species are most common, and pastoralists with their livestock are permanently settled. However, my eyes roamed ever northward across plains and snow-capped ranges toward uninhabited terrain.

Our observations, coupled with information from herdsmen, indicated that chiru generally spent the period from autumn to spring on alpine steppe, often near livestock. Most female chiru disappear sometime in May toward the north to a mysterious place where they gave birth. No one could tell me where they went, only that in late July or August they reappeared with their calves. The males did not travel with the females but hung around the winter area or only wandered short distances, as if waiting for everyone to get back together in November and December to rut. Naturally, I was intrigued. Here was the challenge of solving a scientific mystery and of exploring places in the Chang Tang so remote that not even the nomads had been there. Around the world, similar species, such as caribou, wildebeest, and Mongolian gazelles also calve at certain sites, but, unlike chiru, the males migrate to the same sites as well. Every species has adapted itself to a unique combination of ecological conditions, and I couldn't even guess what specific forces had shaped this aspect of chiru society. Over the course of our early travels in the region, we had found evidence of three more or less distinct migratory chiru populations in Tibet, which I called the East, Central, and West Chang Tang populations, each with its distinct calving ground; I also became aware of another population in Qinghai.

It's fun to unravel a problem of natural history such as the female chirus' migratory destination and it's satisfying to gain new insights into the life of a species. But instead of the leisurely quest I might have expected, it had suddenly become urgent to find out as much as possible about the chiru. In the late 1980s and early 1990s the animals were beginning to be massacred, but I had no idea about the driving force behind this slaughter. Finally in 1992, I discovered that the animals were being killed for their fine wool, which was then smuggled to India to be woven into expensive shahtoosh shawls, I will recount in a later chapter. Even after the Chang Tang Nature Reserve was established as a protected area in 1993 by the Tibet Autonomous Region, and in 2001 made a national reserve covering an area of about 115,000 square miles, almost as large as Germany, poaching of chiru continued. This was not surprising because at that time around 4,000 families lived in the reserve (many more do now), access by vehicle from towns was easy, and the financial gain from the illegal trade was great. The region is so vast that there were not enough vehicles, personnel, and funds to sustain antipoaching efforts, especially not in uninhabited terrain.

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