Introduction
The llama and alpaca were domesticated from the guanaco and vicuña, respectively, about 4000 years ago in the central Andes. Husbandry of the two domestic species subsequently diffused north and south, and by the early 16th century the camelid culture area encompassed the mountainous regions of modern Chile, Argentina, Bolivia, Peru and Ecuador, plus the irrigated coastal valleys of the desert Pacific Rim. Llamas and alpacas permitted the successful occupation of a vast area of the Andes, often too high and too dry for agriculture, but productive when occupied by these hardy herbivores. The transformative impact of the llama and alpaca, however, was halted by the demographic collapse of both human and camelid populations following the Spanish Conquest in 1532. Due to introduced disease and the displacement of camelids by Old World domestic animals, by 1650 the llama and alpaca population had dropped by 90%, associated with many local extinctions.

The demographic bottleneck was exacerbated by a loss of quality, as llamas were allowed to breed with alpacas (producing a fertile and undesirable hybrid) and as indigenous husbandry practices were abandoned. Camelids persisted in remote pockets away from Colonial activity, but their quality as well as their numbers continued to decline. The camelids now grazing the Andes, with localized exceptions, are a major retreat from the genetic and productive levels obtained after millennia of selection, culminating with the Incas. Recovering the pre-Columbian quality of llamas and alpacas therefore becomes the major challenge for contemporary herders and indigenous communities in the Andes.

This course will permit students to become accomplished in the principal alpaca husbandry practices through daily work with a large alpaca herd on the Mazar Wildlife Reserve (MWR), and will place alpacas, llamas and vicuñas in their historical and geographical contexts.

Setting for the Course
We will have access to a herd of 500 alpacas in a beautiful setting in Ecuador located between 10,000 and 12,000 feet elevation. The landscape includes alpaca pastures, montane forest, and grassland páramos above tree line. The host ranch is part of a private conservation area, the Mazar Wildlife Reserve (MWR), owned and operated since 1982 by the instructor and located 100 km to the northeast of Cuenca. Various sites within the MWR, separated by walking distances of 1-5 hours, will be used for husbandry practices. Students will be housed in rustic cabins on the MWR. Basic services (flush toilets, running water, road access and electricity) will be available. Internet access will be limited to the beginning and end of the session, during stays in urban areas. Hikes between sites that traverse forests will be used to discuss the conservation opportunities provided by alpaca husbandry. Road trips, between Cuenca and the MWR, and between the MWR and Salinas, Chimborazo (see below), will be used to elucidate a grand variety of mixed animal-crop farming systems, many on steep mountainsides.

Although most of the course will take place on the Mazar Wildlife Reserve, where the alpacas ranch is located, a short field trip to central Ecuador will focus on llama and alpaca husbandry by indigenous communities, and provide a unique opportunity to view vicuñas at close range on the high páramo within the government’s Chimborazo Faunal Preserve. For those interested, we will have the option to ascend to the climbing hut at 5000 m elevation on Mount Chimborazo.

Instructor
The instructor, Stuart White, has lived in Ecuador for 33 years and raised alpacas on the MWR since 1985 after introducing them from Chile and Peru. He has also raised cattle, llamas and sheep. Stuart received a PhD in Geography at the University of Wisconsin in 1981 and subsequently taught Geography at the University of New Mexico, Albuquerque, until moving to Ecuador. In addition to raising alpacas, Stuart has spent his years in two pursuits: First, promoting the reintroduction of this camelid to the Ecuadorian rural economy; and second, as habitat conservation advocate, crystalized in the establishment of the Fundación Cordillera Tropical (www.cordilleratropical.org), which he headed between 2000 and 2010. Since 2010 Stuart has been associated with the Geography Department at the University of Vermont, where he taught during 2011-2012.
Course Objectives
1. Understand camelid culture history in the Andes.
2. Learn the principal camelid husbandry practices: Handling and restraint, the parenteral and oral administration of pharmaceuticals, blood drawing, castration, placement of uterine boluses, toenail clipping, incisor trimming, use of a feeding tube, shearing, and fiber classification. Students will have the opportunity to work directly with large numbers of alpacas and will perform all of these interventions, some many times.
3. Appreciate herd management as practiced in the tropical Andes, including the use of infrastructure, routine preventive health care, major causes of morbidity and mortality, pasture management, and the construction of a salubrious and productive farm space.
4. Gain a practiced eye in the evaluation of fiber quality and conformation in alpacas, and review methods for genetic improvements. Students will learn to judge alpacas and to make on-farm selection of promising sires.
6. Observe the non-lethal methods employed to reduce predation by mountain lions and foxes, and the cost of these interventions.
7. Focus on the reproductive cycle, birthing and support for newborn crías and alpaca dams. For the Winter Session, we will have the opportunity to work with birthing mothers and alpaca newborns.
8. Distinguish llamas and alpacas in physical aspect, ideal types, and economic potential.
9. Evaluate the feasibility of alpaca husbandry as a tool for conservation and the protection of environmental services in the tropical Andes.

Course Structure
This course earns 4 credits.
Class discussions on specific topics early and late in the day will be combined with sustained daily involvements with the alpacas as detailed in the schedule below. On most days, 2 hours will be dedicated to the instructor’s presentations of case studies, followed by discussions; and 5 hours learning husbandry techniques with the alpacas. An additional 1-2 hours will be needed to complete the day’s readings.
Grading will be based on participation in discussions, mastery of husbandry techniques, and a written final exam.

Readings
Students will be provided a text, The Complete Alpaca Book (Hoffman, 2003, 604 pp), whose cost is included in the program fee. ASCI will distribute copies to students by mid-December, allowing the opportunity to start the course readings before traveling to Ecuador on January 2. In Ecuador, students will also be provided a spiral-bound volume of photocopied articles from which additional readings will be assigned.
### Schedule of Travel, Activities and Topics, ASCI 298, Winter Session, 2018

(Important note: Students should depart late in the day or evening of January 2 in order to reach Cuenca, Ecuador, on January 3. **All students must arrange to be in Cuenca by 9pm on January 3.** Although both Guayaquil and Quito are international arrival cities, the preferred city is Quito (UIO) because it has numerous connecting flights to Cuenca.)

<table>
<thead>
<tr>
<th>Date</th>
<th>Daytime activities/travel</th>
<th>Evening Discussion &amp; 'Reports from the Field'</th>
<th>Readings</th>
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<tr>
<td>Wednesday, Jan. 3</td>
<td><strong>Students arrive in Cuenca.</strong> Students will be met at the Cuenca airport by the instructor, and be taken by taxi directly to the hotel. Night at Posada del Angel, Cuenca. [Internet access]</td>
<td>Welcome. Health and safety instructions.</td>
<td>Chpt 1: Classification, prehistory, and history  2: Behavior and communication  3. Anatomy and conformation</td>
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<td>Thursday, Jan. 4</td>
<td><strong>Overland to Mazar Wildlife Reserve (MWR), Pilisurcu camp</strong> (4 hours). En route, mountain landscapes and exposure to sloped agricultural systems. Settle-in after arrival at the Pilisurcu camp, and our first encounter with the alpaca herd. Night at Pilisurcu, MWR.</td>
<td>Basic Andean geography. Chronology of camelid husbandry in the Andes.</td>
<td>4. Husbandry  5: Restraint  6: Taming and training  15: On-farm assessment and diagnosis Safely M (nd) 4. The ideal alpaca: Suri and Huacaya</td>
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<td>Saturday, Jan. 6</td>
<td><strong>Basic Husbandry I.</strong> Toenail clipping; incisor trimming; oral delivery of antiparasitic drugs; parenteral administration (IM, SC, IV); body scoring, ; taking a fecal sample; normal and abnormal feces; physiological parameters: pulse, respiration, body temperature nutrition and the provision of mineralized salt. <strong>Night at Pilisurcu, MWR.</strong></td>
<td>Report from the Field II: Puma predation.</td>
<td>10: Fiber processing, characteristics and nomenclature  11: Fleece preparation and shearing  26: Breeding to improve fleece quality  17: Parasitology  18: Unusual parasitic diseases Frank, EN, et al. (2006) Phenotypic and genetic description of fibre traits in South American domestic camelids (llamas and alpacas).</td>
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<tr>
<td>Date</td>
<td>Daytime activities</td>
<td>PM Discussion &amp; Reports from the Field</td>
<td>Readings</td>
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| Sunday, Jan. 7     | **Am:** Nutrition and principal parasitic diseases  
More practice handling alpacas  
PM, **Hike to blue tent, and camp out.**  
Night at blue tent, MWR | Report from the Field  
III: Outbreak of Fascioliasis.  
12: Male reproduction  
13: Female reproduction  
14: Obstetrics and Neonatology | 20: Infectious multisystemic diseases  
21: Noninfectious multisystemic diseases |
| Monday, Jan. 8     | **Hike to La Libertad camp, AM**  
La Libertad: Castration; shearing; fiber quality  
Return to Pilisurcu and night at Pilisurcu camp, MWR | Report from the Field  
IV: Acute Sarcocystosis | |
| Tuesday, Jan. 9    | **AM:** Male and female reproduction/Obstetrics and neonatology  
More practice handling alpacas  
PM: Principal infectious and non-infectious diseases  
Night at Pilisurcu camp, MWR | Report from the Field  
V: Grass páramo as hunter-gatherer landscape.  
[Spiral-bound neonatal guide].  
| Wednesday Jan. 10  | **Overland to Salinas.** From Mazar Wildlife Reserve to Azogues (2 hours) and then Azogues to Salinas (6 hours).  
En route we will survey highland agricultural systems.  
Time permitting, stop at Chimborazo National Faunal Reserve  
Night at Hostal La Minga, Salinas | Report from the field  
VI: (i) The Ecuadorian llamino—history and status; (ii) Camelids as meat producers  
Franklin W (1982) Biology, ecology and relationship to man of the South American camelids | |
| Thursday, Jan. 11  | **AM:** Trip to Chimborazo National Faunal Reserve to observe vicuñas in the wild.  
**PM:** Visit artisan cheese factory near Salinas. Guest lecture, Ing. Miguel Rodriguez.  
Visit spinning factory in Salinas. Guest lecture, Ing. Lizbeth Medina  
Night at Hostal La Minga, Salinas | | Evening reserved for reading and review. |
| Friday, Jan. 12    | **AM, early:** Overland return to Cuenca.  
**Afternoon:** Final exam  
Goodbye dinner  
Night at Posada del Angel, Cuenca | Report from the field  
VII: Alpacas as a tool for environmental conservation. | |
| Saturday, Jan. 13  | **Student departures AM** | | |