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Perú: Cordillera Escalera-Loreto





rapid biological and social inventories

INFORME/REPORT NO. 26

Perú: Cordillera Escalera-Loreto

Nigel Pitman, Corine Vriesendorp, Diana Alvira, Jonathan A. Markel, Mark Johnston, Ernesto Ruelas Inzunza, Agustín Lancha Pizango, Gloria Sarmiento Valenzuela, Patricia Álvarez-Loayza, Joshua Homan, Tyana Wachter, Álvaro del Campo, Douglas F. Stotz y/and Sebastian Heilpern

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Instituciones participantes/Participating Institutions





Nature and Culture International (NCI)



Federación de Comunidades Nativas Chayahuita (FECONACHA)

Organización Shawi del Yanayacu y Alto Paranapura (OSHAYAAP)



Municipalidad Distrital de Balsapuerto



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Instituto de Investigaciones de la Amazonía Peruana (IIAP)



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Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos



Centro de Ornitología y Biodiversidad (CORBIDI)

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The Field Museum

The Field Museum is a research and educational institution with exhibits open to the public and collections that reflect the natural and cultural diversity of the world. Its work in science and education - exploring the past and present to shape a future rich with biological and cultural diversity-is organized in three centers that complement each other. Its Collections Center oversees and safeguards more than 26 million objects available to researchers, educators, and citizen scientists; the Integrative Research Center pursues scientific inquiry based on its collections, maintains world-class research on evolution, life, and culture, and works across disciplines to tackle critical questions of our times; finally, its Science Action Center puts its science and collections to work for conservation and cultural understanding. This center focuses on results on the ground, from the conservation of tropical forest expanses and restoration of nature in urban centers, to connections of people with their cultural heritage. Education is a central strategy of all three centers: they collaborate closely to bring museum science, collections, and action to its public.

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Nature and Culture International

Nature and Culture International is a conservation organization that has been working for almost two decades to protect some of the world's most important and vulnerable ecosystems. NCI does so by building local capacity and in working with local peoples, through a permanent presence on the ground with 10 offices in Latin America comprised of highly skilled local teams. NCI's conservation program aims to protect key ecosystems from the ground up, providing both financial resources and project guidance to conserve Latin America's most precious ecosystems. We help governments define and adopt their own conservation policies and protected areas systems, work with communities on ways to develop community reserves that provide opportunities for sustainable incomes, and nurture the growth of an ecological ethic within each culture.

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Federación de Comunidades Nativas Chayahuitas (FECONACHA)

FECONACHA is a Shawi indigenous federation founded in 1985, legally recognized and inscribed in the Loreto Registry Office in Yurimaguas in February 2010, with an office in the District of Balsapuerto. The federation's board of directors includes a president, vice president, secretary, treasurer, accountant, woman's representative, and spokesperson. FECONACHA's jurisdiction extends across the watersheds of the Paranapura River and its three tributaries (the Armanayacu, Cachiyacu, and Yanayacu rivers). The federation represents 126 titled, untitled, and annexed indigenous communities belonging to the Shawi people, all of which are located in the province of Alto Amazonas. FECONACHA aims to strengthen and defend the interests and fundamental rights of indigenous peoples as established in Convention 169 of the International Labor Organization, and to bolster the organizational capacity of its members. The objective of FECONACHA is promoting solidarity among the Shawi indigenous people in the four watersheds of Balsapuerto District, and a strong cultural identity in which the Shawi can maintain healthy natural resources in their surroundings and practice sustainable management to ensure the wellbeing of future generations. FECONACHA is currently involved in processes to establish the mechanisms for integrated biodiversity management and for obtaining recognition of the ancestral territory of the Shawi people. It also works to protect forests in titled community lands from the impacts of forestry, mining, hydrocarbon, and other large extractive projects.

FECONACHA

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Organización Shawi del Yanayacu y Alto Paranapura (OSHAYAAP)

OSHAYAAP is a non-profit organization founded in 2012 and currently processing its inscription in the Loreto Registry Office in Yurimaguas. Based in the Comunidad Nativa Panán, the organization's board of directors consists of a president, vice president, secretary, treasurer, accountant, and two spokespersons. OSHAYAAP's jurisdiction extends across the watersheds of the Yanayacu and upper Paranapura rivers and their tributaries. The organization represents 37 titled native communities and annexes belonging to the Shawi people, all of which are in the province of Alto Amazonas and the district of Balsapuerto. OSHAYAAP aims to build organizational capacity in each of the communities it represents in the Yanayacu and upper Paranapura watersheds, in order to promote a strong and unified Shawi people with a solid cultural identity, capable of safeguarding a healthy landscape where natural resources are plentiful and people benefit from sustainable management that ensures the wellbeing of future generations. OSHAYAAP is currently involved in processes to help establish mechanisms that protect biodiversity and to obtain official recognition of conservation efforts in the Cordillera Escalera. The organization also helps its members resolve conflicts and protect communal forests from illegal logging.

OSHAYAAP

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Municipalidad Distrital de Balsapuerto

The city of Balsapuerto promotes integrated and sustainable development in the region by sponsoring public and private investment and employment. The city plans and carries out activities, public works, and other projects that generate wellbeing for the people of Balsapuerto. City hall is located in the capital of Balsapuerto District, in the watershed of the Cachiyacu River, and another administrative office is located in Yurimaguas. Municipal duties are defined by Peru's Organic Law of Cities, and include exclusive or shared responsibilities in the following areas: land use, environmental protection and conservation, active community building, programs in sanitation, public health, transportation, education, culture, sports and recreation, social programs, human rights, citizen safety, and other public services and products. Balsapuerto is taking an active role in ensuring the protection of the Cordillera Escalera, providing leadership in local workshops to promote management that is participatory, efficient, and effective. These workshops offer a venue for people to exchange ideas and strategies that will help raise the quality of life of local residents and rural communities.

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Instituto de Investigaciones de la Amazonía Peruana

The Instituto de Investigaciones de la Amazonía Peruana (IIAP) is a public institution devoted to research and technical development in Amazonia. Its objectives include research, sustainable resource use, biodiversity conservation, and the wellbeing of human populations in Amazonia. Its headquarters are in Iquitos, and it maintains offices in six other regions of Amazonian Peru. In addition to investigating promising species and developing methods for the cultivation, management, and development of biodiversity resources, IIAP is actively promoting the management and conservation of species and ecosystems, including the creation of protected areas; it also participates in the studies necessary for the creation of these areas. IIAP has six research programs, which are focused on aquatic ecosystems and resources, terrestrial ecosystems and resources, ecological-economic zoning and environmental planning, Amazonian biodiversity, human diversity in the Amazon, and information on biodiversity.

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Herbario Amazonense de la Universidad Nacional de la Amazonía Peruana

The Herbario Amazonense (AMAZ) is situated in Iquitos, Peru, and forms part of the Universidad Nacional de la Amazonía Peruana (UNAP). It was founded in 1972 as an educational and research institution focused on the flora of the Peruvian Amazon. In addition to housing collections from several countries, the collections showcase representative specimens of the Amazonian flora of Peru, considered one of the most diverse floras on the planet. These collections serve as a valuable resource for understanding the classification, distribution, phenology, and habitat preferences of ferns, gymnosperms, and flowering plants. Local and international students, teachers, and researchers use these collections to teach, study, identify, and research the flora, and in this way the Herbario Amazonense helps conserve Amazonia's diverse flora.

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Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos

Founded in 1918, the Museo de Historia Natural is the principal source of information on the Peruvian flora and fauna. Its permanent exhibits are visited each year by 50,000 students, while its scientific collections — housing a million and a half plant, bird, mammal, fish, amphibian, reptile, fossil, and mineral specimens — are an invaluable resource for hundreds of Peruvian and foreign researchers. The museum's mission is to be a center of conservation, education, and research on Peru's biodiversity, highlighting the fact that Peru is one of the most biologically diverse countries on the planet, and that its economic progress depends on the conservation and sustainable use of its natural riches. The museum is part of the Universidad Nacional Mayor de San Marcos, founded in 1551.

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Centro de Ornitología y Biodiversidad (CORBIDI)

The Center for Ornithology and Biodiversity (CORBIDI) was created in Lima in 2006 to help strengthen the natural sciences in Peru. The institution carries out scientific research, trains scientists, and facilitates other scientists' and institutions' research on Peruvian biodiversity. CORBIDI's mission is to encourage responsible conservation measures that help ensure the long-term preservation of Peru's extraordinary natural diversity. The organization also trains and provides support for Peruvian students in the natural sciences, and advises government and other institutions concerning policies related to the knowledge, conservation, and use of Peru's biodiversity. The institution currently has three divisions: ornithology, mammalogy, and herpetology.

Centro de Ornitología y Biodiversidad Calle Santa Rita 105, Oficina 202 Urb. Huertos de San Antonio Surco, Lima 33, Peru 51.1.344.1701 tel *www.corbidi.org* We offer profound thanks to the Shawi people for permitting us to carry out this study in their ancestral territory. It has been a privilege to bear witness to the Shawi people's strong support for the conservation of their ancestral land and their rejection of largescale activities such as oil and gas exploration, timber concessions, and highways that threaten their territory. Although the regional and local federations in the region have different opinions about the best way to conserve and manage the Shawi territorial space, we are certain that a well-planned process of dialogue and reflection will lead to a strong agreement on how to best protect the Cordillera Escalera-Loreto.

At the regional level there are two organizations (CORPI-SL and ORDEPI-AA) that work with the grassroots indigenous federations and we extend our thanks to them both. Our sincere appreciation goes to the directors of the Organización de los Pueblos Indígenas de Alto Amazonas (Organization of the Indigenous Peoples of Alto Amazonas; ORDEPI-AA), and especially to Juan Tapayuri and Rider Mozombite, for taking on the large task of convening the Shawi people for informed consent meetings in the native communities of Balsapuerto, San Gabriel de Varadero, and Panán. We also extend thanks to the directors of the Coordinadora Regional de Pueblos Indígenas-San Lorenzo (Regional Coordinating Body of Indigenous Peoples-San Lorenzo; CORPI-SL) in Yurimaguas, and in particular to Oswaldo Manihuari, Yolo Navarro, and Marcial Mudarra, whose recommendations were of great use to us in carrying out the rapid inventory.

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Reconnaissance overflights are an essential part of rapid inventories. They give us an excellent view of the vegetation and landscape, which makes it possible to choose the biology team's campsites. We extend enormous thanks to the INAER helicopter company, especially to its pilots, Ciro Bardales and Daniel de la Fuente, as well as its personnel in Lima, Liliana Ávila, Ronald Sutcliffe, and Dino Forenza, for all the support they gave us.

Álvaro del Campo coordinated the advance logistics team that entered the field weeks before the inventory teams arrived, to prepare the heliports, campsites, and trails. This is steep and severe terrain, but Álvaro's distinctive mix of determination, leadership, humor, and athleticism somehow got the work done. Together with Alvaro, Guillermo Knell and Edward Ramirez helped establish the 'three-camps-in-one' along the Alto Cachiyacu River. It was a superhuman effort to create trails that extended from 500 m along the river up to 1,950 m in the elfin forests on the mountains crests. The other leaders of the advance team, Italo Mesones, and Magno Vásquez, were amazing in their abilities to establish trails systems along the extremely steep terrain in not one but two campsites. None of our work would happen without the dedicated leaders of the advance team, and we extend our deepest appreciation to Alvaro, Guillermo, Italo, Magno, and Edward.

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images at *http://www.floraoftheworld.org*. These sources, as well as the Field Museum's online plant images (*http://fm2.fieldmuseum.org/plantguides/*), were very helpful to us in making the species determinations of the plants we inventoried in the Cordillera Escalera.

The herpetological team is especially indebted to Alfonso Pizango Tangoa, Gregorio Tuesta, and Adán Tangoa Yumi, who provided Shawi names for the species we recorded in the field, and to Tito Yumi, who helped us at the Alto Cachiyacu summit camp. We also thank Diana Alvira, Joel Inga, and Patty Ruiz of the social team for sharing their photographs of herpetofauna in the communities they visited.

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Tyana Wachter dedicated herself to the inventory from dawn to dusk for over a month and a half, ignoring weekends and holidays, to make sure that everyone involved in any way — from team members to taxi drivers — had the tools and peace of mind to do their job. Perhaps the best example of Tyana's selfless focus on the wellbeing of others is that at some time while she was running non-stop errands in rainy Iquitos she gave away her only umbrella "to someone who needed it." The entire team is supremely grateful for her superpowers. Several Field Museum employees who remained in Chicago throughout the inventory provided crucial support from afar. These include Dawn Martin, Sarah Santarelli, Meganne Lube, and Royal Taylor. Robin Foster and Juliana Philipp created, printed, and laminated a large number of rapid color guides that were heavily used in both the social and biological inventories. Jon Markel and Mark Johnston are a critical piece of the planning and execution of our inventories. Their work extends through the writing phase, once fieldwork has been completed, and continues well into the publication stage.

Jim Costello and his team at Costello Communications has worked with us on inventory reports for so long that we consider him an irreplaceable team member — an endless source of creative strategies for communicating what we learned in the field to our partners, policy makers, and others. We are especially grateful for the efficiency and professionalism of Jim, Sophia Brown, and Todd Douglas. We are also very appreciative of the work of Teresa Fagan and others at University of Chicago Press, who help distribute the inventory reports.

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We are indebted to The Gordon and Betty Moore Foundation and The Hamill Family Foundation for their financial support for this inventory and their commitment to training conservation professionals in Loreto. And we are deeply grateful for the enduring support from our home institution, The Field Museum, especially Richard W. Lariviere and our visionary leader, Debra K. Moskovits.

The goal of rapid inventories—biological and social—is to catalyze effective action for conservation in threated regions of high biological and cultural diversity and uniqueness

Approach

Rapid inventories are expert surveys of the geology and biodiversity of remote forests, paired with social assessments that identify natural resource use, social organization, cultural strengths, and aspirations of local residents. After a short fieldwork period, the biological and social teams summarize their findings and develop integrated recommendations to protect the landscape and enhance the quality of life of local people.

During rapid biological inventories scientific teams focus on groups of organisms that indicate habitat type and condition and that can be surveyed quickly and accurately. These inventories do not attempt to produce an exhaustive list of species or higher taxa. Rather, the rapid surveys 1) identify the important biological communities in the site or region of interest, and 2) determine whether these communities are of outstanding quality and significance in a regional or global context.

During social inventories scientists and local communities collaborate to identify patterns of social organization, natural resource use, and opportunities for capacity building. The teams use participant observation and semi-structured interviews to quickly evaluate the assets of these communities that can serve as points of engagement for long-term participation in conservation.

In-country scientists are central to the field teams. The experience of local experts is crucial for understanding areas with little or no history of scientific exploration. After the inventories, protection of natural communities and engagement of social networks rely on initiatives from host-country scientists and conservationists.

Once these rapid inventories have been completed (typically within a month), the teams relay the survey information to regional and national decision-makers who set priorities and guide conservation action in the host country.

REPORT AT A GLANCE



Dates of fieldwork: 14 September-2 October 2013

REPORT AT A GLANCE				
Region	The Cordillera Escalera is a sub-Andean mountain range rising from the Amazonian lowlands to 2,300 m elevation along the Loreto-San Martín border in northern Peru. The 130,925-ha area we studied (the Cordillera Escalera-Loreto) falls entirely within Loreto Region, and is one of the first montane sites ever studied there. This is the ancestral territory of the Shawi people (also known as Chayahuita or Kampu Piyawi), who today live in 126 communities in the lowlands east of the cordillera. The Cordillera Escalera is a key component of an archipelago of geologically unique and biologically significant sub-Andean mountain ranges stretching from Peru's Sierra del Divisor in the south to Colombia in the north.			
Sites visited	Biological team	Biological team:		
(Fig. 2A)	Paranapura watershed	Mina de Sal S 5°53'22" W 76°36'15.7" 300–750 m	14-20 September 2013	
		Alto Cachiyacu S 5°51'31.0" W 76°43'3.4" 500–1,950 m	20-27 September 2013	
	Cahuapanas watershed	Alto Cahuapanas S 5°39'51.8" W 76°50'20.4" 1,000–1,350 m	27 September-1 October 2013	
	Social team:			
	Paranapura watershed	Comunidad Nativa Nueva Vida 220 m	16-21 September 2013	
		Comunidad Nativa San Antonio de Yanayacu 245 m	21-26 September 2013	
		Comunidad Nativa Balsapuerto 205 m	26 September-2 October 2013	
	During the inventory the social team also interviewed representatives of the indigenous communities of Canoa Puerto, Libertad, Los Ángeles, Nueva Barranquita, Nueva Era, Nueva Luz, Nuevo Saramiriza, Panán, Puerto Libre, San Juan de Palometayacu, San Lorenzo, San Miguel, Soledad, Soledad de Huitoyacu, and Yacu. On 2 October 2013 both teams made a public presentation of the preliminary results of the inventory in Balsapuerto, for residents and authorities of the region. On 5 October 2013 both teams carried out a workshop in Iquitos to identify the primary threats, assets, and opportunities in the region, and to draw up recommendations for conservation.			
Biological and geological inventory focus	Geomorphology, stratigraphy, hydrology, and soils; vegetation and flora; fishes; amphibians and reptiles; birds; medium-sized and large mammals			

Social inventory focus	Social and cultural assets; ethnohistory; demography, economy, and natural resource management; ethnobotany		
Principal biological results	The ancient geological formations of the Cordillera Escalera-Loreto harbor megadiverse biological communities. Apart from the excellent conservation status of their forests and rivers, what makes these mountains a high conservation priority is the large number of plant and animal species that are restricted to mountains in this region of Peru — including the endemic yellow-tailed woolly monkey (<i>Lagothrix flavicauda</i>), categorized as Critically Endangered worldwide. Many adjacent mountains in Amazonas and San Martín have lost their forests to advancing pasture and cropland. Protecting the Cordillera Escalera-Loreto will help assure that the same fate does not befall the incomparable montane habitats of Loreto.		
During the inventory we found at least 38 species new to science (2 fishes, 5 am)		(2 fishes, 5 amphibians,	
	1 reptile, and ~30 plants), hundreds of new records for Loreto (most of them plants) , and two genera new to Peru. Approximately 4,000–4,500 species of vascular plants		
	and vertebrates are believed to occur in the Cordillera Escalera-Loreto.		
		Species recorded during the inventory	Species estimated for the region
	Plants	830	2,500-3,000
	Fishes	30	50
	Amphibians	70	120
	Reptiles	41	>100
	Birds	422	600-650
	Small mammals	29	Unknown
	Medium-sized and large mammals	43	65
Geology	The Cordillera Escalera is one of several tepuis in this report) that run parallel to and Colombia, and constitute a transition Amazonian lowlands. The Escalera moun from the Jurassic (160 million years ag 10 sedimentary geological formations, or region. These are dominated by sandsto small outcrops of evaporites (36%), and Three uplift pulses are responsible for the estimated to have occurred 10 million years ago; and of the Miocene sediments and ended m processes such as folding and faulting,	I sub-Andean mountain ray o the eastern Andean rang on zone between the high intain range consists of d o) to the Miocene (5 mill of both continental and m one (53% of the region), n d limestone (8%). he creation of these mou years ago; the second, a r the last, which resulted hore than 2 million years of parallel strips of differen	anges (called Andean ge of Peru, Ecuador, n Andes and the eposits ranging in age ion years). There are narine origin, in the red beds with some antains: the first, rapid uplift dated in the deformation ago. Due to tectonic th-aged lithologies with

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Geology (continued)	different characteristics are exposed on the surface. Differences in the erodibility of these rocks have resulted in an extremely heterogeneous landscape containing both gentle floodplains with meandering rivers and towering cliffs with waterfalls, as well as great variation in the chemical composition of surface water. The conductivity of these waters ranges from exceptionally low (3.5 μ S/cm) to very high in streams that drain massive evaporites (~2,000 μ S/cm). Most streams are clearwater and most rivers are turbid (whitewater). Acidity varies from extremely low pH (water draining sandstone) to neutral (water draining lutites and limestone).
	The geologically diverse landscape of the Cordillera Escalera offers a tremendous variety of habitat for plants and animals. The extensive areas of quartzite sandstone harbor communities of rare and probably endemic organisms. In contrast to these, and covering a much smaller area, limestone formations contain fossils of various marine organisms. Another important feature of the region are the evaporate deposits: salts that have played an important role in the human history of the region and that are still mined for food today. The Shawi people also use these salts when spinning the cotton thread they use to weave traditional garments.
Vegetation	The Cordillera Escalera-Loreto harbors a diverse array of vegetation types and plant communities, strongly determined by local geology and topography. Elevation and climate play an important but lesser role in determining vegetation patterns, and we observed similar plant communities growing at markedly different elevations on the same geological substrate. Broadly, vegetation types range from dwarf ridgecrest forest growing on nutrient-poor sandstone rock formations at the highest elevations (Andean tepuis, between 1,700 and 1,950 m) to magnificent, stately expanses of tall slope forest on relatively fertile soils at middle elevations (800–1,200 m) to lowland Amazonian forest similar to, but less diverse, than the forests that dominate most of Loreto. The southern half of the Cordillera Escalera-Loreto harbors the greatest geological and topographic diversity, and consequently the greatest habitat diversity within the
	proposed area. By contrast, most of the northern half of the Cordillera Escalera-Loreto is a single geological formation of extremely poor soils at 1,000–1,400 m elevation. This plateau measures ~50,000 ha and harbors a remarkable set of specialized plant communities comprising both lowland white-sand and highland sandstone-associated elements. Tall forests and stunted forests (or <i>chamizales</i>) grow side by side on sandy soils in the valley bottoms while low shrubs cover the sandstone massifs (Andean tepuis) that overlook the valleys. These vegetation types closely resemble those of the tepuis of southern Venezuela, and these plant communities share species with lowland white-sand islands in Amazonia below 200 m (e.g., Allpahuayo-Mishana National Reserve near Iquitos) and species typical of other Andean tepuis (e.g., Cordillera del Cóndor).

Flora	The botanists collected 644 specimens of vascular plants and observed about 200 other species, for a total of 830 species recorded during the inventory. We estimate that 2,500–3,000 vascular plants occur in the Cordillera Escalera-Loreto. Our inventory is the first to document the flora above 1,500 m in Loreto, and our collections add several hundred species to Loreto's plant checklist (currently ~7,000 known species). For example, almost all of the 150 species recorded above 1,800 m at the Alto Cachiyacu campsite are new records for Loreto.
	The survey also yielded 15 species and two genera (<i>Phainantha</i> and <i>Dendrothrix</i>) that are new records for the flora of Peru. Many of these are Guiana Shield disjuncts found growing on high-elevation sandstone outcrops, whose closest known populations are ~300 km to the north in the Cordillera del Cóndor of Ecuador. Many other species we observed on sandstone substrates in Cordillera Escalera-Loreto are known to occur on other Andean tepuis in Peru, including Cordillera Azul, Cordillera Yanachaga, and Sierra del Divisor. We estimate that 30 species recorded during the inventory are new to science, including several species in the families Rubiaceae, Melastomataceae, and Bromeliaceae. Many of these occur at the highest elevations and may be endemic to the Cordillera Escalera region.
	Mid-elevation forests on richer soils included significant populations of some high- quality timber species that have been logged out in other areas of lowland Amazonian Peru (<i>Cedrelinga cateniformis</i> and <i>Cabralea canjerana</i>) but not others (<i>Cedrela odorata</i> and <i>Swietenia macrophylla</i>). Local residents indicated that these species have been mostly logged out in lowland forests around the communities, but we found no evidence of logging in the cordillera itself.
Fishes	Ichthyologists sampled fish communities in six streams, one river, and one lake in the Cordillera Escalera-Loreto. The sampling stations were located in the middle and upper Cachiyacu River (in the Huallaga watershed) and in the upper Cahuapanas (the Marañón watershed). We recorded 30 of the 50 fish species estimated to occur in the region, a diversity typical of sub-Andean habitats. Among the fish recorded are two species of <i>Astroblepus</i> that may be new to science.
	The most common species in these mountains are fish adapted to fast-running waters and restricted to aquatic habitats on the Andean slopes. These include species in the genera <i>Chaetostoma, Astroblepus, Ancistrus, Hemibrycon, Creagrutus, Parodon,</i> and <i>Bujurquina</i> . The two watersheds we visited have almost entirely different ichthyofaunas, however; only one of the 30 species recorded during the inventory was found in both watersheds.
	Fish communities in the two watersheds also showed marked differences in abundance, with more fish in the Cahuapanas headwaters and fewer in the Cachiyacu. It is crucial

REPORT AT A GLANCE	
Fishes (continued)	that the headwaters of both watersheds are preserved, since they serve as spawning sites for economically important migratory Characiformes species such as <i>Prochilodus</i> and <i>Salminus</i> . The middle Cachiyacu, near Mina de Sal, showed evidence of use of the fish toxin <i>barbasco</i> (<i>Lonchocarpus utilis</i>).
Amphibians and reptiles	We recorded 111 species in the Cordillera Escalera-Loreto: 70 amphibians and 41 reptiles. The herpetofauna of these mountains is unique in that it includes both widely distributed Amazonian species and an important group of species characteristic of montane forests between 1,500 and 2,500 m, and restricted to northern Peru and southern Ecuador. We estimate that the region harbors a total of 120 amphibian and 100 reptile species. Among the species we recorded, the poison dart frog <i>Ranitomeya fantastica</i> is endemic to the Andean tepuis of northern Peru, and six species (the rain frogs <i>Pristimantis avicuporum, P. bromeliaceus, P. nephophilus, P. rufioculis,</i> and <i>P. incomptus,</i> and the arboreal lizard <i>Anolis</i> sp. nov.) inhabit montane forests at intermediate elevations.
	The most important findings were five amphibian species and one lizard species that are potentially new to science. Three of these are rain frogs in the genus <i>Pristimantis</i> , which has diversified explosively on the Andean slopes. We also recorded for the first time in Peru the glass frog <i>Rulyrana flavopunctata</i> . We discovered a rare toad species, <i>Rhaebo ecuadoriensis</i> , which was recently described and previously known from a single locality in Peru (Panguana, Huánuco).
	Three frog species characteristic of montane forests and recorded during the inventory (<i>Pristimantis bromeliaceus, P. incomptus</i> and <i>P. nephophilus</i>) are classified as Vulnerable by the IUCN. Species diversity and abundance were very high in hill and premontane forests, and included such species as <i>Enyalioides praestabilis</i> and several poison dart frogs (i.e., <i>Ranitomeya fantastica</i>), reflecting the well-preserved conservation status of the Cordillera Escalera-Loreto.
Birds	The ornithologists recorded 422 species of birds during the inventory and estimate a regional avifauna of 600–650 species. The impressive diversity of the Cordillera Escalera-Loreto bird community is accompanied by an unusual composition, combining a relatively depauperate Amazonian element with diverse lower- and mid-montane elements. Our relatively limited sampling between 1,400 and 1,900 m yielded 65 species restricted to that elevational range, and we expect a full complement of mid- montane Andean species to occur in the higher elevations of the Cordillera Escalera. Notable records included 11 globally threatened bird species and half of the 30 species known to be restricted to sub-Andean ridges in Peru. Six of these species have restricted ranges in southern Ecuador and northern Peru, while the others are

more widespread along the Andes. Five other species recorded during the inventory are associated with sandy soils restricted to the region between the Marañón River and Cordillera Azul in Peru and have disjunct ranges from populations in eastern Amazonia, mainly on the Guiana Shield. Hummingbird species richness is impressive (31 species, the highest number recorded during a rapid inventory), and two species found here are endemic to Peru (*Phaethornis koepckeae* and *Herpsilochmus parkeri*, whose type locality lies just south of Cordillera Escalera). Thirty-eight species are new records for Loreto.

Game birds were poorly represented, suggesting significant hunting pressure. However, some large birds that are not heavily hunted in the region (e.g., macaws and *Amazona* parrots) were also sparse. The avifauna of the Cordillera Escalera-Loreto is probably very similar to that of Cordillera Azul (~100 km to the south), but lacks some of the Amazonian species found there and includes a small number of northern species that have never been recorded as far south as Cordillera Azul.

Mammals

Mammal communities in the Cordillera Escalera-Loreto appear to be a diverse mix of lowland and Andean faunas, but densities recorded during the inventory were very low. Field work yielded 29 species of small mammals (28 bats and 1 rodent) and 43 species of medium and large mammals. We are examining two tailless nectar bats (*Anoura* spp.) and two *Myotis* bats to determine whether they represent species new to science.

Base camps at all three sites were dominated by lowland species with wide distributions in the Amazon basin. Higher-elevation faunas, particularly those in cloud and dwarf forests above 1,500 m, had a much stronger Andean character, including bat and rodent genera such as *Anoura* and *Akodon*. All elevations harbored globally threatened mammal species. Between 1,200 and 1,700 m we observed yellow-tailed woolly monkey (*Lagothrix flavicauda*), the first record for Loreto of a primate that is Critically Endangered at the global scale. We did not observe signs of the globally Vulnerable spectacled bear (*Tremarctos ornatus*) during the inventory, but local communities reported its presence in the cordillera.

Mammal communities at the three sites we visited differed markedly in composition and abundance. The lowest site, Mina de Sal, showed clear impacts of nearby human settlements. Primates, peccaries, and other frequently hunted large mammals were conspicuously scarce and the common vampire bat (*Desmodus rotundus*), which is commonly encountered in areas with livestock, was present. In contrast, five species of primates were recorded at the second camp and mammal densities there were higher. *Collpas* (mineral licks), which are important resources for mammals and hunters on many landscapes elsewhere in Loreto, were scarce here and appear to play a smaller role in the mammal community.

Human communitiesThe portion of the Cordillera Escalera we studied is the ancestral territory of the Shawi people. On the eastern and northeastern flanks of the range, more than 100 Shawi communities are established in the Paranapura, Shanusi, and Cahuapanas watersheds. To the west and north there are Awajún (Aguaruna) communities, and to the south is a Llakwash (Quechua Lamista) community.The Shawi people historically lived in the headwaters of the Cordillera Escalera. Starting in the sixteenth century, driven by the establishment of missions, commercial trade routes, <i>haciendas</i> , and towns, the group dispersed into the lowlands, where they lived in a number of different watersheds. In the late 1960s and early 1970s there was a second wave of evangelical work, during which the Shawi established nuclear settlements on the banks of the Cachiyacu, Armanayacu, Yanayacu, Sillay, Cahuapanas, Paranapura, and Shanusi rivers with the goal of educating their children and founding churches.Despite this long history of migration, submission, and slavery, the Shawi maintain strong connections to the Cordillera Escalera-Loreto and to the lowland forests and rivers around their present-day communities. Their knowledge regarding the use and management of natural resources remains intact, and is reflected in their daily life and worldview. Today, the Shawi communities have a subsistence economy based on slash- and-bur agriculture, hunting, fishing, poultry farming, and since the 1980s cattle ranching, which families use to preserve their savings. Rice, peanuts, corn, beans, poultry, and other products are sold by the Shawi in the towns of Yurimaguas and San Lorenzo, and sometimes sold to itinerant traders or bartered for other products in stores. Since 1980 a large amount of lowland forest around communities has been cut to cultivate rice and establish pasture. This deforestation has sped
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roads, campsites, and trails; dynamism and a great capacity for organization; respect between community residents, community authorities, and the indigenous federations that represent them; and strong family support networks and reciprocal mechanisms. Together, these assets explain why the Shawi — despite living in a region that the Peruvian government characterizes as suffering from extreme poverty — described their local quality of life as good during participatory workshops.

Archaeology	With its great abundance and variety of petroglyphs and other archaeological artifacts, the Paranapura watershed constitutes the most important archaeological site in Loreto. In 2002, Peru's National Institute of Culture (today the Ministry of Culture) formally designated the Upper and Lower Cachiyacu River Archaeological Reserved Zone. Despite this honor, the Archaeological Reserved Zone has yet to be formally delimited or implemented.
	The rapid inventory did not include archaeological work, but our report includes a chapter summarizing archaeological research carried out in the region to date. Of the 50 archaeological sites discovered so far, one is located inside the study area (in the upper Cachiyacu) and 49 a few kilometers outside of it to the east, in the Cachiyacu and Armanayacu rivers. The 12 archaeological settlements, 13 rock tool workshops, and many ritual sites (25 petroglyph-bearing rocks with hundreds of carved drawings) are located close to scarce and valuable resources, including a salt mine on the banks of the Cachiyacu River and rocky riverbeds used to produce and sharpen stone tools (axes and chisels).
	The age of the rock carvings and the cultural affiliation between the peoples associated with these pre-Hispanic settlements and the Shawi who have occupied the forests and rivers of the Paranapura watershed in more recent centuries remain unknown. Protecting, preserving, and learning more about these important sites will require carefully coordinated efforts by central, regional, and local governments, in partnership with indigenous organizations.
Current status	The 130,925-ha area we studied in the Cordillera Escalera-Loreto currently has no formal protection. Nationally, it has been designated as a conservation priority by the Peruvian park service (SERNANP 2009). Regionally, the government of Loreto has recognized the area's two most important rivers — the Paranapura and the Cahuapanas — as Priority Watersheds (Regional Ordinance No. 005-2013-GRL-CR) and the area itself as a Regional Conservation Priority (GOREL 2012). Despite this consensus regarding its high conservation value, the Cordillera Escalera-Loreto faces a gamut of threats. A road from Moyobamba to Balsapuerto threatens to open the area to colonization and deforestation, and a medium-sized hydroelectric dam has been proposed for the upper Cachiyacu River. Large proportions of the area are within petroleum concessions (lots 103 and 109; 97% of the total) and areas designated for timber production (BPP blocks 4E and 4G; 38%). Although neither are in the production phase, their presence in an area designated as a high priority for conservation and recognized as ancestral Shawi territory has generated significant concern in the surrounding communities.

REPORT AT A GLANCE		
Principal assets for conservation	01	A consensus among the main stakeholders that the Cordillera Escalera-Loreto is a high priority for conservation
	02	A strong sense of linguistic, social, cultural, and family identity in the Shawi communities, which includes a deep knowledge of their territory and its flora and fauna
	03	A continuous elevational gradient of intact habitats ranging from 200 to 2,300 m, representing the best opportunity in Loreto to mitigate the effects of climate change
	04	A crucial link in the chain of Andean tepuis stretching from Colombia to Bolivia
Conservation targets	01	Diverse biological communities possessing rare and endemic species, especially on nutrient-poor soils derived from sandstone
	02	Species and landscapes that are culturally and spiritually important to the Shawi, including the abundant pre-Hispanic archaeological sites in their territory
	03	Nationally or internationally threatened species and range-restricted species, including the Critically Endangered yellow-tailed woolly monkey (<i>Lagothrix flavicauda</i>)
	04	Cultural practices and knowledge linked to the sustainable management of natural resources
Main threats	01	The lack of a legal designation to protect the Cordillera Escalera-Loreto
	02	The proposed Moyobamba-Balsapuerto highway
	03	Gas and petroleum exploration and production
Principal recommendations	01	Conserve the 130,925-ha study area in the Cordillera Escalera-Loreto, which is ancestral Shawi territory
	02	Build a strong consensus regarding the best legal designation for conserving the Cordillera Escalera-Loreto over the long run, to benefit both local indigenous populations and biodiversity
	03	Officially declare the conservation of the Cordillera Escalera-Loreto to be in the Regional Public Interest
	04	Phase out large-scale extractive activities (oil, gas, timber, mining, etc.) in the Cordillera Escalera-Loreto
	05	Respect the Shawi people's decision to not build the Moyobamba-Balsapuerto highway
	06	Incorporate the information in this biological and social inventory into the Ecological and Economic Zoning exercise currently underway in Loreto's Alto Amazonas province

Why Cordillera Escalera-Loreto?

Fully 97% of the hyperdiverse forests of Peru's Loreto Region lie deep within the lush Amazonian lowlands. However, along the western limits of Loreto, a chain of isolated mountain ranges rises up from the Amazonian plain. The winds that sweep west across the Amazon rainforest drape these mountains in fog and drench them in rain, giving rise to hundreds of montane streams and waterfalls that eventually return to the lowlands as tributaries of the Huallaga and Marañón rivers.

Currently some 20,000 Shawi indigenous people live along these rivers, and there are powerful signs that humans have inhabited this landscape for centuries. A two-hour walk southwest of the Shawi community of Canoa Puerto lies the most famous archaeological artifact in Loreto: a house-sized boulder covered in petroglyphs. Known as the *Casa de Cumpanamá*, this boulder, and dozens of other such rocks in the landscape, are covered in etchings made by an ancient civilization: hummingbirds, jaguar tracks, huge frogs and salamanders, rainstorms, long waterfalls, suns and moons, and human figures with their hands extended upwards.

The present-day Shawi also celebrate these mountains for their gifts of water, fauna, flora, and salt. Unlike Andean landscapes in neighboring San Martín that have lost most of their forests to colonization and agriculture, the Shawi ancestral territories in the Cordillera Escalera remain a roadless, forested wilderness. These mountains provide a refuge for a diverse and specialized fauna and flora: *Astroblepus* fishes that scale waterfalls, healthy populations of Peru's endemic and Critically Endangered yellow-tailed woolly monkey, an abundance of spectacular hummingbirds, hundreds of plants adapted for survival on nutrient-poor sandstone outcrops and montane versions of Loreto's famous white-sand forests, and more than 20 species of frogs, lizards, and plants that appear to occur nowhere else in the world.

For the flora and fauna of Cordillera Escalera, as well as the Shawi residents whose way of life depends on these mountains, protecting this landscape is critical. For these organisms to have any chance of responding to a changing climate, altitudinal variation is key: plants and animals need a continuous landscape to migrate upwards towards cooler conditions. Protecting Cordillera Escalera-Loreto and the adjacent portion of these mountains in San Martín will create a seamless conservation landscape of approximately 2.5 million ha of montane forests stretching from Cordillera Azul National Park through the Escalera, Manseriche, and Kampankis mountains, all the way to the Cordillera del Cóndor at the Peru-Ecuador border.

Conservation in the Cordillera Escalera-Loreto region

CONSERVATION TARGETS

01	A complex landscape with unique geological, hydrological, and edaphic features
	• A stunning natural setting of waterfalls, cliffs, and mountains—vanishingly rare features in the mostly lowland Loreto—officially recognized as a conservation priority by Peru's central government (SERNANP 2009) and the Regional Government of Loreto (GOREL 2012)
	 An extremely diverse geological landscape overlying a 2,000-m elevational gradient, resulting in a mosaic of substrates of different ages and fertilities at varying elevations, aspects, and slopes
	 A network of montane rivers and streams that varies greatly in watercourse type (from steep rocky cascades to gently meandering rivers), water type (clearwater, whitewater, redwater, and blackwater), and water chemistry (very low to very high levels of conductivity; extremely low to neutral pH)
	 Patchy but prominent evaporite deposits (salt deposits) in the Cachiyacu watershed that contribute to strongly heterogeneous water and soil chemistry there (Fig. 3B)
02	Extremely diverse plant and animal communities with some unique
	biological features
	 Plant and terrestrial vertebrate communities that rank among the most diverse on Earth at the regional scale, combining hyperdiverse lowland communities and endemic-rich montane communities
	• Dwarf ridgecrest forest growing on nutrient-poor sandstone, a vegetation type rare in Peru and in Loreto and characterized by a poorly studied flora and fauna with high rates of endemism (Fig. 5A)
	• The upper Cahuapanas watershed, a unique plateau at 1,000–1,400 m elevation that harbors blackwater rivers and patches of white sand forest similar to those in lowland Loreto, as well as sandstone massifs with a unique flora of poor-soil specialists (Fig. 3E)
	 Montane plant and animal communities that are among the most threatened in Peru, due to large-scale deforestation in neighboring San Martín Region

Conservation Targets (continued)

03	A rich storehouse of natural resources for local communities
	 Populations of animal species important for subsistence hunting, including peccaries, tapir, deer, monkeys, and large rodents
	• Very diverse forests that local communities rely on to support a high quality of life at a low economic cost, including hundreds of plant species that are used for medicine, timber, thatch, textiles, ornaments, food, and other uses
	 Substrates that provide clays for pottery
	 Historically important salt mines on the lower Cachiyacu River, still visited and used today by Shawi families (Fig. 3B)
04	At least 44 species considered to be threatened worldwide
	 Plants considered globally threatened by the IUCN (2014): <i>Guzmania</i> bismarckii (CR), Calatola costaricensis (EN), Stenospermation arborescens (EN), Abarema killipii (VU), Aegiphila panamensis (VU), Blakea hispida (VU), Centronia laurifolia (VU), Columnea mastersonii (VU), Couratari guianensis (VU), Cremastosperma megalophyllum (VU), Ficus pulchella (VU), Guarea trunciflora (VU), Monnina equatoriensis (VU), Nectandra pseudocotea (VU), and Pouteria vernicosa (VU)
	 Plants considered globally threatened by León et al. (2006): Nectandra cordata (CR), Octomeria peruviana (EN), Prunus rotunda (EN), Tococa gonoptera (EN), Allomarkgrafia ovalis (VU), Tachia cf. loretensis (VU), and Wettinia longipetala (VU)
	• Amphibians (IUCN 2014): <i>Pristimantis bromeliaceus, P. incomptus,</i> and <i>P. nephophilus</i> (VU)
	• Amphibians: four other globally threatened amphibian species are expected to occur in Cordillera Escalera-Loreto: <i>Atelopus pulcher</i> (CR), <i>Rulyrana saxiscandens</i> (EN), <i>Hyloxalus azureiventris</i> (EN), and <i>Ameerega cainarachi</i> (VU)
	 Birds: 11 species, including Royal Sunangel (Heliangelus regalis) and

- A population of one of the world's rarest and most threatened primates, the yellow-tailed woolly monkey (*Lagothrix flavicauda*), which is Critically Endangered (IUCN), listed on Appendix I (CITES), and Endangered (US Fish & Wildlife)
- Other mammals: Ateles chamek (EN), Pteronura brasiliensis (EN), Dinomys branickii (VU), Lagothrix poeppigii (VU), Myrmecophaga tridactyla (VU), Priodontes maximus (VU), Tapirus terrestris (VU), Tayassu pecari (VU), and Tremarctos ornatus (VU); other globally endangered species not recorded but expected to occur in the Cordillera Escalera-Loreto include Callicebus oenanthe (EN), Aotus miconax (VU), and Leopardus tigrinus (VU)

05 At least 15 species considered threatened in Peru (MINAG 2004, 2006)

- Plants: Ruagea cf. glabra (EN), Euterpe catinga (VU), Parahancornia peruviana (VU), and Tabebuia incana (VU)
- Amphibians: two threatened species are expected to occur in Cordillera Escalera-Loreto: *Rulyrana saxiscandens* (EN) and *Hyloxalus azureiventris* (EN)
- Birds: Herpsilochmus parkeri (EN), Ara militaris (VU), Aburria aburri (NT), Mitu tuberosum (NT), Morphnus guianensis (NT), Campylopterus villaviscencio (NT), Heliodoxa gularis (NT), and Hemitriccus rufigularis (NT)
- Mammals: Dinomys branickii (EN), Lagothrix flavicauda (EN), Pteronura brasiliensis (EN), Ateles chamek (VU), Myrmecophaga tridactyla (VU), Priodontes maximus (VU), and Tapirus terrestris (VU)

06 Several dozen species that appear to be new to science

- Plants: dozens of undescribed plant species, including taxa in the genera Dendrothrix, Erythroxylum, Gordonia, Guzmania, Macrocarpaea, Pitcairnia, and Purdiaea (Fig. 5)
- Fishes: two species in the genus Astroblepus (Fig. 6)
- Amphibians: three species in the genera *Rhinella, Pristimantis,* and *Chiasmocleis* (Fig. 7)
- Reptiles: one species in the genus *Enyalioides* (Fig. 7)

Conservation Targets (continued)

07	A significant number of species that are restricted to Andean tepuis, many of them currently found in no established protected areas in Loreto
	 Several dozen species of plants, including the majority of those that occur in the dwarf ridgecrest forest and dwarf ridgecrest scrub (Fig. 5A)
	 16 species of birds specialized on and restricted to Andean tepuis (Table 7)
	 An undetermined number of small mammal species that appear to be restricted to the high-elevation portions of Andean tepuis in this area of Peru
08	Valuable ecosystem services for local communities, Loreto, and the world
	 Montane streams and rivers in the Cordillera Escalera-Loreto that are important watersheds for the Huallaga and Marañón river basins and a crucial source of water for Shawi and Awajún communities downriver
	 Watersheds with dense, natural forest cover that safeguard against erosion and landslides
	 Large stocks of aboveground carbon, in the form of healthy forests, that are valued by the international carbon market. Because the Cordillera Escalera- Loreto region is very close to one of the most active deforestation hotspots in Peru, it has special potential for generating value via Reducing Emissions from Deforestation and Forest Degradation (REDD+) programs
	 Montane streams that serve as spawning sites for economically important food fish, including <i>Prochilodus nigricans, Salminus iquitensis,</i> and <i>Leporinus friderici</i>
09	A rich archaeological history, recognized as culturally important by specialists, local communities, and the Peruvian government
	 At least 50 known archaeological sites in the Paranapura drainage, including massive stone blocks decorated with petroglyphs, comprising what may be the largest and most detailed archaeological record in the Peruvian Amazon (Fig. 12)
	 The Upper and Lower Cachiyacu River Archaeological Reserved Zone, formally recognized in 2002 by Peru's Ministry of Culture

10	A stunningly beautiful natural and cultural landscape with high potential for eco-tourism
	 Breathtaking vistas of mountains, cliffs, waterfalls, and the Amazon lowlands (Fig. 1)
	 A rich archaeological heritage in the form of several dozen ancient petroglyph- bearing rocks (Fig. 12)
	 Healthy populations of plant and animal species valued highly by Peruvian and international tourists, including dozens of hummingbird and orchid species (Fig. 8)

ASSETS AND OPPORTUNITIES

01	Extremely high levels of biodiversity featuring Andean tepuis, a rich mixture of highland and lowland elements, unique or range-restricted species and ecosystems, and threatened species, most notably the Critically Endangered yellow-tailed woolly monkey (<i>Lagothrix flavicauda</i>)
02	An important link in the regional and international conservation corridor that connects mountainous areas in Peru from Cordillera Azul National Park to the Cerros de Kampankis and extends north to the Kutukú and Cóndor mountain ranges in Ecuador
03	Important watersheds of the Paranapura and Cahuapanas rivers, which have been identified as conservation priorities in Loreto (Regional Ordinance 005-2013-GRL-CR)
04	The best opportunity in Loreto to mitigate and monitor the effects of climate change
	 The longest altitudinal gradient in Loreto Region occurs in the Cordillera Escalera-Loreto
	 This gradient enables lowland species to migrate upslope to cooler, higher elevations as temperatures increase
	• The montane lakes likely preserve a valuable record of historic climate change in the form of pollen and phytoliths
05	Archaeological sites on a stunning landscape with good potential for tourism
06	The Shawi people's strong linguistic, social, and cultural identity
	 Cooperative networks between families and between communities that maintain the social fabric and keep Shawi culture strong
	 Bilingual elementary education that preserves culture and traditions
	 Important role of women in cultural maintenance
	 Respect for local authorities (<i>apus</i> [traditional indigenous leaders], lieutenant governors, municipal agents, mayors, and justices of the peace)

07	The Shawi's knowledge of their territory, which is passed on from generation to generation					
	 An opportunity to establish and implement a common vision of the Shawi people for the conservation and sustainable use of their territory that is grounded in traditional ecological knowledge 					
	 Great potential for implementing a system of indigenous protection and oversight of the territory 					
	 An opportunity to monitor and manage populations of birds, fish, and game animals that have declined due to unregulated hunting and fishing 					
08	A system of communication between indigenous communities based on cell telephones, Gilat telephones, letters, loudspeakers, radio programs, rivers, and trail networks which help keep families together and facilitate community organization and communication					
09	O9 Collaboration with other indigenous groups and other provinces of Loreto and San Martín in conserving and managing the Cordillera Escalera					
	 Potential for inter-ethnic cooperation between the Awajún, Shawi, and Llakwash (Quechua Lamista) peoples in the management and protection of the Cordillera Escalera 					
	 Potential for inter-provincial cooperation in the management and protection of the Cordillera Escalera between the provinces of Alto Amazonas and Datem del Marañón 					
	 Potential for regional cooperation between Loreto and San Martín in the management and protection of Cordillera Escalera 					
	 New contributions and information that can enrich the land-use plan being prepared by the province of Alto Amazonas 					
10	Access to resources for managing and protecting the Cordillera Escalera					
	 An opportunity for the Shawi people and for local, regional, and national authorities to come together around a consensus vision for conserving and managing the territory via funds potentially available in the Forest Investment 					

Assets and Opportunities (continued)

Plan project 'Integrated Management of the Forest Landscape in the Tarapoto- Yurimaguas Area, in the San Martín and Loreto Regions'
A consensus among indigenous peoples, the central government, and the regional government that the Cordillera Escalera-Loreto is a high priority for conservation based on its biological, archaeological, and cultural diversity
 Consensus among the Shawi people and the authorities who represent them to protect the mountain range for future generations and to guarantee for perpetuity the natural resource stocks they currently use
 Identified as a conservation priority at the national level by the Master Plan of Natural Protected Areas (SERNANP 2009)
 Identified as a conservation priority at the regional level (GOREL 2012)
 Identified as a conservation priority according to a recent study of biodiversity and protected areas in Peru (Fajardo Nolla 2012)
 Declaration of the Archaeological Reserved Zone of the Upper and Lower Cachiyacu Watershed by Peru's Ministry of Culture (National Directorial Resolution No. 314/INC, April 2002)

THREATS

01	The lack of a legal designation to protect the Cordillera Escalera-Loreto, which has led to:
	 Unregulated use of the area and unrestricted use of the flora and fauna
	 Distrust among local communities and between communities and the Peruvian government
	 Apparent land trafficking within the area
02	A history of tension between the Shawi people and the Awajún people of San Martín over the use and protection of the Cordillera Escalera-Loreto
03	The proposed Moyobamba-Balsapuerto highway. The planned route cuts through the Cordillera Escalera-Loreto, which would lead to:
	 Large-scale deforestation within at least 5 km on each side of the highway, which would degrade the headwaters and water quality of the Cachiyacu River
	 Land speculation and unregulated colonization
	• Negative social impacts on the communities located near the highway, such as an increase in crime, economic inequality, immigration, etc.
04	Exploration for and production of gas or petroleum in the hydrocarbon lots 103 and 109, which together cover 97% of the area. These pose a threat via:
	 Strong socioeconomic pressure exerted on local communities, which often generates conflicts within communities and federations
	 Environmental impacts in an important headwaters area (e.g., pollution of rivers by industrial waste and erosion)
05	High rates of deforestation due to agriculture and cattle ranching in indigenous communities to the east (Loreto) and the west (San Martín) of the Cordillera Escalera-Loreto, which have led to:
	• Changed dyamics in the Paranapura watershed due to silting of the rivers with eroded sediment
	 A drop in river level, which hampers river travel and communication between communities, and reduces water quality and populations of edible fish

Threats (continued)

06	Overhunting and fishing in and around the Cordillera Escalera-Loreto, which threaten an important source of fish and game animals for local communities
	 Unsustainable hunting in the upper Cachiyacu River watershed, which has caused a significant decline in populations of large and medium-size mammals in the zone
	 Use of the natural fish poison <i>barbasco</i> (<i>Lonchocarpus utilis</i>) in streams, a fishing method that destroys entire fish communities without discriminating between useful and non-useful species
	 Excessive commercial fishing in the areas surrounding Yurimaguas, which makes it difficult for migratory fish to reach the headwaters where they spawn
07	Development projects developed outside the region that propose projects unsuitable for the region. One example are projects that promote large-scale single-crop agriculture (coffee, cacao, papaya) instead of traditional mixed farm plots (<i>chacras</i>)
08	The uncertainty caused by the designation of the area as Permanent Production Forests (PPFs). Blocks 4E and 4G cover 38% of the study area (approximately 50,000 ha). They have not been concessioned and it is not known if they will be in the future. While in theory the law gives forests within PPFs some degree of protection, in practice the weak presence of the state means that they are just as vulnerable as other forests in the area
09	The proposal of the Ministry of Energy and Mines to establish an 80-MW hydroelectric power plant on the Cachiyacu River in 2021 (Finer and Jenkins 2012). A hydroelectric power plant on the Cachiyacu River is not a good investment because:
	 Landslides and earthquakes are frequent in the Cachiyacu headwaters, which would threaten the sustainability of a dam
	 The damming of the river would generate massive changes downriver, including negative impacts on fishing and changes in flow

- Hydroelectric projects in Amazonia have a long history of social, ecological, and commercial failure
- Networks to distribute electricity (e.g., towers and cables) will require deforestation
- 10 Water pollution caused by poor management of solid waste and raw sewage from humans and cattle that poses risks to the health of local residents
- 11 A general lack of zoning and land-use planning, and the incomplete and in some cases erroneous process of land titling
- 12 Unfounded rumors regarding the presence of gold in the Cordillera Escalera-Loreto, which attract colonists whose mining could generate severe negative impacts on forests and aquatic habitats, as well as on the Shawi population

RECOMMENDATIONS

The Cordillera Escalera-Loreto is an impressive mountain range located on the western border of Peru's Loreto Region that is **recognized as a conservation priority at both national and regional levels.** The range has extremely high levels of biodiversity — a mix of Amazonian, premontane, and montane elements — as well as a wealth of unique ecosystems, endemic species, and species with limited distributions.

The indigenous communities that surround the mountain range are the most important stakeholders on the social landscape. More than 100 communities of the Shawi people occur to the east and northeast of the Cordillera Escalera-Loreto, dozens of Awajún communities are settled to the north and northeast, and a small number of Quechua Lamista communities are located in the south. The lives of indigenous residents depend on the healthy forests and pure water of the Cordillera Escalera, and residents of these communities have a strong commitment to their care and management.

Within the Shawi communities **dozens of archaeological sites** have been found. Some of them, such as the *Casa de Cumpanamá*, are among the most important in the entire Amazon. These sites attest to the long history of human habitation in the Cachiyacu watershed, whose legacy includes many other sites of historic and cultural importance.

The Cordillera Escalera-Loreto deserves immediate protection, as an irreplaceable resource both for the indigenous communities who live around it and for its diverse and endangered flora and fauna. The threats facing this landscape rich in biology, culture, and history are legion and they require immediate action.

PROTECTION AND MANAGEMENT

- O1 Conserve the Cordillera Escalera-Loreto for the long term. At present the area has no legal status to guarantee its protection, and that makes it vulnerable to invasions, large-scale extractive activities, and deforestation. Additionally, no consensus exists among local stakeholders regarding how to best conserve the area
 - Create a working group to develop a strong consensus regarding the best legal mechanism for ensuring the protection of the Cordillera Escalera-Loreto. The working group should include the primary stakeholders of the area in order to generate and solidify a unified vision of conservation in both districts (Balsapuerto and Cahuapanas), both provinces (Alto Amazonas and Datem del Marañón), both regions (Loreto and San Martín), and above all, among local residents. The work must be begin with indigenous stakeholders, in recognition that a solid agreement among indigenous groups is fundamental for achieving effective conservation
 - Obtain a Declaration of Regional Public Interest that makes the Cordillera Escalera-Loreto (130,925 ha) an official conservation priority, highlighting the importance of the area for local indigenous communities and biodiversity
- **o2 Implement legal protection of the Cordillera Escalera-Loreto** via a land use category that reflects a consensus of the working group in coordination with regional and national authorities

	03	Exclude large-scale extractive activities from the Cordillera Escalera-Loreto
		 Eliminate oil and gas concessions, timber concessions, commercial mining, intensive monoculture agriculture, and hydroelectric projects from the area
		 Resize or eliminate Blocks 4E and 4G of Permanent Production Forest once the Cordillera Escalera-Loreto has been declared an area of public interest and its legal land use category has been determined
	04	Respect the decision of the Shawi people to not construct the proposed Moyobamba-Balsapuerto highway. The highway is the biggest threat to the forests of the Cordillera Escalera-Loreto and the high quality of life of the Shawi communities who depend on its flora, fauna, and water
MANAGEMENT AND CARE OF THE CORDILLERA ESCALERA-LORETO	01	Implement a system to protect and monitor the natural resources of the Cordillera Escalera-Loreto in close collaboration with the indigenous communities, making use of existing communal patrols and monitoring
	02	In each watershed reach consensus on and strengthen communal agreements regarding the management of species that are hunted and fished in communal territories and in the Cordillera Escalera-Loreto. These agreements should be founded on the recognition among local indigenous communities of the importance of letting game populations in the Cordillera Escalera-Loreto 'rest'
	03	Establish a system of comprehensive watershed management that includes protecting intact areas of the Cordillera Escalera-Loreto and restoring areas that need it along rivers and streams in communal territories
	04	Promote economic activities that are compatible with the conservation and sustainable management of the Cordillera Escalera-Loreto
		 Jointly analyze and determine with indigenous communities and tourism companies the types of tourism (e.g., historical, cultural, ecological) that are desirable and feasible in the Cordillera Escalera-Loreto. This process should include a detailed analysis of the legal framework, practical limitations, target audiences, and the historical, cultural, biological, social, and archaeological research needed for tourism to succeed. Analyze and apply the lessons learned from tourism in the communities of Alto Cachiyacu in collaboration with the non- governmental organization Terra Nuova
		 Implement the land use plan proposed by the Loreto regional government for the province of Alto Amazonas, with a special focus on areas surrounding the Cordillera Escalera-Loreto
		 Analyze, identify, and evaluate together with the communities socially and ecologically responsible economic activities (e.g., agroforestry systems of coffee

RECOMMENDATIONS		
Management and care of the Cordillera Escalera-Loreto (continued)	and cacao, silvo-pastoral systems, aquaculture) and the ideal scale at which activities can maximize benefits and minimize negative impacts	these
	 Ensure the active participation of the Shawi people (and the Awajún people i northwest) in the planning, execution, and benefits of any economic activity affects the Cordillera Escalera-Loreto or their quality of life 	n the that
	Ensure the protection of the archaeological sites in the Shawi communities of Balsapuerto District, which are the most important in Loreto. Implement the Archaeological Reserved Zone declared in April 2002 (National Directorial Resolution No. 314/INC) in the upper and lower watershed of the Cachiyacu Ri via a well-planned process. This should include mapping the zone, establishing management rules, and building a site museum, all of which should be carried out as a close and respectful collaboration between the Shawi people and relevant authorities	ver
PROMOTE DIALOGUE AND COLLABORATION BETWEEN THE LORETO REGIONAL GOVERNMENT	Continue to strengthen the ties between the Shawi people and government authorities so that they can take joint actions (e.g., cooperation between DISAF and the Shawi in order to address the Awajún settlement of Bichanak)	ILPA
COMMUNITIES	Standardize and update the land-tenure information that is in the hands of vari stakeholders, in order to:	ous
	 Ensure that everyone has the same high-quality cartographic information on communities 	
	 Resolve pending land tenure requests and resolve land tenure conflicts 	
	Disseminate the results of the rapid biological and social inventory and incorporthem into regional and municipal development plans, such as the regional land use plans of the provinces of Alto Amazonas and Datem del Marañón. Promote ecological and economic zoning and land use planning at the district, watershe and community levels	rate
MANAGEMENT AND ZONING OF COMMUNITY LANDS	Design and implement a system for managing solid waste and waste water, in o to eliminate this source of pollution in rivers throughout the Paranapura waters	r der hed
	Explore, through the Forest Investment Plan project 'Integrated Management of the Forest Landscape in the Strategic Focus Area of Tarapoto-Yurimaguas in the Regions of San Martín and Loreto,' the opportunity to allocate funds for definin implementing a common vision of management and conservation of the Cordillo Escalera and the communal territories that surround it	e g and era

ADDITIONAL RESEARCH AND INVENTORIES

01 Carry out high-priority studies on the biological and cultural diversity of the Cordillera Escalera-Loreto. Some topics include:

- A survey of habitat quantity and quality and population size of the yellow-tailed woolly monkey (*Lagothrix flavicauda*) in the Cordillera Escalera-Loreto. It is critically important to determine if the minimum elevation limit of 1,500 m reported in the rest of its range applies in the Cordillera Escalera-Loreto, because an effective estimate of the number of individuals remaining in Peru requires an answer to this question. Similar studies are an urgent priority for the forests between 1,200 m and 1,800 m just outside the Cordillera Escalera-Loreto on the San Martín side
- Additional biological inventories in the northern sector of the Cordillera Escalera-Loreto. The rapid inventory was sufficient to confirm the unique character of its poor-soil forests but too short to describe them in detail
- Geological and paleo-ecological studies to determine the age and origin of the lake near the Alto Cachiyacu base camp and to reconstruct the history of vegetation, climate, and human occupation of this region of the Cordillera Escalera-Loreto
- More detailed inventories of the plants, animals, and geology in the highest reaches of the Cordillera Escalera-Loreto, where rare and endemic species are concentrated

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	Prot	egido/Prot	tected	Hectáreas	Acres
	01	Bolivia	Tahuamanu	1,427,400	3,527,182
	02	Perú	Cordillera Azul	1,353,190	3,343,805
	03	Ecuador	Cofán-Bermejo	55,451	137,022
L	06	Bolivia	Federico Román	74,054	182,991
	11	Perú	Tamshiyacu-Tahuayo	322,979	798,098
	12	Perú	Ampiyacu-Apayacu	433,099	1,070,211
ſ	15	Perú	Megantoni	216,005	533,760
	16	Perú	Matsés	420,635	1,039,412
	17	Perú	Sierra del Divisor	1,478,311	3,652,986
	18	Perú	Nanay-Pintayacu-Chambira	956,248	2,362,940
	20	Perú	Güeppí	592,749	1,464,714
	21	Ecuador	Terr. Ancestral Cofan	30,700	75,861
	21	Ecuador	Cofanes-Chingual	70,000	172,974
	22	Perú	Maijuna	336,089	830,494
	23	Perú	Yaguas	868,927	2,147,165
	Tota	I Protegido	p/Protected	8,635,837	21,339,615
	Pror	uesto/Pro	nosed		
ĉ	05	Delivie	Madua da Disa	F1 110	100 201
	05	Bolivia	Madre de Dios	51,112	126,301
	11	Bolivia	Federico Roman	202,342	499,998
	16	Peru	Tavari Motoćo	220 557	1,920,061
	10	Feru	Durana	220,557	243,008
2	19	Ecuduor	Vaguas Catubá	9,409 507 471	23,390
	20	Peru	Fraguas-Colulie	597,471	1,470,303
	20	Peru	Ere-Campuya-Algodon	900,172	2,223,425
	20	Peru	Cordinera Escalera-Loreto	130,925	323,523
~	Tota	Propuesto	o/Proposed	2,889,069	7,138,097
	Fort	alecido/Re	einforced		
	04	China	Yunnan	405,549	1,002,133
	07	Cuba	Zapata	432,000	1,067,495
	08	Cuba	Cubitas	35,810	88,488
	09	Cuba	Pico Mogote	14,900	36,819
	10	Cuba	Siboney-Juticí	2,075	5,127
	13	Cuba	Bayamesa	24,100	59,552
	14	Cuba	Humboldt	70,680	174,654
	20	Ecuador	Cuyabeno	603,380	1,490,984

TOTAL HECTÁREAS/ACRES

Kampankis

13,511,849 33,387,553

398,449

1,986,943

984,589

4,909,841



COLOMBIA

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BOLIVIA

rapid biological and social inventories

Instituciones participantes/ Participating Institutions

The Field Museum

Nature and Culture International (NCI)

Federación de Comunidades Nativas Chayahuita (FECONACHA)

Organización Shawi del Yanayacu y Alto Paranapura (OSHAYAAP)

Municipalidad Distrital de Balsapuerto

Instituto de Investigaciones de la Amazonía Peruana (IIAP)

Herbario Amazonense de la Universidad Nacional de la Amazonía Peruana (AMAZ)

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