Heritage Routes Collection

Región de Arica y Parinacota
• Cultura Chinchorro. Patrimonio de la Humanidad.
• Los Altos de Arica. Precordillera y Altiplano.
• Arica y Parinacota. Fiestas Tradicionales y Populares.
• Afrodescendientes del Valle de Azapa. Ruta del Esclavo.

Región de Tarapacá
• Desembocadura del río Loa. Bien Nacional Protegido.
• Oasis de Niebla Alto Patache. Bien Nacional Protegido.
• Salitrera Humberstone. Patrimonio de la Humanidad.
• Quebradas de Tarapacá. Andes Altiplánicos.
• Tarapacá. Fiestas Tradicionales y Populares del Norte.
• Salar del Huasco – Collacagua. Bien Nacional Protegido.

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• Ex - oficina salitrera Chacabuco. Desierto de Atacama.
• Tal Tal - Punta Tórtolas. Historia y desierto junto al mar.
• Oasis del Desierto de Atacama. San Pedro y Chiu Chiu-Lasana.
• Antofagasta. Fiestas tradicionales y populares.

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• Valles de Atacama.
• Litoral de Atacama.
• Atacama. Fiestas tradicionales y populares.

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• Humedales de Tongoy. Bien Nacional Protegido.
• Caletas y Humedales del Choapa.
• Camino a Gabriela Mistral.
• La Serena. Patrimonio vivo.
• Coquimbo. Fiestas tradicionales y populares.
• Fray Jorge. Reserva de la Biósfera.
• Valles Transversales. Camino Los Andes - Vicuña.

Región de Valparaíso
• Archipiélago Juan Fernández. Reserva de la Biósfera.
• Cartagena. Arquitectura, mar y poesía.
• Valparaíso. Patrimonio de la Humanidad.
• Petorca. Patrimonio vivo de cordillera a mar.
• Valparaíso. Fiestas tradicionales y populares.
• Te Ara o Rapa Nui. Patrimonio de la Humanidad.
• Viña del Mar. Jardines, castillos y palacios frente al mar.
• Valparaíso popular.

Región Metropolitana
• Río Olivares - Gran Salto. Bien Nacional Protegido.
• Ruta de la Memoria. Región Metropolitana.
• Santiago. Fragmentos de una ciudad.
• Santiago en el corazón. Recovecos de la patria popular.

Región del Libertador Bernardo O'Higgins
• Camino Real a la Frontera. Tradición colonial.
• Camino Real del centro del Corregimiento de Colchagua.
• Camino Real de la Costa. Huellas coloniales.
• Libertador General Bernardo O´Higgins. Fiestas tradicionales y populares.

Región del Maule
• Laguna del Maule. Bien Nacional Protegido.
• Humedales del Maule. Observatorio natural.
• Valles de Nirivilo y Pichamán. Tradición vinícola del Maule.
·Radal Siete Tazas. Parque Nacional.

Región de Ñuble
·Ñuble: Costa, valle y tradiciones

Región del Biobío
• Alto Biobío. Araucarias de la cordillera de Pemehue.
• Nahuelbuta. Cordillera, costa y cultura.
•Golfo de Arauco. Tradición carbonífera del Biobío.
•Humedales del Biobío

Región de La Araucanía
• Huellas de Pablo Neruda en Temuco.
• Lagos de la Araucanía. Península Lican Ray.
• Padre Pancho, misionero en La Araucanía.
• Budileufü o Lago Budi.
• Araucanía Andina

Región de Los Ríos
• Fundo Llancahue. Bien Nacional Protegido.
• Los castillos del fin del mundo. Estuario de Valdivia.

Región de Los Lagos
•Archipiélago de Chiloé. Humedales, aves y cultura.
•Lago Palena. Andes Patagónicos.
•Río Blanco. Bosques Patagónicos
•Río Palena. Andes Patagónicos.
•Río Ventisquero. Bien Nacional Protegido.
·Vicente Pérez Rosales. Parque Nacional

Región de Aysén del General Carlos Ibáñez del Campo
• Caleta Tortel. Campo de Hielo Norte.
• Cuenca del Palena. La Junta - Raúl Marín Balmaceda.
• Glaciar río Mosco. Bien Nacional Protegido.
•Lago Verde - Lago Palena, huella los Troperos. Andes Patagónicos.
•Los Glaciares. Campo de Hielo Sur.

Región de Magallanes y Antártica Chilena
•Charles Darwin. Travesía al fin del mundo.
•Refugio natural. Canquén Colorado.
•Milodón. Patagonia a los pies del macizo del Paine.
•Puntas Arenas. Un viaje por su historia.
•Estrecho de Magallan es. Cabo Froward.
•Estrecho de MagallanesMonte Tarn.
•Isla Navarino. Reserva de la Biósfera Cabo de Hornos.
•Circuito Dientes de Navarino.
•Isla Navarino. Reserva de la Biósfera Cabo de Hornos. Circuito Lago Windhond.
•Isla Navarino. Reserva de la Biósfera Cabo de Hornos. Circuito Bahía Wulaia.

Experiencing this Heritage Route through its audio guide:

RUTA PATRIMONIAL ANDES DE SANTIAGO | REGIÓN METROPOLITANA

RUTA PATRIMONIAL
ANDES DE SANTIAGO

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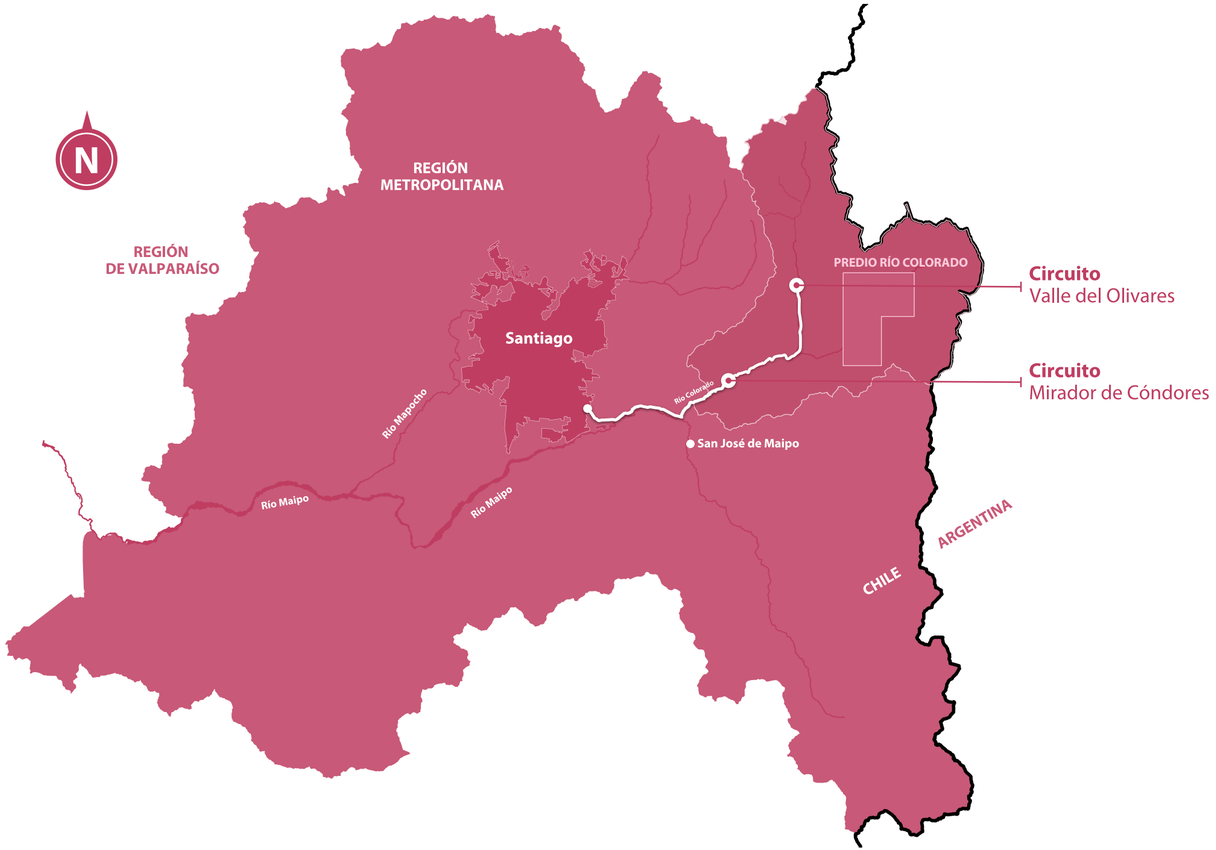
Gobierno de Chile

CIRCUITS MAP



Recommendations for visitors to the Mirador de Cóndores Circuit

Start the tour early in the morning so that you have enough natural light for descent.

Carry enough water (at least 2 liters per person) is adequate. Protect oneself from the sun and radiation with a hat, sunglasses, and sunscreen.

Notify someone near your excursion and save sufficient battery power in your cell phone.

Return with all your garbage.

Keep a safe distance from the cliff and wildlife you encounter, do not feed the animals, do not cut plant species, or make a fire on the circuit.

Avoid going on rainy days or after storms. Both the circuit and access road cross ravines through which alluviums can come down.

Recommendations for visitors Valle del Olivares Circuit

Organize your campsites well, as water supply is a critical element of the route. Certainly, you will be able to provide yourself with water in the Amarilla and Honda vegas. and Picarte (which flows down from Gran Salto), Castaños, Ramadas, and Cepo streams, although they have greater sedimentation. In spring, the availability of water increases along the route, and streams can be found at the Morrena Alta and Rinconada landmarks, which can also be used as campsites.

If you are going to do the glacier circuit, you will have to cross the Picarte Stream, which, depending on the season, can bring quite a lot of water. It is preferable to wade across a stream with a rope and trekking poles.

Bring adequate equipment according to the section you are going to hike. The short section of the Olivares River requires equipment, such as the Mirador de Cóndores circuit. The long section of the Olivares River also requires camping equipment, while the glacier section requires mountaineering equipment and knowledge.

Special care is taken when crossing streams and creeks because in the thawing season, they can drag stones and mud.

Although you should behave in an environmentally friendly manner throughout the circuit, caution should be exercised in high Andean plains and marshes, as these are points of high biodiversity.

Content

INTRODUCTION

The Heritage Routes Program was created in 2001 in response to the need to provide citizens with free, self-guided tours to enhance the value of cultural and natural heritage in the fiscal territory. Over the last 20 years, the Ministry of National Assets has developed and implemented 79 multimodal tours throughout national territory in diverse geographic and cultural environments. In this context, the Metropolitan Region of Santiago has four Heritage Routes that show the cultural and natural heritage richness of a part of the central zone of the country. The aim is to expand a cultural and heritage network that allows visitors to learn about, experience, and respect the local cultures present on these routes.

The Ruta Patrimonial Andes de Santiago includes two different circuits: the Mirador de Cóndores circuit and Valle del Olivares circuit. The Mirador de Cóndores circuit is operated during the day and has an extension of approximately 4 km and an elevation gain of 725 m. In this medium-difficulty tour, you will be able to observe not only the flight of the majestic condor but also striking rock formations, interesting Andean vegetation, and archaeological remains left by the first inhabitants of the cajón del Maipo.

However, the Valle del Olivares circuit is a long circuit that extends more than 100 km. Although it takes at least seven days to cover the entire route, there are three different sections of different difficulty and duration, where you can choose which one to do according to your time available and your specific knowledge of trekking and mountaineering. The first section, also called the short section of the Olivares River, runs to the Ramadas Stream and is a day trip suitable

Union of the Colorado and Maipo Rivers

for families who enjoy walking. Here, you will be able to observe moraines that bear witness to the modeling of the mountain landscape by the glaciers, giving the valley its characteristic "U" shape. The second section, also called the long section of the Olivares River, requires knowledge of camping and orienteering, requiring 4 a round round-trip on foot. It is a mixture of large mountains, high Andean plains, and the erosive forces of rivers. The climax of this section is a glacial cirque dominated by the wall of Loma Rabona and the great Salto del Olivares, one of the steepest waterfalls in Chile.

The third section, called the glacier section, corresponds to the upper sector of the valley, where the glaciers are recommended only for people with mountaineering experience and where at least three additional days should be considered. It is a demanding route that takes you to the high sector of the basin, where there is an almost continuous glacier field vital for the provision of water in the Maipo River basin. In this sector, you will find yourself inside the new Glaciares de Santiago National Park.

Mirador de Cóndores
Mirador de Cóndores Circuit
Section 3 | Landmark 8

THE FORMATION OF CAJON DEL MAIPO

To the east of the city of Santiago is a vast mountainous territory called the Andes de Santiago, with high mountains and deep valleys, glaciers and mighty rivers, rocky walls, accumulations of sedimentary strata, avalanches, and tenacious vegetation that has adapted to this rough geography. Everything is changing and still in formation. The fauna, for its part, has adapted. Villages and their inhabitants have been able to interpret this landscape to build a habitat, a cultural landscape. Here, mountains and their geology dominate.

A single river and its tributaries drain all the water that precipitates in the Andes of Santiago, and all of it flows to the sea and Pacific Ocean. This was a mighty Maipo River. The most important tributary rivers are Volcán, Yeso, Colorado, and Olivares, which feed Maipo in its mountainous section and define, to a large extent, what is traditionally known as the Cajón del Maipo.

Downstream and already on the plain, the Mapocho River is incorporated, which, in its Andean part, defines an important portion of the Santiago Andes. Thus, two basins, Maipo and Mapocho, and their corresponding mountain ranges define, to a large extent, the geographic space of the Santiago Andes.

The Cajón del Maipo has a great diversity of rocks and fossils that give us clues about the powerful forces that have been transforming and geologically shaping the landscape since the first rocks were consolidated 166 million years ago, up to the present day. We can find traces of huge glaciers that have already disappeared, dormant and active volcanoes, thousands of meters thick stratified rocks, mineralized veins, and fossil remains of land and marine animals. For millions of years, the Cajón del Maipo was home to living beings inhabiting the oceans. To learn about this history, we must travel back time.

If we were transported in time, just now when the oldest rocks of the commune of San José de Maipo were created, we would appear in a place covered and surrounded by seawater, in a shallow sea populated by aquatic animals. The continental coast would be to the east, while to the west, a chain of volcanic islands would demarcate the limit where the seafloor would gain depth abruptly. We would be in a sea-forming part of the Neuquén basin, which existed 166 million years ago when dinosaurs dominated the planet, in a geological period called

Olivares Valley

Jurassic. This is because the oldest rocks in the commune date from that time contained a great variety of fossils and marine rocks; that is, they are evidence that a marine basin existed 166 million years ago. These rocks comprise the Río Colina Formation, located south of the San José volcano in the southeastern part of the commune. Let us now return to the history of Neuquén Basin.

A basin is an area that is sunken with respect to its surroundings, like a gully. The Neuquén Basin was formed before the first rocks of the Cajón, approximately 200 million years ago, when the continents had a very different configuration from the present one. South America, Africa, Antarctica, India, and New Zealand were fused to form a supercontinent called Gondwana. However, 200 million years ago, Gondwana was fragmenting and separating, and in this process, the Neuquén Basin was born. This separation or fragmentation of the supercontinent is explained by the remarkable concept of plate tectonics and the drift of continents.

Part of Gondwana, which we know today as the South American plate, began to separate by moving westward, approaching, and colliding at its western edge with the neighboring Nazca oceanic plate extending eastward. Because the oceanic plate is denser and heavier, it began to sink under the South American plate in a process called subduction. This displacement towards the depths of the planet generated friction and an extreme increase in temperature between the rocks that rubbed against each other, forming magma. The subduction between the continental and South American plates and the formation of magma caused a period of strong volcanism on the Earth's surface, forming a strip of volcanoes, known as a volcanic arc, in a north-south direction in a position like today's Coastal Range. While the volcanoes grew and gained height because of the continuous subduction, behind the chain, to the east, the continental land was sinking under the weight of the volcanoes, curving enough for the oceanic water to find passages through which to enter and flood the basin completely, leaving a strip of volcanic islands separated from the continental land and forming the Neuquén Basin.

This shallow sea lasted for millions of years, until a major change occurred between 100 and 80 million years ago. The subduction angle between the South American and oceanic plates decreased. As a result, the area inside the volcanoes, instead of sinking under the weight of the volcanoes, began to compress, deform, and rise, thereby gaining altitude. As a result, the area inside the volcanoes, instead of sinking under the weight of the volcanoes, began to compress, deform, and rise, thereby gaining altitude. Therefore, the seafloor was uplifted, displacing the water and disappearing the basin. This entire process, which includes the compression, uplift, and disappearance of a basin, is called basin inversion and closure.

Parallel to the process of inversion and closure of the Neuquén Basin, the volcanic mountain range migrated eastwards towards the interior of the continent, forming the current Andes Mountain Range at the end of its migration. In this new scenario, the rocks of the Cajón del Maipo became continental terrain and were in the Cordillera, being in contact with air and terrestrial living beings and subject to the erosive forces of rain, rivers, and volcanoes, among others. To the west of the Cajon rocks, there was now a central plain and beyond it, the Coastal Range behind which the Pacific Ocean appeared.

We know about the terrestrial setting of Cajón del Maipo from the evidence treasured by the rocks of the Abanico Formation,

ABANICO BASIN

which crosses the entire commune from north to south in a thick strip positioned in the central part of the commune, covering a third to a quarter of its total area. This formation is 40 million years old and contains deposits of lava and incandescent materials that are expelled by eruptions. It also contains sediments originating and dragged by rivers and mountainous deposits, as well as fossils of terrestrial organisms. During this period, the configuration of the continents was relatively like that of today, but South America was an island not yet connected to North America through the Isthmus of Panama.

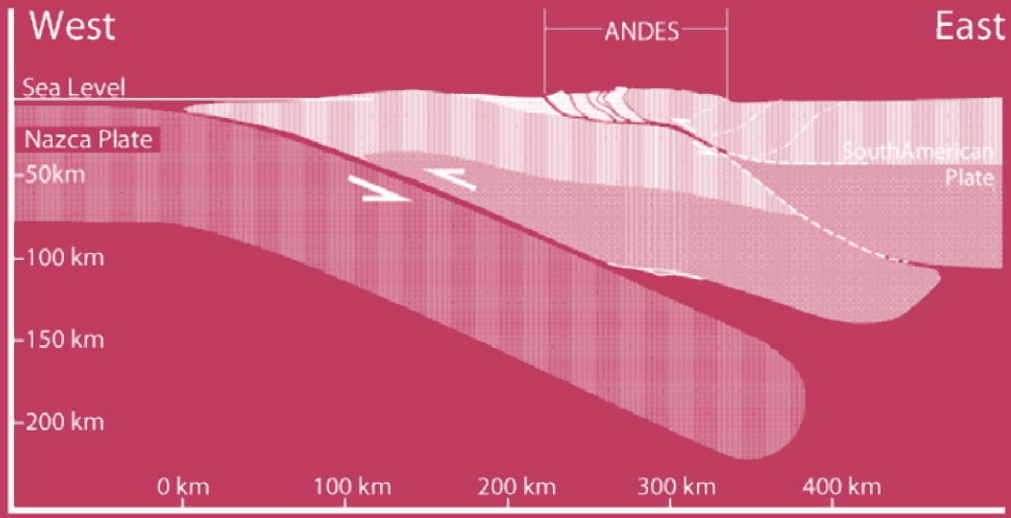
The last great geological moment that allows the final touches to the Cajón del Maipo occurs during the Quaternary, that is, from 2.6 million years ago to the present. Throughout this period, one of the main artists shaping the landscape was the glaciers that covered, extended, or retreated over the course of at least four glaciations, carving the characteristic U-shaped valleys. Two outstanding examples of this type of valley are the Olivares and Colorado River valleys. Volcanoes such as Tupungatito, San José, and Maipo also contributed to the landscape by adding lava and pyroclastic material to the environment; in fact, the large Diamante caldera is the remnant of one of the largest eruptions on the planet that occurred 450,000 years ago.

Finally, the alluviums and rivers dragged huge amounts of sediment, forming flat terraces, such as the plains on the banks of the Maipo River where the towns of El Manzano and San José de Maipo are located.

In summary, the Cajón del Maipo began its life 166 million years ago as part of a shallow marine basin that emerged from the waters and was in the recently formed Andes Mountains approximately 40 million years ago, and the forms that characterize it in the present, such as its glacial valleys, mining poles, and alluvial and fluvial terraces, after the last glacial period.

We know this history thanks to the evidence stored in the rocks of the Colina and Abanico formations and the more recent formations, such as the U-shaped valleys carved by glaciers, volcanoes, and the Diamante caldera. The geological record is so exquisite and diverse that the commune has been nominated for inclusion in the UNESCO World Geoparks. If you like the history of the formation and transformation of the Earth, you can learn even more, since we have only briefly summarized Cajón del Maipo's tremendous history. We invite you to continue exploring this topic. On the other hand, understanding the geological history of Cajón del Maipo, to a large extent, brings you closer to the geological history of the Earth.

SUBDUCTION



HOW TO GET THERE?

To access this Heritage Route from Santiago, take route G-25, called Camino al Volcán, which starts in the Las Vizcachas sector (0 km), in the district of Puente Alto, and runs along the north bank of the Maipo River. After crossing the bridge over the Colorado River, you will join route G-345 that leads to the villages of Los Maitenes and El Alfalfal along the southeast bank of the Colorado River (17 km). From turnoff to route G-345, another 19 km of paved road to the Trescientos ravine, where the parking area is located, and the Mirador de Cóndores circuit begins.

For the Olivares River circuit, on the other hand, you must continue along route G-345 from the Trescientos ravine for another 3.5 km to the entrance to the Alfalfal hydroelectric power plant, where the control barrier managed by AES Andes S.A. is located. After registering the entrance, one must travel 29 km to reach the olive intake, the starting point of the circuit. The route from access control was duly signposted to the start of the circuit.

ENTRANCE

For both the Mirador de Cóndores and Valle del Olivares circuits, access is regulated and permits must be obtained in advance through the website of the Ministry of National Assets. To do so, you must enter https://permisos.bienes.cl/ and follow the instructions detailed therein. Once you have your permit, which once approved, is sent to your email, you must present it along with your identity card or identification document at the corresponding checkpoint according to the circuit.

Laguna Picarte
Valle del Olivares Circuit
Section 3 | Landmark 18

MIRADOR DE CÓNDORES CIRCUIT

The Mirador de Cóndores circuit is operated during the day, with an extension of approximately 4 km and a 725 m difference in altitude. Its route is divided into three sections

SECTION 1

The first section is 1.3 km long, starting from the beginning of the hike, between the Trescientos ravine and route G-345. With an elevation gain of 270 m, it is a steep section where the trail winds parallel to the cliff among quillayes, hawthorns, and quiscos until it reaches Mirador del Viento, a landmark with a splendid view of the Colorado River, which allows you to cool off in the wind that blows this point on hot days. Consider a travel time of one hour to one and. h.

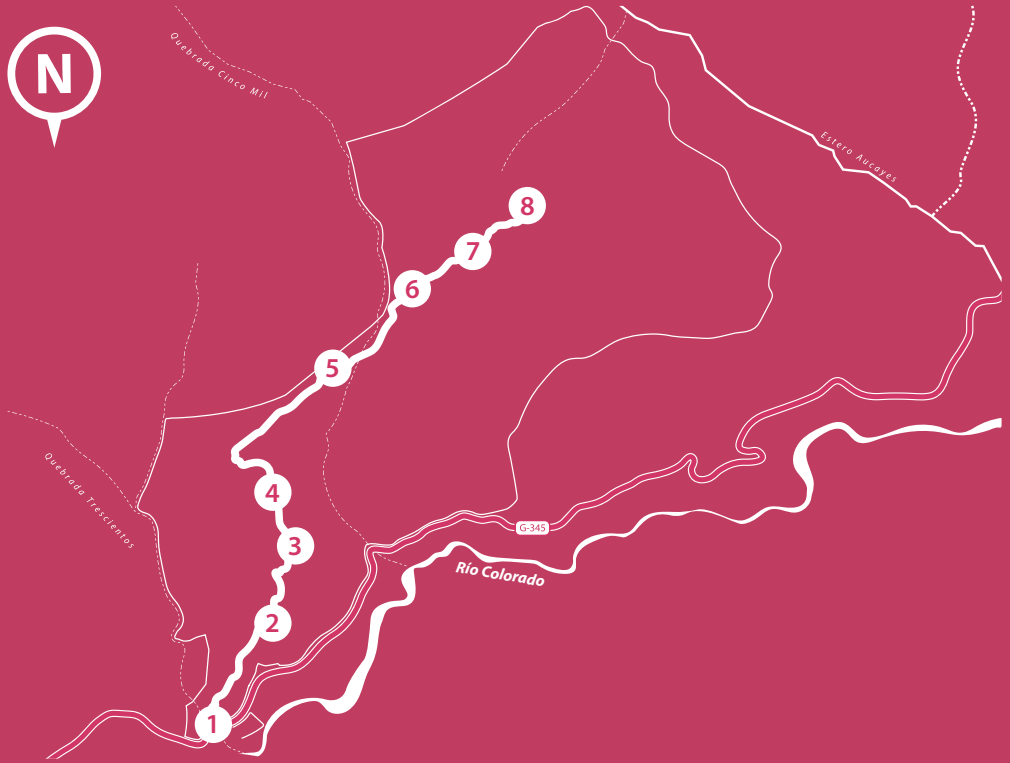
SECTION 2

The second section had an extension of 1.4 km and an elevation gain of 220 m. It will take you from Mirador del Viento to the Cinco Mil ravine, a refreshment point where you can get water and shelter from the sun under the shade provided by the sclerophyllous forest. Consider an additional time of an hour to an hour and a half of walking.

SECTION 3

The third section is 1.3 km long and has a 235 m difference in height. In this section the arboreal vegetation is left behind and rocky strata come into view, guiding the trail to the Mirador de Cóndores viewpoint, The culminating landmark of this circuit. Consider an additional time of an hour to an hour and half of the travel time.

Circuit



Landmarks

1. Quebrada Trescientos
2. Petroglifo
3. Mirador del Viento
4. Planicie Queltehues
5. Quebrada Cinco Mil
6. Bosque de Frangel
7. Estratos
8. Mirador de Cóndores

LANDMARK 1

QUEBRADA TRESCIENTOS

Coordinate (UTM WGS/84)	70°13'20"O 33°31'24"S
Altitude (m.a.s.l.)	1305
Accumulated distance (km)	0

From the parking area, you must cross road G-345 towards the Trescientos Ravine with caution. As soon as you enter the ravine, a well-marked trail appears in the southwest direction (right when you walk) that you must follow.

The path first takes you through vegetation typical of sunny slopes, where the hawthorn (Acacia caven), a tree that can reach up to 6 m in height and has the property of growing in stony and nutrient-poor soils, takes precedence. It is one of the most widely used species for firewood, charcoal and cattle feed in this area of Chile. In this section, xerophytic vegetation (species adapted to life in a dry environment), such as the quisco (Echinopsis chiloensis), is a shrubby plant that can reach up to 8 m in height. Like hawthorn, it is a characteristic plant of the sclerophyllous scrubland, frequent on slopes with northern exposure, in dry or stony areas. It has a characteristic red flower, which appears in November and December.

When you have traveled a little more than 700 m from the beginning of the trial, you will arrive at landmark n° 2 "Petroglifo" Here, you will be able to carefully observe rock art engraved in stone. Although there is no certainty of its age and who made it, some studies estimate that it corresponds to Aconcagua culture.

Quebrada Trescientos
Mirador de Cóndores Circuit
Section 1 | Landmark 1

LANDMARK 2

PETROGLIFO

Coordinate (UTM WGS/84)	70°13'20"O 33°31'19"S
Altitude (m.a.s.l.)	1455
Accumulated distance (km)	0,7

From landmark n° 2, the trail continued to climb steadily and steeply. This was one of the steepest routes. Leafy quillay trees will be found in some sections of the trail, which will provide shade on hot days. The quillay is an iconic tree of a sclerophyllous forest that grows on sunny slopes and poor soils and can reach up to 15 m in height. Quillay bark has been historically exploited for local use and export. The bark is not removed as this practice leads to tree death.

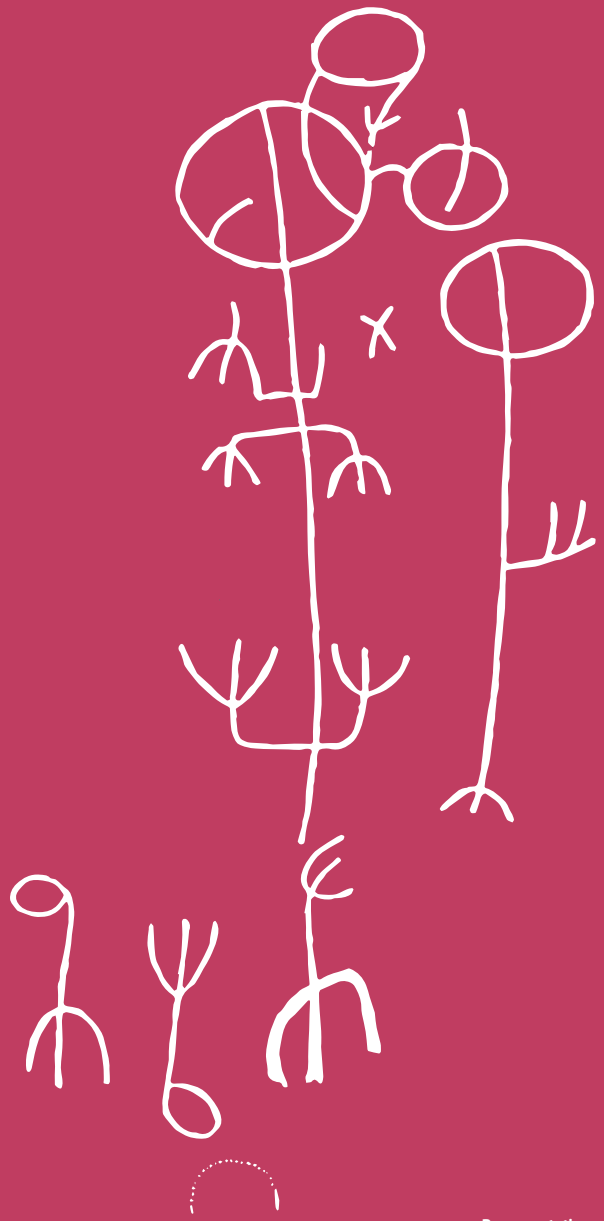
A little more than 500 m from landmark n°2, we reach Mirador del Viento, landmark n°3. This point offers an excellent view of the valley, allowing us to observe how the waters of the Colorado River pierced the canyon on their way to the sea. The landmark takes its name from the refreshing and constant current of air that passes through it.

Petroglifo
Mirador de Cóndores Circuit
Section 1 | Landmark 2

THE FIRST PEOPLE

The first records of human presence in the Cajón del Maipo date from approximately 10,000 to 8,000 B.C., approximately the same time as the first reports of human groups in what is now central Chile. Almost at the same time as the first reports of human groups in what is now central Chile. This is the archaic period and at that time the Maipo river basin was partially traversed by small bands of highly mobile hunter-gatherers whose main diet was associated with the consumption of guanaco meat and other animals such as foxes, viscachas and even pudúes. The settlements in the first phase of this period were functional camps that did not exceed 1,000 m above sea level; that is, they did not extend beyond what is now San José de Maipo. Particularly relevant in this period is the El Manzano Stream sector, where in one settlement, the skeletal remains of five or six individuals were found, as well as arrowheads and animal bones. Only around 2,500 B.C. did these human groups begin to expand along the Maipo Canyon, occupying sectors located above 2,500 m above sea level, similar to where the Baños Colina or the Mirador de Cóndores are located. However, settlements at higher altitudes are sporadic or transient. Vestiges found in the Yeso River Basin showed that the diet of these groups included an increase in the consumption of vegetables, such as quinoa. This finding also shows the interaction with trans-Andean groups, since there was no horticulture in central Chile at that time, so it is assumed that this activity would have started in the territory by bartering with these groups.

Around 400 B.C., a new historical period called Early Pottery began, which lasted until approximately 900 A.D.. During this period, groups of semi-sedentary horticulturalists associated with the Bato and Llolleo cultures appeared, who settled on river terraces below 1,500 m of altitude, such as the El Manzano Stream. Generally, they were small and probably family social units that coexisted with hunter-gatherers, who, unlike the former, settled in higher lands and were placed a little further away from the terraces where the horticulturists' hamlets were located. The gatherers occupied overhangs in rocky blocks on the slopes of mounts or secondary ravines. Today, these overhangs are known as stone houses, and some are still used by muleteers. It is estimated that during the first centuries of this period, there was a closer interaction between these two groups, with some degree of exchange where hunter-gatherers obtained ceramic vessels and cultivated vegetables, such as quinoa.



Representation of the petroglyphs of Mirador de Cóndores

During this period, the Colorado River Basin began to be more intensely occupied. Near the town of El Alfalfal and on river terraces located on both sides of the Cabeza de León or Quempo Stream, which is a tributary of the Colorado River, several indigenous settlements have been linked to the exploitation and processing of copper ore. One of these sites, Los Panales, can be associated with the first phase of occupation of El Alfalfal, dated between 600 and 700 A.D., where small social groups were organized under a few residential units. From this place, they would have occupied other small sites around the Cabeza de León Stream, one of which is known as Claros del Bosque, where a dozen small stones, several grinding hands, and ore slag were found, indicating that this place was used as a mill in the ore crushing process. Subsequently, from 900 A.D. onwards, new groups that could be assigned to the Aconcagua culture settled in the area. These new groups used a much larger space, occupying a large base camp known as Los Escobarinos 1, in which several residential units were installed. from which other sites around the Stream were accessed, as is the case for Los Maitenes 2, where remains found would allow us to estimate that copper processing, specifically smelting, was carried out in this place. Because of the ceramic items found at the site, which are associated with the Aconcagua style and a few remains of Diaguita ceramics, it is possible to suppose that the occupation of the El Alfalfal sector could have continued, at least until the Inca presence in the area around the 15th century.

Although research carried out on the opposite bank of the Colorado River failed to detect other settlements, petroglyphs were found. These were assigned to the Aconcagua style because they present signs with certain similarities to their ceramics. Unlike petroglyphs from northern Chilean cultures, those found in mountainous areas of central Chile are scarcer and more abstract. An intensely repeated sign appears, which archaeologist Hans Niemeyer called the "Shield Sign" because of its shape. One of these rock art manifestations can be observed next to the Mirador de Cóndores circuit, which presents not only the Escudo sign but also a main anthropomorphic figure with a phytomorphic aspect (with the appearance of a plant).

Although their interpretation is almost impossible, the fact that they are located in places not suitable for agricultural crops and in a high-altitude area with a wide view of the valley could help elaborate some hypotheses. . Considering research conducted at Los Ratones Mount, in the Los Queltehues sector, with petroglyphs strategically arranged in a similar way to the ones found at Los Queltehues, with petroglyphs arranged in a strategically similar way, it could be assumed that the petroglyphs at Mirador de Cóndores may have served as site and road markers, as well as a reminder or sign of the passage of individuals or tribes or, even, with spiritual significance if it is related to the expectation of obtaining game. Although their meaning will perhaps always be subject to debate, the petroglyphs at Mirador de Cóndores and the remains found in the vicinity of El Alfalfal indicate that these sites have been visited for many centuries.

Hans Niemeyer

LANDMARK 3

MIRADOR DEL VIENTO

Coordinate (UTM WGS/84)	70°13'36"O 33°31'30"S
Altitude (m.a.s.l.)	1575
Accumulated distance (km)	1,3

Mirador del Viento
Mirador de Cóndores Circuit
Section 1 | Landmark 3

From landmark n°3, the slope became less steep. After a short walk you will pass through a plain with quillay trees from where you will be able to observe to the right (southwest) the waterfall formed by the waters of the Cinco Mil. This location was suitable for short breaks. Continue walking along the path, while it begins to climb again between fringes until it reaches a notorious plain called Planicie Queltehues, which is landmark n°4 of the circuit. In this area, a seasonal lagoon is formed during some winters. This is a good resting point since it is located halfway to the viewpoint, and the trees of the place, typical of the Andean sclerophyllous forest, will provide good shade.

LANDMARK 4

PLANICIE QUELTEHUES

Coordinate (UTM WGS/84)	70°13'32"O 33°31'40"S
Altitude (m.a.s.l.)	1635
Accumulated distance (km)	1,6

From landmark n°4 Planicie Queltehues, the track crosses the plain on its west side (right in the direction of travel) to start gaining height again, zigzagging through a grove of tralhuenes. Tralhuén (Talguenea quinquinervia) is an endemic shrub that grows in degraded soils on sunny slopes, and its flowers are whitish in color and appear between August and October of each year. Its straight branches have numerous thorns and can reach a height of up to 3 m.

Leaving the tralhuenes behind, the trail begins to climb gently to the west, until it reaches a fence. You will have to cross the fence through a small valley until you reach the Cinco Mil ravine, which has a small stream from which to draw water if necessary. This stream corresponds to landmark n°5 of the route and takes its name from the homonymous mount from which its water originates. We recommend that you cross the ravine (a crossing that is not difficult at all) and advance 20–30 m to a forest to shelter from the sun and take a somewhat longer break.

Planicie Queltehues
Mirador de Cóndores Circuit
Section 2 | Landmark 4

SCLEROPHYLL FOREST

The conditions for plant life in the Andes Mountains of central Chile are adverse: very hot in summer and very cold in winter, with large temperature variations, even during the same day. The possibility for plants to hydrate and store water in this zone occurs almost exclusively in winter because rainfall does not normally occur in summer. In contrast, during the summer, under conditions of high temperatures and drought, vegetation is exposed to dehydration due to the loss of water through its tissues. This loss, called transpiration, occurs in leaf tissue.

Plants that live under these extreme climatic conditions or under the Andean Mediterranean climate have special leaves. Some of them are thick and hard, such as those of the quillay (Quillaja saponaria) and the litre (Lithraea caustica), which prevent dehydration by favoring water retention during periods of summer drought. On the other hand, there are species that have small, thin leaves, such as hawthorn (Acacia caven), which facilitates heat loss by reducing the need to transpire to regulate temperature. All these species and many more species can be observed along the circuit because they are immersed in the Andean Mediterranean climate. The Andean Mediterranean sclerophyllous forest and scrubland biome are characteristic of this climate. It is located between 200 and 2,200 m above sea level and has the largest vegetation formation in central Chile. The term forest refers to a plant formation dominated by trees, and the word sclerophyllous comes from the Greek words sklerós meaning "hard" and phyllon meaning "leaf." As we have already mentioned, the quillay and litter have this type of leaves and are typical representatives of the Andean Mediterranean sclerophyllous forest, to which we must add the distinguished frangel (Kageneckia angustifolia), all of which are endemic species of Chile. Another type of Andean Mediterranean Forest is the thorn forest, the main representative of which is hawthorn (Acacia caven). Unlike the sclerophyllous forest, the thorn forest is located between 600 and 1,100 m a. s.l., that is, at lower altitudes, and it is believed to correspond to a degradation phase of the original sclerophyllous forest. Finally, above 2,700 m.a.s.l. and above the sclerophyllous forest, the Andean Mediterranean grassland grows, which is also colloquially called "high altitude desert." Rosettes contain herbs, such as Menonvillea spathulata.

FRANGEL

Kageneckia angustifolia

ESPINO

Acacia caven

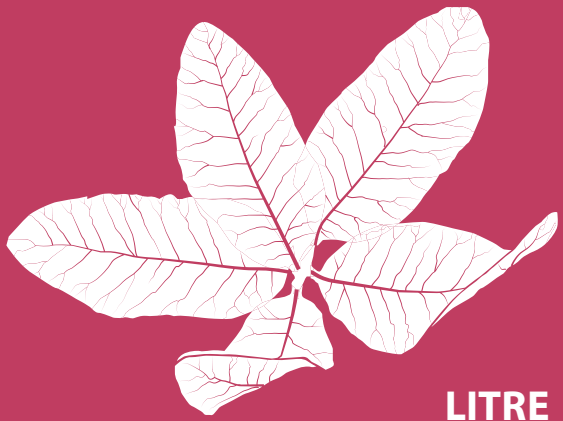
Let us return to the Andean Mediterranean sclerophyllous forest and scrub, and the species you observe along the circuit. Quillay and litre are predominant between the landmarks "Quebrada Trescientos" and "Planicie Quelthues" Planicie Quelthues'. These are evergreen trees with broad leaves, which tend to form clusters or patches, and have a very closed and low canopy, providing shade and shelter from high temperatures for various species, including humans who walk the circuit. To recognize the litre, it is sufficient to look at its leaves and appreciate the clear color contrast between the green and yellow edges and veins. The leaves of the quillay are easily recognizable by the trained eye, but the flowers and fruits of the untrained eye are distinctive. Its flowers, which emerge between December and January, are whitish and star-shaped, whereas their fruits appear to be woody, with star-shaped open arms. Quillay is a highly coveted species because of its presence in the bark of a chemical compound called saponin. Saponin is widely used in the cosmetology industry owing to its emulsifying capacity and in breweries because of its ability to produce foam. However, this endemic species of Chile has also been key in studies to generate effective vaccines against viruses, such as COVID, because saponin stimulates the immune system, favoring a good response to vaccines.

Around 1500 m.a.s.l., or from the Landmark "Planicie Quelthues," you will be able to discover the frangel. Unlike the litre and quillay, which are evergreen, the frangel loses part of its leaves in summer, and its canopy is very open and does not reach the ground; therefore, it does not provide as much shade as the other trees. This species resists snow better than litre and quillay, which is why it can grow at higher altitudes in the mountain range, demarcating the upper tree limit of the sclerophyllous forest. An interesting ecological role of the frangellum, recently reported by Chilean scientists, is that it acts as a nurse tree for its species. This means that under its canopy, it offers favorable conditions for seed germination and the growth of new fringes during the winter, increasing the survival of these plants to summer drought and favoring the regeneration of the forest.

Despite being very resistant to drought, the Andean Mediterranean sclerophyllous forest shows signs of deterioration. The mega drought that the central zone of the country has suffered from from 2010 onwards is taking it to its limit of resistance. The significant loss of canopy in trees and shrubs, together with the browning of their leaves (i.e., brown instead of green), are worrisome changes that Chilean researchers reported in 2020 in the mountainous area of the Metropolitan Region. According to these authors, the loss of

QUILLAY

Quillaja saponaria

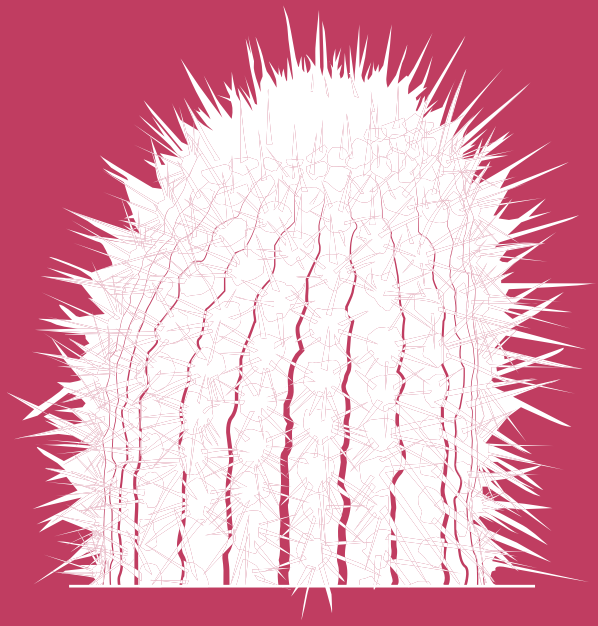


LITRE

Lithraea caustica

leaves is a strategy that would allow species to reduce water leakage through them and prolong the life of an individual in situations of water stress; however, at the same time, this implies a decrease in its capacity for growth and feeding, which may result in the death of the individual. However, it is not all bad news because they found that forests located at the bottom of ravines and gullies seem to retain moisture better and be more resistant to climate change, becoming important "wet refuges" to protect sclerophyll forests.

In summary, the Andean Mediterranean sclerophyllous forest and shrubland and the species that make up it have unique characteristics that allow them to withstand large variations in temperature throughout the year and throughout the same day, along with prolonged periods of drought. One of these characteristics is found in leaves, which are thick and hard. Some species, such as the litre, provide shade to many living beings that inhabit and pass through their surroundings, providing shelter from high or low temperatures. Others, such as quillays, allow the production of chemical compounds that are useful for cosmetics and vaccines. In addition, and like all forests, the Andean Mediterranean sclerophyllous forest protects the slopes of the mountsides, prevents erosion and the generation of alluvium, absorbs carbon from the atmosphere, stores it, and contributes to ensuring the water supply for the large population of the city of Santiago. Therefore, conserving the humid refuges of this forest is fundamental in the context of the climate crisis, so that it can regenerate and continue to enjoy the ecosystem services it provides to all living beings, including humans.



QUISCO

Echinopsis chiloensis

LANDMARK 5

QUEBRADA CINCO MIL

Coordinate (UTM WGS/84)	70°13'46"O 33°31'59"S
Altitude (m.a.s.l.)	1795
Accumulated distance (km)	2,7

From landmark n°5, the last section of the route begins, characterized by a constant ascent up to landmark n°7 Estratos, from which the slope decreases considerably and remains constant until the end of the circuit. The track began to cross the forest on a slope dotted with fringes.

It will be 545 m until the landmark n°6 Bosque Frangel, where a break can occur during the ascent. The frangel or olivillo de la cordillera (Kageneckia angustiflora) is an endemic species and one of the highest-altitude trees in this area (between 1,500 and 3,000 m a. s.l.). This species partially loses its leaves in summer, can reach up to 7 m in height, and has been used by muleteers and other inhabitants of the mountain range as firewood.

Quebrada Cinco Mil
Mirador de Cóndores Circuit
Section 2 | Landmark 5

LANDMARK 6

BOSQUE FRANGEL

Coordinate (UTM WGS/84)	70°13'59"O 33°32'10"S
Altitude (m.a.s.l.)	1880
Accumulated distance (km)	3,3

From landmark n°6, the route continues uphill. There will be approximately 100 m of unevenness until the slope flattens at landmark n°7 called "Estratos." Strata are superimposed layers (stacked one on top of the other) in which sediments and rocks are differentiated due to sedimentation processes.

The interesting thing about the strata is that they are fundamentally chronological units; that is, in general, every stratum is later than the one below it and earlier than the one above it. Knowledge of the strata serves as a basis for reconstructing the sedimentary filling processes of the sectors where they are found, such as the advance and retreat of water or the tectonic activity that occurred there. To the south, observe the beautiful strata that have accumulated in the mountains and photograph a curious rounded layer of clear rock composed of volcanic tuff.

Bosque Frangel
Mirador de Cóndores Circuit
Section 3 | Landmark 6

LANDMARK 7

ESTRATOS

Coordinate (UTM WGS/84)	70°14'11"O 33°32'18"S
Altitude (m.a.s.l.)	1980
Accumulated distance (km)	3,8

From landmark n°7, there is only 345 m left to reach landmark n°8 Mirador de Cóndores marked the end of the circuit. This section stands out not only for its gentle slope but also because from it, you can see the entire plateau that constitutes the Mirador; to the north, there is a vertical drop of about 800 m to route G-345 that allows access to this circuit.

During this short distance that separates landmarks n°7 and n°8, and over the hills that host the strata, one will be able to observe the northwest shoulder of Mount Piuquencillo, a mountain of more than 4000 m altitude that dominates the basin of the Aucayes stream, which is close to the west of the Mirador de Cóndores.

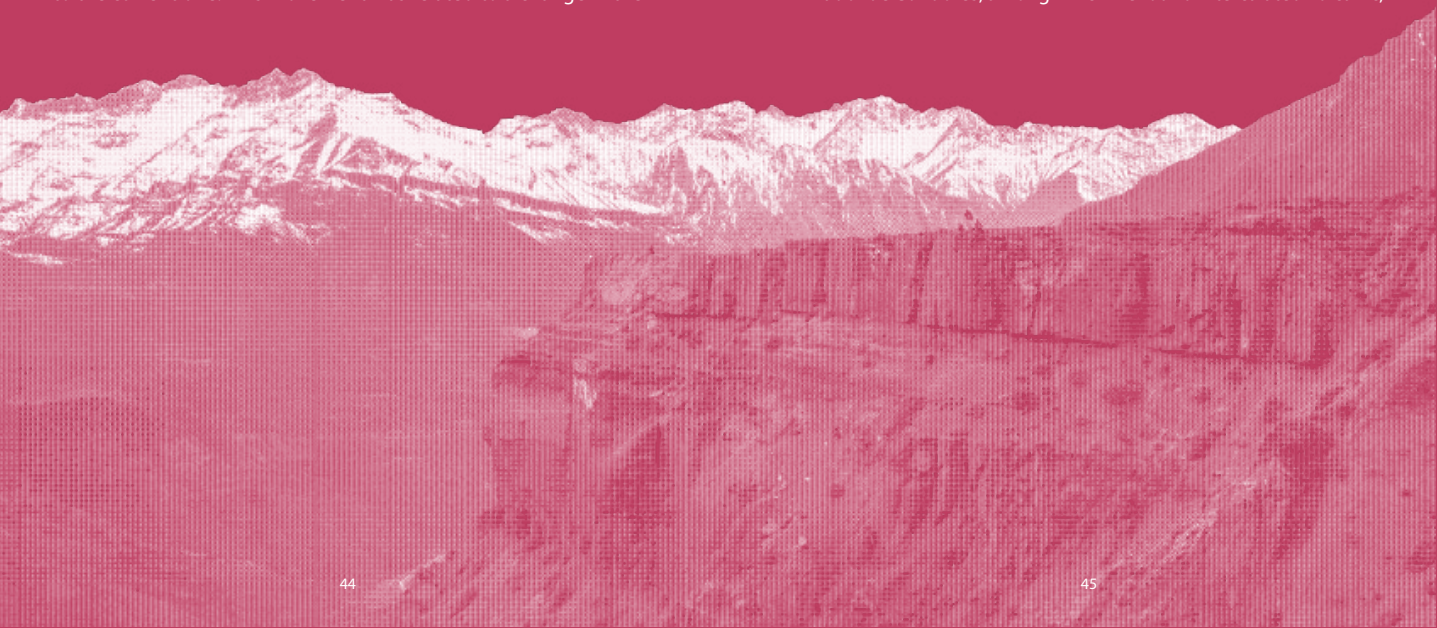
Estratos
Mirador de Cóndores Circuit
Section 3 | Landmark 7

FORMATION OF MIRADOR DE CÓNDORES

The Mirador de Cóndores not only attracts attention for the large number of condors that can be observed from its summit, but also for its striking rock formations. Its plateau configuration and almost vertical rocky walls allow it to stand out from its surroundings and allow us to contemplate the unparalleled views of the Colorado River valley to the north and the Aucayes River gorge to the southeast. In addition, when you reach the top, it is possible to observe peculiar rock forms that stand side-by-side, as if they had been carved by hand and arranged in that order in a premeditated way. As if this were not enough, along the route, you can see areas with layers of rocks stacked one on top of the other, distinguishable from each other by their colors and textures. How was Mirador de Cóndores formed? What story do these rocks tell us? Why was the plain left between the two rivers? The rocks that make up the Mirador de Cóndores were created more than 37 million years ago in a period called the Paleogene. It was a terrestrial environment of great volcanic activity, and there was a huge basin called the Abanico Basin, of which the Mirador rocks formed part of its floor. We start to go through this history from the beginning; however, if you want to know in more detail the history prior to the formation of the Mirador, the continental and tectonic context in which South America was located, and the Paleogene period, we can read the capsule on the formation of the Cajón del Maipo.

37 million years ago, the Andes Mountains and their volcanoes moved from their position on the west coast of the South American continent to the east, that is, inland, and acquired a position similar to the current one. This movement was related to a change in the subduction angle between the Nazca Plate and South America. During the movement of the volcanic arc and the Cordillera towards the interior of the continent, the mountain range grew and gained weight, resulting in the formation of a continental basin. This sunken area of the continent accumulated volcanic and volcanoclastic rocks and sediments originating from volcanic windows, rivers, and lakes for over 21 million years until the basin floor began to rise, gaining height or, in technical terms, the basin floor, as uplifted by a compressional process, and the basin disappeared approximately 16 million years ago. This basin is known as the Abanico Basin and has an enormous extension, from 29°S, where the city of La Serena is today, to 39°S, where the city of Valdivia is now and also includes Argentine territory. The soil of the Abanico Basin, together with all the rocks that accumulated during its existence, currently make up the Mirador de Cóndores.

How do we know about the volcanic environment in which the Mirador de Cóndores rocks were created and piled up? These rocks form layers or strata. Some rocks are due to the presence of volcanoes, whereas others are volcanoclastic. Volcanic rocks originate directly from volcanic windows, that is, lava emanating and bubbling from the earth's interior, as well as ash and pyroplastic bombs expelled by eruptions. Volcanoclastic rocks are a mixture of volcanic rocks with surrounding elements; for example, when lava merges with the surrounding sediment or with water from a river or lake to form a lahar. And here is an interesting detail not only do the volcanoclastic rocks suggest that lakes and surrounding rivers may have existed at that time, but also some of the Mirador strata are composed of fine-grained sediments, which usually originate from the presence of rivers or lakes. In conclusion, the rock strata of Mirador de Cóndores, among which we found intercalated volcanic,



volcanoclastic, and fine sedimentary strata, are evidence left by the past. This evidence tells a story about an active volcanic environment with volcanic windows probably surrounded by rivers and lakes. . It is now known that the Mirador rocks began their formation 37 million years ago in a volcanic environment with rivers and lakes, and that the rocks that compose it were piled up over millions of years, thickening the floor of a large basin called Abanico. We are left with the question of how the rocky outcrops of several tens of meters in height that form the cliff, plateau, and strange formations of its summit were carved. The summit and vertical wall formations have been carved, dissected, and isolated from the surrounding rocks over thousands of years by continuous water erosion. The friction and wear of water generate erosion, and since the Colorado River has been proposed as the main culprit, the process that gave rise to the El Mirador shapes is known as fluvial erosion. The friction and wear of water generates erosion, and since the Colorado River has been proposed as the main culprit, the process that gave rise to the El Mirador shapes is known as fluvial erosion. The concept of erosion refers to the removal of soils or rocks through the movement or transport of matter, whereas fluvial erosion refers to water channeled superficially on continents, such as rivers. Consequently, one of the reasons for the existence of cliffs and strange formations at the top of Mirador is the erosion caused by water on the rocks. However, why are these shapes rare and different? The explanation lies in the second important element: the composition of the rocks.

The rocks that make up the walls and floor are of different types, which makes some rocks harder and more resistant to erosion than others. For example, sandstone is less resistant to erosion than limestone and granite are. If we had a rocky area composed of intercalated layers of sandstone, limestone, and granite, and a river started flowing over this composition, the water would wear away much faster the sandstone parts than the limestone and granite parts. After thousands of years of work done by the water and in places where the water no longer flows, we would observe holes. In areas with limestone and granite, rock and plateau plains, rocky outcrops, and mounts are formed. The hypothetical example described above describes a process called differential erosion, which results in the creation of irregular shapes owing to the different strengths and hardnesses of the rocks that make up a surface. This seems to have happened at Mirador de Cóndores. Therefore, the striking shapes that exist on the top of the plateau, which stand between the two surrounding valleys and its rocky outcrops, are the result of fluvial erosion and differential erosion of the Colorado River on these rocks. Therefore, amazing is the Mirador Plateau, in which the formations of its summit and the rock layers that compose it have been selected as a geosite that is part of the proposed geopark in the Cajón del Maipo to be submitted to UNESCO. The relevance of Mirador is the story it tells about the Paleogene fan basin, its environment populated by volcanoes, lakes, and rivers up to the spectacular differential erosion it suffered due to the action of the Colorado River.

GEOLOGICAL STRUCTURE

LANDMARK 8

MIRADOR DE CONDORES

Coordinate (UTM WGS/84)	70°14'21"O 33°32'23"S
Altitude (m.a.s.l.)	2030
Accumulated distance (km)	4,0

The landmark n°8 Mirador de Cóndores is the final landmark in this circuit. With some luck, you will be able to experience the flight of contours that in this sector take the thermals that allow them to ascend without almost flapping their wings. On clear days, you will be able to see, to the east, that the summit of the Tupungato volcano, which has 6570 m.a.s.l., is the highest peak in the Metropolitan Region, as well as the marvelous rocky strata of various colors that rise in the Andean buttress. If you are going to approach the cliff, do it with caution and keep a sufficient distance from it.

Recall that you must have enough daylight for your return, which is done by the same path. It most likely took half the time it took you to climb.

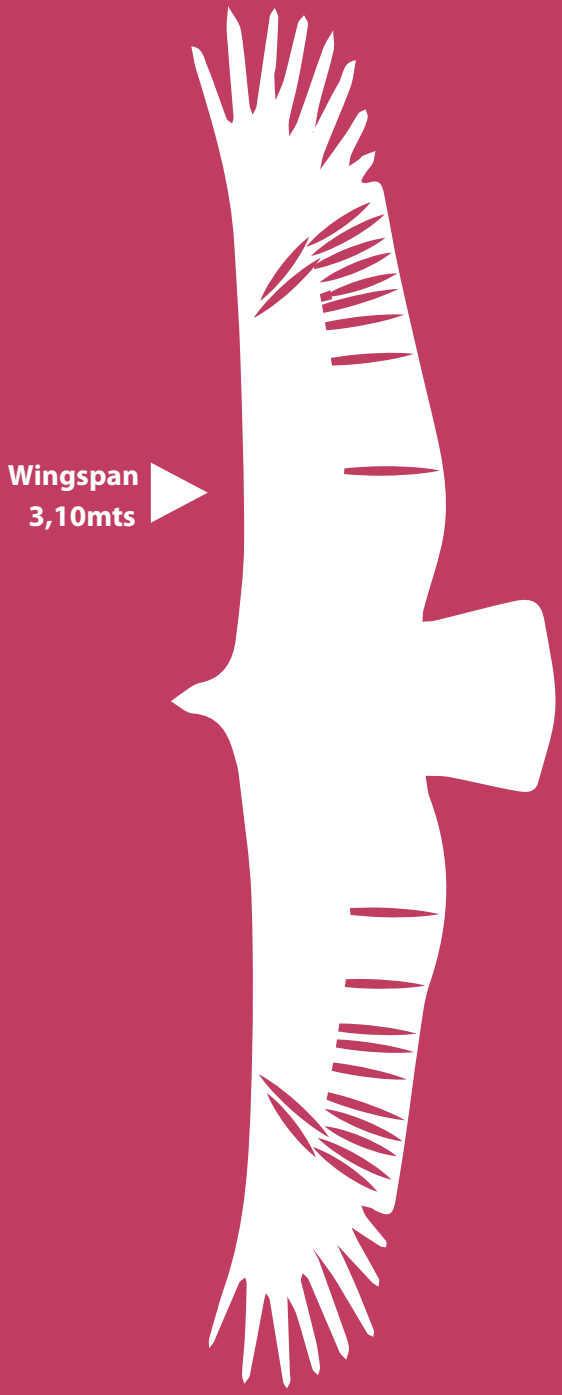
Mirador de Cóndores
Mirador de Cóndores Circuit
Section 3 | Landmark 8

THE CONDOR

When you reach the maximum height of the circuit, you may be able to observe the enormous bird that gives its name to this circuit, the condor. The condor (Vultur gryphus) is the largest flying bird along the entire length of the Andes Mountains, and ranges from Colombia to Tierra del Fuego. However, its largest population is found between Chile and Argentina, and its conservation status in our country is "almost threatened. "The inhabitants of the Andes Mountains are considered keystone species because of their relevant roles in various cultural domains, such as myth, art, politics, and identity, among others. Condors can fly 350 km per day and reaching heights of 7,000 meters. With their wings extended, they can reach 3.1 meters from tip to tip, have a height of 1–1.22 meters and weigh between 7.5 to 15 kilograms. The head and part of the neck are featherless, with the male having reddish skin in this section, while the female has gray skin. On the lower part of the neck, there is a wide white collar of feathers that can be distinguished even during flight. The rest of its plumage is black, except for a strip of white feathers on the dorsal part of its wings. The condor is a bird of prey, like the tiuque (Milvago chimango) and a black-chested eagle (Geranoaetus melanoleucus); however, it has some physical characteristics in its wings, beak, and claws, which make it easier and more efficient to feed on immobile or dead animals than to hunt them as tiuques and eagles. We will look at some of these attributes as we answer the question of why it is so common to see condors at El Mirador.

Although it is not yet clear why there are so many condors in the area, there are some ideas. It could be that the rocky cliffs that form the viewpoint are ideal nesting sites, which would make it easier for large numbers to congregate. Other options are that there is a greater concentration of food in the surroundings of the circuit, or that the air currents that facilitate their flight are more abundant in this area. None of the ideas have been proven through systematic studies or validated by scientists, but all of them are consistent with the needs for life of this species. We delve into each hypothesis.

The first one is related to reproduction. Condors like to lay their eggs and hatch them in cliffs with cavities or rocky ledges, which are characteristics that can be found in the highest part of the viewpoint. These formations could hinder the access of predators and make it easier for them to start flying each time they must leave



the nest. Let us remember that these are large animals, and what is most difficult for this type of bird is to start flying. The less flapping, they must perform, the better. Interestingly, this species forms monogamous pairs for life, with both parents caring for the young. Their reproduction rate is one of the lowest among birds, with only one egg per clutch. The time it takes to incubate and raise the chick until it becomes independent allows it to reproduce every two to three years. If the nesting site is successful, that is, if the offspring survives, the couple maintains it for years to come, could this be the case at Mirador de Cóndores?

Let us now move on to the second idea: the abundance of food. It seems that in the areas surrounding Mirador, there is an abundance of food and condors can feast frequently. These birds are scavengers, that is, they eat the remains of dead animals. Their strong hooked beaks, hence, the species name gryphus, "hook" in irrigation, allow them to open and slit the skin of carcasses, gaining access to the soft tissues on which they feed. An interesting characteristic is that their blunt clawed feet and toes with little bending capacity do not allow them to hold prey during flight, which is why they must feed on them wherever they find it. This differentiates them from birds, such as the tiuque and the black-chested eagle, which can bury their sharp talons and curl their toes to transport animals. Finally, to find dead animals, condors use their eyesight, observe the behavior of other scavengers, or visit places where they have found dead animals. This behavior could be one reason why they are here. The role of scavengers, such as condors, is of great value for the health of ecosystems as they consume decaying meat, eliminating potential sources of contamination and infectious sources of infection from the environment, thereby accelerating the decomposition processes of dead animals. In the past, condors fed on medium to large native herbivores, such as guanaco. However, over time, these animals have been displaced by livestock, and sheep, goats, or dead cows are now their main food sources.

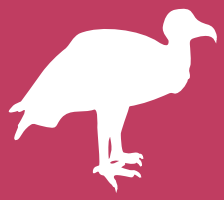
Let us address the last hypothesis of their abundance in El Mirador: the air currents. The bluffs of Mirador are located at the junction of two valleys, the Colorado River and the Aucayes Stream, where winds commonly originate, blow down through them, and collide with the abrupt rocky walls, forming ascending air currents that are preferred by condors. Because they are huge animals, they privilege gliding flight and gain altitude by taking advantage of ascending and circular currents of warm air, where they rarely beat their wings, avoiding expending energy to move through the air. In this context, the air currents generated at the lookout point can be appreciated by the condors, allowing them to reduce their physical effort to glide. At this point, we will make a small parenthesis to help you recognize the condors as they fly. The feathers at the ends of its wings are slightly curved towards the sky and noticeably separated,

Finger-shaped booms reduce turbulence and allow precise maneuvering.

During the “glide”, the wing tilts upwards.

as if they were fingers. These separate and long feathers are one of the most notorious characteristics that differentiate them from other raptors such as the tiuque and the eagle, which have feathers together at the end of their wings. In summary, if one observes a large bird flying, if it glides most of the time, gains altitude by flying in ascending circles without flapping, and seems to have many toes on the ends of its wings, it is very likely to be a condor.

In conclusion, why are the condors concentrated in El Mirador? Although to date there are no studies or scientific papers published on the subject, it is not clear why the condors are concentrated in El Mirador, and it seems that the condor colonies that exist in the sector, the air currents generated by the collision of the winds coming from the surrounding valleys, and the abundance of food would explain the large number of condors present in the circuit.



Take-off run

Cóndor Andino
(Vultur gryphus)

The Olivares Valley circuit offers different alternatives to travel it, from one day in its initial part as a simple hike, to at least seven days to its glaciers and only reserved for mountaineers. It has a total extension and round trip on foot of more than 100 km. It has three sections of different difficulty and duration: the first section, also called the short section of the Olivares River; the second section, also called the long section of the Olivares River; and the third section, called the glacier section.

Short stretch of the Olivares River: Bocatoma – Las Ramadas

The short section of the Olivares River has an extension of 6.3 km and consists of six landmarks. It starts at the Bocatoma Olivares landmark and ends at the Mirador del Valle landmark. It is a day tour that takes about 4 to 6 hours of round trips on foot, suitable for families who like to walk. In it you will be able to observe moraines that testify the modeling of the mountain landscape that made the glaciers, giving its characteristic "U" shape to the valley.

Long stretch of the Olivares River: Las Ramadas – Gran Salto del Olivares

The long section of the Olivares River consists of nine landmarks and has an extension of 24.6 km. However, an additional 6.3 km must be added to the short section of the Olivares River. It requires knowledge of camping and orienteering as well as 4 days round trip to cover it completely. It is a combination of large mountains, high Andean plains, and the erosive forces of rivers. The climax of this section will be a glacial cirque dominated by the wall of Loma Rabona and the great Salto del Olivares, one of the steepest waterfalls in Chile.dominado por la pared de la Loma Rabona y el gran Salto del Olivares, una de las caídas de agua con mayor desnivel de Chile.

Upper section: Glaciares

The glacier section is an additional 22.8 km long and consists of 12 landmarks. Covering the round trip on foot requires at least seven days (of which the first four days are common to the first two sections of the circuit). This corresponds to the upper sector of the valley, where glaciers are recommended only for people with mountaineering experience. It is a demanding route that takes you to the high sector of the basin, where there is an almost continuous glacier field, vital for the provision of water in the Maipo River basin. In this sector you will find yourself inside the new Glaciares de Santiago National Park.

VALLE DEL OLIVARES CIRCUIT

LANDMARK 1

BOCATOMA OLIVARES

Coordinate (UTM WGS/84)	70°08'01"O 33°24'12"S
Altitude (m.a.s.l.)	2060
Accumulated distance (km)	0,0

From the parking area in the vicinity of landmark n°1, Bocatoma Olivares, one must climb a marked trail that originates to the right of the totem pole, steadily ascending a mount originating from glacial moraine. When you have walked about 600 m, you will find the detour to the landmark n°2 Domo Olivares. From this point, it was 200 m from the dome.

Bocatoma Olivares
Valle del Olivares
Circuit
Section 1 |
Landmark 1

LANDMARK 2

DOMO OLIVARES

Coordinate (UTM WGS/84)	70°08'07"O 33°23'55"S
Altitude (m.a.s.l.)	2167
Accumulated distance (km)	0,8

From landmark n°2, Domo Olivares returns along the same trail to the turnoff, from where you continue following the trail, which is highlighted with apachetas in this section. This is an area of mounts originating from moraines. Moraines are signs in the landscape that mark sectors where the glacier has reached a certain extent in its various advances and retreats over the years.

From the turnoff to the Olivares Dome, it is approximately 1 km to landmark n°3 Mirador Rio Olivares.

Domo Olivares
Valle del Olivares
Circuit
Section 1 |
Landmark 2

LANDMARK 3

MIRADOR RÍO OLIVARES

Coordinate (UTM WGS/84)	70°07'50"O 33°23'20"S
Altitude (m.a.s.l.)	2211
Accumulated distance (km)	2,2

At landmark n°3 Mirador Rio Olivares: You will find a platform. It is a high sector ideal for the observation of the Olivares River Valley and the majestic flight of condors, especially in this section of the circuit. You can also observe how the river has been cutting through the valley, generating a deeper section of the valley.

From there, the route began to descend, approaching the river. It will be 2.3 km from the landmark n°4 Mirador Las Ventanas, which is located near a stream of the same name, from where you will be able to access water.

Mirador Río Olivares
Valle del Olivares
Circuit
Section 1 |
Landmark 3

LANDMARK 4

MIRADOR LAS VENTANAS

Coordinate (UTM WGS/84)	70°08'15"O 33°22'19"S
Altitude (m.a.s.l.)	2200
Accumulated distance (km)	4,5

From landmark n°4 Mirador Las Ventanas, the trail began to ascend between two small mounts, then turned east, and reached a flat area from which it advanced 200 m into the valley until it reached a detour to the Olivares River. This 150 m detour is made across the country until it reaches the landmark n°5 Mesa de Piedra.

Mirador Las Ventanas
Valle del Olivares
Circuit
Section 1 |
Landmark 4

LANDMARK 5

MESA DE PIEDRA

Coordinate (UTM WGS/84)	70°08'10"O 33°21'40"S
Altitude (m.a.s.l.)	2245
Accumulated distance (km)	5,8

The Mesa de Piedra corresponds to an erratic block, which is a rock dragged by glaciers. Once the glacier retreated, they were stranded, leaving traces of advances in the glacier tongues.

From landmark n°5 Mesa de Piedra returns to turnoff and crosses the Las Ramadas stream, from which point there is another turnoff, this time to the western slope of the valley. Cross-country approximately 300 m from landmark n°6 Mirador del Valle.

Mesa de Piedra
Valle del Olivares
Circuit
Section 1 |
Landmark 5

LANDMARK 6

MIRADOR DEL VALLE

Coordinate (UTM WGS/84)	70°08'27"O 33°21'38"S
Altitude (m.a.s.l.)	2278
Accumulated distance (km)	6,3

The landmark n°6 Mirador del Valle is the final landmark of the short circuit, where you will be able to appreciate the great panoramic view of the Olivares River valley and part of the Sierra Esmeralda, which generally presents snowy peaks that exceed 5000 m.

At this point, you can return along the same path to the starting point or continue the Olivares Valley circuit along the long stretch of the Olivares River.

Mirador del Valle
Valle del Olivares Circuit
Section 1 | Landmark 6

Long stretch of the Olivares River

LANDMARK 7

PRIMERA VEGA

Coordinate (UTM WGS/84)	70°08'17"O 33°20'32"S
Altitude (m.a.s.l.)	2261
Accumulated distance (km)	8,6

From landmark n°6, Mirador del Valle continues north along the trail, which is well marked at this point. After approximately 2.8 km through a relatively flat area, the landmark n °7 Primera Vega will be reached.

Landmark n°7 Primera Vega is the first high Andean wetland of the long stretch of the Olivares River and is an ideal place to break. Upon reaching it, it is recommended to border it on the right until it reaches its northern end where there is a Muleteer shelter or ruco. During springtime, it is possible to find small streams with water around this ruco that flows into the fertile plain.

From landmark n°7, Primera Vega continues inland, after 1.2 km the trail begins to climb the El Bordón slope following the ravine and with a view of the waterfall of the same name. Continue along the south side of the ravine until you cross the El Bordón stream in a flat section marked with "apachetas." Generally, this crossing does not have more difficulties than a jump, although in the period of thaws (November to January), its flow can increase.

Primera Vega
Valle del Olivares
Circuit
Section 2 |
Landmark 7

VEGAS ALTOANDINAS (HIGH ANDEAN MEADOWS).

Living beings that can withstand the climatic conditions present in Olivares Valley have conditions to survive in harsh environments. Water arrives almost exclusively in winter in the form of snow, whereas it is dry in summer. In winter, temperatures reach several degrees below zero, whereas in summer, heat is intense. Under these conditions, finding evergreen places seems to be the result of a hallucination; however, along the circuit that runs through the Olivares Valley, there are real oases where plant and animal life are concentrated, such as the high-altitude wetlands called vegas altoandinas (high Andean meadows).

High Andean meadows were formed in areas with almost permanent water availability. Some grow on the sides of slopes or streams where water flows liquid most of the year, whereas others originate in flat areas where water accumulates, and its movement is impeded or hindered. Both the cases were observed throughout the circuit. Vegas that develop near streams that run through sloping sectors are called hanging or slope vegas and are characterized by plants like round cushions that are hard to touch. Another type of vega grows in flat places, known as vega plana, and its vegetation formation resembles a carpet of freshly mowed grass. It is generally estimated that these high Andean wetlands are 70–100% covered by plants.

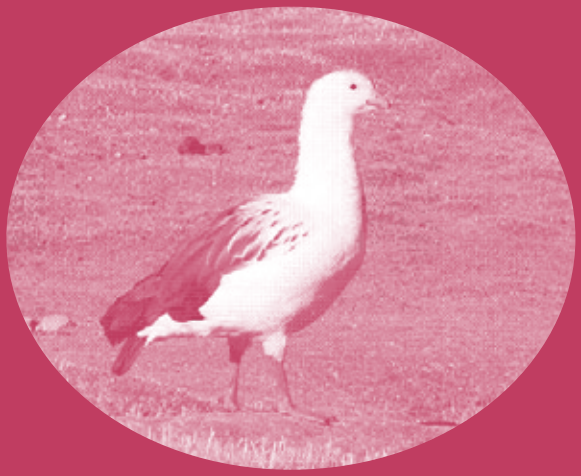
The vegas grow on land or sediments carried by glacial rivers or alluvium These manifestations of these earth movements are common to observe in the valley. No organic matter accumulates under the plants in the vegas, and there is little presence of living organisms in the substrate; therefore, the soil is practically non-existent. If we were to remove the vegetation layer of these wetlands, we would quickly come across the sediments of alluvial or glacial rivers, composed of little fine material and a large amount of coarse clasts or rocks.

These characteristics encourage the animals that live in the high mountains to concentrate on them, as they are focal points of biodiversity, since birds, mammals, reptiles, and insects know that they will find food and water there whenever they need it. This means that they are highly endemic, that is, we can find species that exist only in the mountain ecosystems of Chile. These characteristics make the high Andean plains ideal places to rest in silence and observe a large concentration of birds, such as the cushion partridge (Thinocorus orbignyianus), piuquén (Oressochen melanopterus), and the juarjual duck (Lophonetta specularoides). In addition to providing breeding and nesting sites for birds, they also allow for livestock feeding, transhumance as a way of life, and tourism. In summary, high-altitude wetlands provide many service ecosystems.

Vega Honda

In the Metropolitan Region of Santiago, we only have 49 km2 of wetlands, whereas the Los Lagos Region, for example, has 2,036 km2. There is still much research to be conducted on the role, dynamics, and functioning of high-altitude wetlands in Chile. However, wetlands in general, whether coastal or inland, saltwater, or freshwater, are fragile and valuable ecosystems. Consequently, all actions for their conservation and care that we, as visitors, can take, are important.

Perdicita Cojon
Thinocorus orbignyianus o.



Piuquen
Oressochen melanopterus

Pato Juarjual
Lophonetta specularioides s.

LANDMARK 8

LOMAS COLORADAS

Coordinate (UTM WGS/84)	70°08'42"O 33°19'01"S
Altitude (m.a.s.l.)	2434
Accumulated distance (km)	11,8

Lomas Coloradas is landmark n°8, it is an excellent viewpoint overlooking the colorful slopes on the other side of the Olivares River, which are home to the Lomas Coloradas ravine. Special attention should be paid to the large alluvial fan at its base, which originates from this ravine.

An alluvial fan is a landform formed when a fast-flowing stream enters a flatter area and its velocity decreases, spreading its channel and the sediments it carries. Along this route, this geoform is repeated in the lower areas of the ravines on the slopes on both sides of the valley.

From this landmark, one will also be able to observe the Tronco and Risopatrón mounts, both mountains over 5000 m that will adorn the landscape throughout the long stretch of the Olivares River.

From landmark n°8 Lomas Coloradas, the trail begins to descend from the Bordón slope until it reaches a plain next to the Olivares River, known as Vega Larga. The trail does not descend to this plain, but remains parallel to the edge of the river. From there, the route continues without great unevenness until it reaches the Cepo or Paramillos stream, which must be crossed with caution. This stream has a significant flow variation during the day. After crossing the stream, it was continued for 700 m until landmark n°9 Vega Amarilla.

Lomas Coloradas
Valle del Olivares Circuit
Section 2 | Landmark 8

LANDMARK 9

VEGA AMARILLA

Coordinate (UTM WGS/84)	70°08'30"O 33°17'45"S
Altitude (m.a.s.l.)	2376
Accumulated distance (km)	14,4

When you reach landmark n°9 Vega Amarilla, you must go around it to the left until you reach its northern sector, where there is a Muleteer ruco. This Landmark was the first possible camping point on a long stretch of the Olivares River.

It is recommended to set up camps outside the northern sector of the vega, taking care not to invade the space of birds that are concentrated in this sector. The water supply in Vega comes from a stream that runs down the hillside behind the ruco.

Landmark n°9 Vega Amarilla is also a connection point with other complementary routes to this heritage circuit. For example, one can connect with the Farellones sector by the Cepo pass, which is located one day away, or with the La Jarilla circuit, which requires two or three days.

From landmark n°9, Vega Amarilla continues north through shrubby vegetation and flat terrain, which then gives way to a rocky area where landmark n°10 Cascada Los Castaños was located.

Vega Amarilla
Valle del Olivares
Circuit
Section 2 |
Landmark 9

LANDMARK 10 CASCADA LOS CASTAÑOS

Coordinate (UTM WGS/84)	70°08'24"O 33°16'11"S
Altitude (m.a.s.l.)	2405
Accumulated distance (km)	17,5

The landmark n°10 Cascada Los Castaños is a staggered waterfall, one of the most beautiful in the valley that comes from the drawer and glacier of the same name, a "raised" or hanging valley, located at a higher altitude than Olivares Valley. These hanging valleys, of glacial origin, are common geoforms along this stretch; they can also be seen in the Esmeralda or Fierro estuaries.

From landmark n°10 of Cascada Los Castaños, the stream must be crossed with caution because it is activated by rainfall, increasing its flow, and dragging sediments. Hydration can be achieved if the water is not too cloudy.

After crossing the stream, it continued for approximately 600 m to landmark n°11 in Vega Honda.

Cascada los Castaños
Valle del Olivares
Circuit
Section 2 |
Landmark 10

LANDMARK 11 VEGA HONDA

Coordinate (UTM WGS/84)	70°08'17"O 33°15'54"S
Altitude (m.a.s.l.)	2405
Accumulated distance (km)	18,1

Landmark n°11 Vega Honda is an alternative campsite to that located at Landmark n°9 Vega Amarilla. This required an additional hour of hiking. It is a smaller place to set up a camp and water must be extracted from the vega itself. Despite this, the valley is one of the most beautiful areas on the route and offers unparalleled views of the Tronco and Morro del Fierro mountains.

Caution should be taken when approaching the rocky bluff on the western edge of the vega because of the risk of landslides. Vega Honda is also the right camp if you want to venture into alternative routes to this circuit, such as the Pircas Pass.

From the camp at landmark n°11, Vega Honda continues along the left side of the valley to its end. When leaving the vega, the trail enters a wide stony esplanade without a trail until it arrives at landmark n°12 Esmeralda Stream.

Vega Honda
Valle del Olivares
Circuit
Section 2 |
Landmark 11

EXPLORATIONS OF THE QUEIMPÚ (OR QUEMPO)

According to the geographer Manuel Abascal, at the beginning of the 20th century, the Olivares River basin, especially the area of its ice, was a nown corner for science, which is why it was called the "mystery of the Olivares". This enigmatic place led adventurers with different motivations to enter the drawer to reveal their secrets. We will tell you in the following paragraphs, we explain how these explorers gradually unveiled the halo of mystery that hangs over this corner of the Andes of Santiago.

We know that although there were pre-Columbian incursions in the high peaks that encased the valley, as corroborated by the findings of stone spheres in the vicinity of the Cepo pass or the Inca sanctuary of the Cerro El Plomo, no studies have confirmed the occupation of the Olivares River Valley by these communities. Nevertheless, the trooper trail from the Cepo pass to Vega Amarilla and the stone house that sits on it, both adjacent to the Olivares River, could indicate that these places also traveled during that time.

The first records we have of incursions into the Queimpú drawer, as Benjamín Vicuña Mackenna points out that in indigenous times the valley of the Olivares River was called, date back to colonial times and are associated with the search for a pass that would cross the Andes Mountains at this latitude. At that time, it was said that there was a "Friar's Road" between Santiago and Mendoza that linked these cities by crossing the Cordillera in approximately three days, was commonly used by a priest from Mendoza who left that city every Saturday, came to Santiago by a straight and unknown road, said mass in that city on Sunday and on Monday he was back in his parish. Although this story is a colonial legend, it is known that some baquianos of the La Dehesa hacienda, as well as smugglers of products and slaves, had found a path that allowed them to move from Santiago to Mendoza in a straight line. Two brothers, Marcos and Lorenzo Osorio, and a certain Antonio Arancibia, became famous among these Andean trekkers. These data motivated the Governor of the Intendancy of Córdoba del Tucumán, Rafael de Sobremonte y Núñez, to organize in March 1786 the exploration of this road by expeditionaries led by Lieutenant Pedro José Arenas. The details of this 12-day journey suggest that crossing of the mountain range was carried out through the Las Pircas pass. After this expedition, Sobremonte asked the Chilean Government to continue researching this Andean slope. The survey was finally entrusted in January 1799 to Italian architect Joaquín Toesca. The route chosen was to follow the Molina River, a tributary of the Mapocho River, and then pass through the Cepo pass to the Olivares Valley, following the course of the Pircas stream, which they were unable to cross.

Cerro Roth closes the Pircas pass on the south side

Although Toesca's exploration led to the official acceptance of the impracticability of the route through the Pircas Pass for a long time, it continued to be used by baquianos and smugglers, and even as a secret route in the process of independence. There are uncorroborated versions that Manuel Rodríguez used several times, some of which were accompanied by the patriot Ramón Picarte. The latter, after the disaster of Rancagua in October 1814, fled to Mendoza through the passage of Las Pircas, on which occasion he reported having seen a lead hill containing silver "charqueada" ore, covered by earth and facing east. This statement gave way to one of the most famous Andean legends: "El derrotero de Picarte' (Picarte's route), which, in part, allowed us to understand the toponymy of some of the mountains in the sector, such as Nevado del Plomo or Cerro El Plomo. What is documented is that General San Martín commissioned the engineer Antonio Arcos to evaluate this road as a mountain crossing for the Liberation Army of the Andes in 1817, but it was rejected due to the presence of penitent camps. Although the road "en derechura" continued to be of interest as an alternative route from the very beginnings of the Republic, as attested by the order given in 1820 by the Supreme Director Bernardo O'Higgins to some officers for its reconnaissance, it was not until the explorations of the Chilean Boundary Commission in 1897, headed by Luis Risopatrón, that its study was officially resumed. This Commission entered through the Cepo pass to go up to the Pircas pass, where it placed a demarcation marker and, although it explored the Olivares River valley, it did not venture beyond the Gran Salto del Olivares. Nevertheless, these explorations allowed Risopatrón to publish in 1897 the first version of a chart of the area that showed the Olivares River sector almost as a large blank space. Subsequently, the Boundary Commission published in 1915 the first edition of the national chart of Chile, in which the Olivares River area was shown in greater detail, but without demarcating a large area of 60 km between the Las Pircas pass and Navarro pass, because of the difficult terrain that did not allow geodetic work to be carried out in the area.

Manuel Rodriguez

LANDMARK 12 ESTERO ESMERALDA

Coordinate (UTM WGS/84)	70°07'35"O 33°14'28"S
Altitude (m.a.s.l.)	2455
Accumulated distance (km)	21,3

From landmark n°12 Estero Esmeralda, it is possible to observe the Estero de las Pircas on the other side of the Olivares River, which leads to the passage of the same name. From this landmark, it is also possible to visit the Esmeralda Gorge, which allows one to approach the front of the glacier.

To continue with the circuit, the crossing of the Esmeralda stream can be somewhat complicated during thawing. This may require getting your feet wet. After crossing the stream, it continues for approximately 1.1 km over a wide rocky terrain until landmark n°13 Morrena Alta is reached.

Estero Esmeralda
Valle del Olivares
Circuit
Section 2 |
Landmark 12

LANDMARK 13 MORRENA ALTA

Coordinate (UTM WGS/84)	70°07'05"O 33°13'59"S
Altitude (m.a.s.l.)	2481
Accumulated distance (km)	22,4

As its name indicates, landmark n°13 of Morrena Alta is a geoform that arose from the retreat of the glaciers that covered the Olivares valley. To continue from here, you must border the moraine along its right side until you reach a small rise next to the stone monolith at the top of the moraine.

In spring, it is possible to find a small stream running down the eastern slopes of the valley, but it disappears as summer progresses. From Morena Alta, the trail continues into the interior, bordering the Olivares River through stony terrain without a trail, although there are small "apachetas" that guide the route. The circuit continues along the Olivares River until it reaches the second slope of the circuit, which is called the Tabolango slope. The tabolango or chinchemolle (Agathemera crassa) is a native insect typical of the Andean ecosystems of central Chile. This insect shoots a foul-smelling liquid when disturbed.

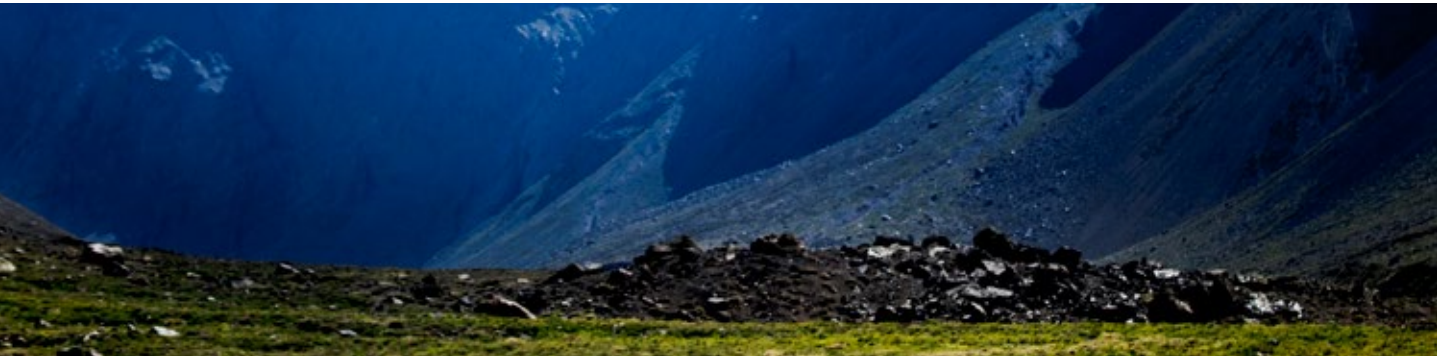
The trail climbs up this slope to its highest point, from which it is possible to observe a wide panoramic view of the Olivares River Valley to the Vega Honda sector to the south. In this sector, the river divides into several branches that resemble a braid. This fluvial geoform is called an anastomosed river because the slope in this area is very low, and the runoff does not have the energy to erode or deepen its channel, and with a low or weak slope, the runoff has little energy and begins to drift and erode to the sides or margins and sedimentation occurs.

Continuing, you will cross a ravine called Quebrada Blanca with a 50-meter crossing that could have water with snow during the spring season. After passing this ravine, the trail ascends again and then descends abruptly for approximately 200 m on loose terrain with large rocks.

The section runs parallel to the Olivares River along the flat terrain following the upper terrace of the Olivares River and skirts the escarpment until the terrace widens before the river enters a narrow pass.

On this plain, you must leave the Olivares River and begin to climb the Ferrosa slope in zigzag following apachetas. It is 150 m in unevenness until it reaches the top of the slope. At this point, we continue flat terrain winding between large rocks and then begin a steep descent to the Rinconada ravine. After crossing the ravine, the trail continues parallel to the Olivares River until it reaches two large rocks that mark Landmark n°14 Rinconada.

Morrena Alta
Valle del Olivares
Circuit
Section 2 |
Landmark 13



LANDMARK 14 RINCONADA

Coordinate (UTM WGS/84)	70°06'53"O 33°11'48"S
Altitude (m.a.s.l.)	2758
Accumulated distance (km)	27,3

At landmark n°14 Rinconada, there is a cave in which the muleteers call the Cueva de María (Mary's Cave). Near these large rocks, there is sandy and flat land where it is possible to set up a camp in the spring season because there is a small stream of water in the mail. In summer, this stream disappears and is not suitable for camping due to this situation.

From landmark n°14 Rinconada, you must climb 25 m up the western slope following the apachetas until you reach a terrace. Continuing into the valley, you will see the great vertical wall of Loma Rabona that closes the valley in a great glacial cirque.

The Loma Rabona is flanked by two large waterfalls: to the left of the Picarte Stream, which forms the Great Olivares Waterfall, and to the right of the Juncal Sur Stream. When both streams join, they give birth to the river.

Once you have traveled 1.2 km from Rinconada, you will reach a wide plain known by muleteers as La Cancha.

Cross La Cancha longitudinally along its right edge and then take a ravine that ascends diagonally towards the Gran Salto del Olivares.

There are no trails to guide the way; therefore, you will have to take the waterfall as a reference. When you have traveled 1.5 km from La Cancha, you will reach landmark n°15 Gran Salto.

Rinconada
Valle del Olivares
Circuit
Section 2 |
Landmark 14

LANDMARK 15

GRAN SALTO

Coordinate (UTM WGS/84)	70°07'59"O 33°10'24"S
Altitude (m.a.s.l.)	2878
Accumulated distance (km)	30,9

Landmark n°15 Gran Salto del Olivares is the final landmark of the long stretch of the Olivares River. This waterfall, one of the largest in Chile, is formed by the waters of the Picarte Stream, which descends the vertical walls of the glacial cirque that closes the valley.

Be cautious when approaching the edge of the waterfall as it keeps the terrain wet, making it slippery. If you decide to camp in the vicinity, it is recommended that it be conducted in a plain located 500 m before the Great Fall. Water can be drawn from Picarte Stream, which flows down pristine in spring, but will have some sediment in the summer.

Gran Salto
Valle del Olivares
Circuit
Section 2 |
Landmark 15

TWO SHAPING AGENTS OF THE OLIVARES RIVER VALLEY

The Olivares River Valley is one of the longest in the commune of San José de Maipo. It has a north-south orientation, and its very marked river, which crosses it almost completely, is formed from the melting of snow and glaciers located on its high peaks in the extreme north. Thus, it runs 41 km from its headwaters to join the Colorado River. This distance is like that between Santiago and San José de Maipo. The valley basin has an area of 466 km2 and its current shape, especially the slopes of its mountains and the arrangement of its rocks, among other elements, are the work of mainly two actors or modeling agents that worked on the relief: the glaciers and the rivers. Let us begin with the first example.

This area of the Andes Mountains was covered by extensive glaciers in each glacial period during the last 2.5 million years, during which time these ice masses grew in volume and extension, carving mountains and valleys; in the last glaciation, called the Portillo Glaciation, which ended 14,800 years before the present, glaciers advanced through the valley up to 2,650 m above sea level; in the penultimate glaciation, called the Guardia Vieja Glaciation, they reached 1,600 m.a.s.l., and in an older one, called the Salto del Soldado Glaciation, they reached 1,300 m a.s.l. Between glaciation periods, there are periods when temperatures increase and precipitation decreases, causing glaciers to shrink and retreat. These lapses are called interglacial periods, and it is believed that the Earth will be experiencing one of these periods during the present. Returning to the glaciers and the Olivares River valley, each cycle of glacial advance and retreat allowed the powerful forces of these ice masses to shape the landscape leaving the characteristic U-shaped valley and the moraines that can be observed along the valley, both attributes described in the capsule on glaciers. However, there are two additional elements linked to the existence of glaciers that have attracted attention and are part of the landscape of this basin.

The first is waterfalls, which can be observed along the route through the valley, both in the western and eastern borders. The waterfalls are indicators that behind them, there are hanging valleys, which in the case of Olivares are located above 100 meters high on the sides of the river. Hanging valleys originate from small glaciers that feed the main glacier, something like what happens with small rivers tributary to a large one. Since small glaciers have less mass and erosive force than large glaciers, their ability to undermine the ground and walls is less, forming smaller U-shaped valleys on one side of the main glacier and at a higher altitude. Thus, when temperatures rise and the glaciers retreat, clearing the terrain, the U-shaped valley floors of the small glaciers are several meters above the main glacier, separated by quasi-vertical walls. That allow the formation of waterfalls originating from the thawing of tributary

V-shaped valley: Excavated by a river

U-shaped valley (Artesa): Excavated by a glacier

U / V valley (Mixed): Excavated by glacier and the by a river

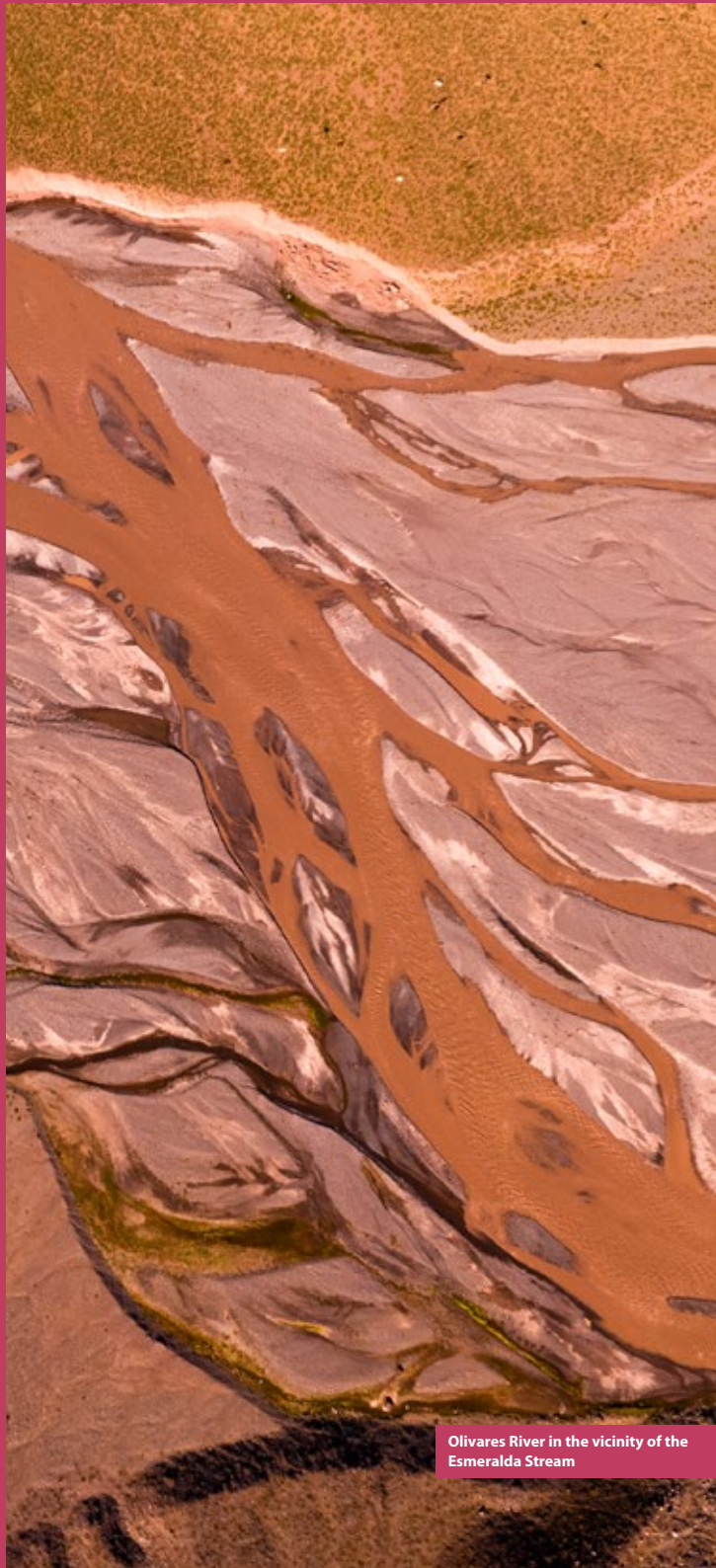
glaciers. Whenever a waterfall is observed during the long section of the Olivares River, it is likely that there is still a glacier at a high altitude that has carved a hanging valley.

Another striking element that you will see along the route is the huge rocks scattered throughout the circuit in flat places or relatively far away from other rocks or rock walls, which were also brought there by glaciers. These rocks are called erratic blocks and are characterized by large angular rock fragments, which differ in composition from the surrounding rocks, both from the ground where they rest and from the nearby walls and can even be found hundreds of kilometers away. These erratic blocks were displaced from their place of origin by being incorporated into the ice mass of the glacier, thus, enveloped by the ice or on the ice, they are dragged during periods of glacial growth and transported by the ice during its advance, like the movement on a conveyor belt. Subsequently, as the temperature rises and the glacier melts, the ice that enveloped the erratic blocks disappears, and they are deposited several kilometers away from their place of origin. When many erratic blocks are distributed in a sector, it is usually called a field of erratic blocks, which can show the erosive power of the glacier and the direction of the glacier front displacement.

For erratic blocks to be transported, they must first be formed; to do so, the block must be separated from the rest of the slope or bedrock. This occurs because of a process called gelifraction or cryoclastism, which is caused by the freezing and thawing of water inside the cracks. During the day when the temperature rises, the snow and ice on the glacier melt and water penetrates the crevices of the rocks surrounding the glacier. At night, the temperature drops to 0°C or below, and the water inside the cracks refreezes and increases in volume. Consequently, the crack enlarged. The repetition of this freezing and thawing process results in the cracks becoming increasingly larger over time, until at some point in time, a piece of rock or block will eventually detach from the slope and become available for transport.

The second artist who sculpted the shapes of the Olivares River Basin were rivers. The erosive force of these watercourses performed its molding work once the large glaciers had taken refuge at the heights, that is, when the last glacial period ended. The two main landforms left by the rivers were a small V-shaped valley in the eastern part of the basin and alluvial fans on the sides of the valley.

Because melting glaciers form watercourses that, because of gravity, flow down the slopes, it is very common that after glacial erosion that forms U-shaped valleys with flat bottoms, the watercourses begin to erode this soil. The steeper the slopes around the rivers, as is the case in the Andes Mountains, the faster and stronger the



Olivares River in the vicinity of the Esmeralda Stream

water flow, breaking fragments of the surrounding rocks, tearing them up, and transporting them to places with lower slopes. The same fragments transported by the river also help break up and further fragment the soil through which it flows. These fragments are known as sediments, and the process of wearing away and displacing this material by a river is known as fluvial erosion.

In places with high slopes, the greatest fluvial erosion is vertical or linear, that is, it undermines the base of the river and its soil. As the river furrow deepens, the channel walls are exposed to freeze-thaw weathering and other erosive agents, such as rainfall. Consequently, the rocks of the walls broke and detached from the slopes, creating a V-shaped valley. This form can be observed on the east side of the Olivares River valley, generating a mini V-shaped river valley nested in the glacial valley, which can be clearly observed at landmark n°3 in Mirador Río Olivres. However, along the Olivares, there are also sections that form meanders, places where the river is shallow, and where its course is winding or with many bends. This occurs because the slope decreases in these sections, the water loses its strength to transport sediments and begins to accumulate them, and the predominant erosive force is lateral, that is, the channel widens. Finally, if you look carefully at both sides of the valley in the areas where the relatively vertical walls meet the flat valley floor at some distance, you will find accumulations of sediments in the shape of a fan or triangle. They are called fluvial fans and are left and probably continue to be left by the creeks and stream tributaries of the Olivares River. Watercourses that flow through steep slopes have the force to transport sediment because of the velocity and energy they accumulate. As mentioned above, this force is lost when the river reaches flat or low slopes, thus losing its capacity to transport sediment. When the change in slope was abrupt and the slope changed from a place with a steep slope to one with almost no slope, the sediment deposition was also abrupt, remaining in the form of a fan (semicircle). Therefore, where you see river fans at the base of the vertical walls of the Olivares River valley, it is likely that there was a riverbed that went from a high gradient to a very low gradient in a very short distance. In summary, the current shape of the Olivares Basin is primarily due to glacial and fluvial erosion. The former left a U-shaped valley, moraines, hanging valleys from which waterfalls and huge rocks scattered on the terrain emerged. Subsequently, the small and large rivers finish carving out a small V-shaped valley and river fans over which you will have to pass to reach the Gran Salto del Olivares.

Second Salto del Olivares

UPPER SECTION: GLACIERS (LANDMARKS 16 AL 27)

The glacier section is an additional 22.8 km long and consists of 12 landmarks. It is a demanding route that takes you to the upper sector of the basin, where you can set up a base camp at milestone 18 Laguna Picarte and from there, hike for the day to visit the attractions of this sector of the basin. One of the suggested combinations of hikes is to enter the western sector of the basin connecting landmarks n°19 to n°22, returning to spend the night at Picarte Lagoon. A second route leaving the Picarte Lagoon connects landmarks n°23 to n°27.

To continue with the upper section, called Glaciares, you must cross the Picarte stream in the direction of landmark n°16 La Isla.

To do this, one must return 500 m and go down to a sandy beach on one side of the Picarte Stream. Look for a wide section to forge a stream. The difficulty of this crossing depends on the time of year. In spring, and before the thaws, trekking poles will be sufficient to forge the estuary; in summer and in times of thaw, the flow will increase in strength, so it is advisable to use a rope and harness to forge the estuary. After crossing the Picarte Stream, you can set up a camp in the first flat place you find. This sector is a landmark on n°16 La Isla. This section is only recommended for people with mountaineering experiences.

GLACIERS SECTION

16 Tramo Glaciares
17 Segundo Salto
18 Laguna de Picarte
19 Laguna Barrosa
20 Salto Píderit
21 Mirador Glaciares Olivares
22 Lagunita Colorada
23 Laguna Sierra Blanca
24 Mirador Juncal Sur
25 Laguna Rabona
26 Mirador Frontal
27 Mirador Loma Rabona

LANDMARK 16 LA ISLA

Coordinate (UTM WGS/84)	70°07'38"O 33°10'31"S
Altitude (m.a.s.l.)	2846
Accumulated distance (km)	31,7

Landmark n°16 La Isla takes its name from the fact that it is located on a triangular piece of land isolated from the rest of the Olivares valley. On the north side, the island is enclosed by the great wall of Loma Rabona; on the east side, it is surrounded by the Juncal Sur Stream. On the west side, Picarte Stream separates it from the rest of the valley.

From Landmark n°16, there were no trails, and only a few small trails marked the way to follow. Continued advancement by the circuit continues parallel to Picarte Stream in the direction of the steep and loose carriers located on the eastern side of the estuary.

As you go up through these carries, you begin to enter the box that houses the Olivares waterfall. It is a difficult section where you will have to traverse eroded and unstable slopes. Special attention should be paid not only to exposure but also to rock falls that may originate from the upper areas of the rocky outcrop.

The hike zigzags between rocks gradually ascend the 250 m elevation difference and 1.3 km that separating the landmark n°17, Segundo Salto, from the previous landmark.

La Isla
Valle del Olivares
Circuit
Section 3 |
Landmark 16

LANDMARK 17 SEGUNDO SALTO

Coordinate (UTM WGS/84)	70°08'13"O 33°10'13"S
Altitude (m.a.s.l.)	3092
Accumulated distance (km)	33

As its name indicates, Landmark N° 17 of Segundo Salto is an intermediate waterfall of Gran Salto de Olivares. At this point, the route comes within a few meters of this great waterfall, and it is inevitable for it to get wet. At this point, the trail comes within a few meters of this large waterfall, and it inevitably gets wet from it. Caution should be exercised when passing through this section because rocky terrain is very wet and slippery.

The circuit in this place ascends by loose carries parallel to the rocky buttresses that originate in this second fall, always looking at a zigzag between these buttresses. After approximately 1 km and 300 m of elevation gain, one emerges from this steep slope into an open valley with the Lliboutry waterfall and snow-capped summit of the Federation Mount, crowning the landscape. This waterfall takes its name from Louis Lliboutry, one of the most important glaciologists in Chile, and the first to study the glaciers of this place in depth.

Continue along this valley towards the Lliboutry waterfall, but before reaching it, go up a new rocky buttress of rocks polished by glacial action. This geoform is known as a scoriated rock. After the ascent of the rocks, you will reach a plain dotted with rock. Walk northwest until you see Picarte Lagoon.

The Picarte Lagoon is the Landmark n°18 of the circuit, it is recommended to set up camp at its western end near the lagoon's outlet since runoff generates better quality water.

Segundo Salto
Valle del Olivares
Circuit
Section 3 |
Landmark 17

LANDMARK 18 LAGUNA PICARTE

Coordinate (UTM WGS/84)	70°08'49"O 33°09'09"S
Altitude (m.a.s.l.)	3647
Accumulated distance (km)	36,2

Landmark n°18 Laguna Picarte will be a key site for the next few days, as the next tours in the sector will take place from this camp. The Picarte Lagoon, like most of the lagoons found in this sector, was generated by the retreat of the Olivares glaciers.

One route is to leave Picarte Lagoon to the west to visit Laguna Colorada and return to Picarte Lagoon to spend the night. The second route is to leave this lagoon towards Miador Juncal Sur, Mirador Frontal, and Mirador Loma Rabona. To continue the circuit, Landmark n°18 Laguna Picarte, head west following the direction of the valley through the moraine terrain until you reach, after only 700 m, Landmark n°19 Laguna Barrosa.

Laguna Picarte
Valle del Olivares
Circuit
Section 3 |
Landmark 18

LANDMARK 19 LAGUNA BARROSA

Coordinate (UTM WGS/84)	70°09'14"O 33°09'12"S
Altitude (m.a.s.l.)	3622
Accumulated distance (km)	36,9

Landmark n°19 Laguna Barrosa, like the Picarte Lagoon, originated from glacial retreat. Unlike the blue waters of the Picarte Lagoon, the Barrosa Lagoon has a light brown color - hence its name–because of the sediments in its waters.

In Laguna Barrosa, there is a beautiful view of the Olivares Gamma glacier. It is advisable to border Laguna Barrosa on its left side, which requires crossing the estuary that drains the lagoon. Depending on the season or the time of crossing, this wading may be done by jumping between rocks or having to get your feet wet.

After crossing this stream, it is recommended that the lagoon continue bordering until it reaches a small mound between the lagoon and Olivares Gamma glacier to obtain a view of the front of the glacier. From this sector, return 600 m along the same route to the lagoon drainage area and continue along the valley in an easterly direction for 2 km, gradually ascending through moraine terrain to a new lagoon that rises from the Píderit waterfall.

Laguna Barrosa
Valle del Olivares
Circuit
Section 3 |
Landmark 19

LANDMARK 20 SALTO PÍDERIT

Coordinate (UTM WGS/84)	70°10'22"O 33°09'23"S
Altitude (m.a.s.l.)	3696
Accumulated distance (km)	38,9

Landmark n°20 Salto Píderit is named after mountaineer Carlos Píderit, who made the first crossing of the Olivares Glacier and the first ascent of Mount Federación. This waterfall originated from the melting of the Olivares Beta glacier.

From this Landmark, you will have to change the course of the route in a southerly direction to cross the Nacimiento Stream. This crossing required simple fording. After crossing the stream, it ascends 130 m to a balcony formed on some rocks. This is the landmark n°21 Mirador Glaciares Olivares.

Salto Píderit
Valle del Olivares
Circuit
Section 3 |
Landmark 20

LANDMARK 21 MIRADOR GLACIARES OLIVARES

Coordinate (UTM WGS/84)	70°10'19"O 33°09'28"S
Altitude (m.a.s.l.)	3826
Accumulated distance (km)	39,8

The landmark n°21 Olivares Glaciers Viewpoint is a natural balcony from which splendid views of the Olivares Beta and Gamma glaciers as well as the peaks that enclose the basin to the north can be obtained. The mountains Altar, Barentin, Picarte, and Federación, as well as the snow-capped mountains Plomo and Risopatrón, all mountains over 5000 m, stand out, which are built on rocks eroded by glaciers during their periods of extension and retreat.

From Landmark n°21, Mirador Glaciares Olivares continues in a westerly direction, inland valley, over the moraine terrain. When you have traveled 1.6 km you will reach a wide plain where the Nacimiento Stream has several branches (anastomosed river). This location is ideal for crossing, which will require the river to be forwarded to its opposite bank.

Once the crossing is completed, one must climb a mount without a trail and with boulders until it reaches 300 m from the crossing of the stream (Landmark n°22, Lagunita Colorada.

Mirador Glaciares Olivares
Valle del Olivares Circuit
Section 3 | Landmark 21

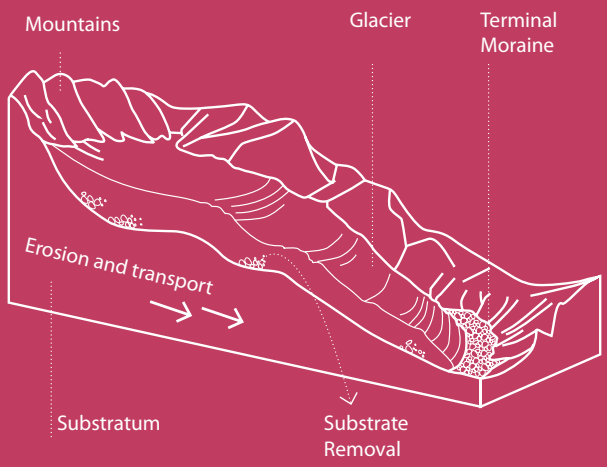
GLACIAL LANDSCAPE OF THE OLIVARES VALLEY

There are few capitals in the world that have glaciers in their vicinity, Santiago is one of them, with huge glaciers 45 km away measured in a straight line from Plaza de Amas. In fact, the largest glacier in central Chile is in the upper basin of the Olivares valley at about 3,800 meters above sea level, called Juncal Sur. Next to it, forming an almost continuous glacier field, it is possible to observe the Olivares Beta and Gamma glaciers and, a little farther away, the Olivares Alfa glacier. Above the Gran Salto del Olivares, a waterfall is formed thanks to its thaws. It is also worth mentioning the Esmeralda glacier, which covers the eastern face of the famous El Plomo mountain and whose melting ice feeds into the Olivares valley below the Gran Salto. Glaciers are masses of ice that move owing to the effect of gravity, such as in frozen rivers. Because of climate change and droughts that have hit much of the planet, particularly Chile, glaciers have become strategic water resources and are attracting worldwide attention. These ice masses make a fundamental contribution to the rivers, preventing them from drying up or their flow from decreasing considerably in summer or during periods of drought because glaciers accumulate water in solid form during the winter and during the summer or in dry periods, and melt and release water in liquid form.

A couple of examples of great importance due to the millions of people who depend on it are the contributions that glaciers have made to the Yeso and Maipo Rivers in the Metropolitan Region of Santiago. During summer, the Maipo River receives between one-third and two-thirds of the total volume of water it carries from glaciers that crown its basin. A study with field data published in 2018 indicated that the Yeso River received up to 40% of its flow from glaciers in the upper basin between December and May 2017 and 2018. The water contribution of these large ice masses is a consequence of their melting and loss of stored ice volume, which would not be problematic if the glaciers could recover their size in winter, but what has been observed is that this is not happening and the glaciers are systematically retreated; for example, the Maipo glaciers decreased in size by 20% between 1955 and 2016, from 19 km2 to 15 km2. This is equivalent to 3.6 billion m3 of water or to filling 14 times the El Yeso reservoir. As an example, in 1947 the famous glaciologist Luis Lliboutry observed that the Juncal Sur glacier reached somewhat lower than the great Salto del Olivares, about 5 km below the current location of the glacier front.

Glaciers are the shapes of the landscape in parallel to their key water roles. Throughout their lives, they change their size and length, grow, and shrink, leaving moraines that resemble large mounds of earth, carve the valleys and walls of the glaciers, and shape the landscape. All the marks of glacial existence can be observed in the Olivares

Erosion and transport caused by the glaciers.



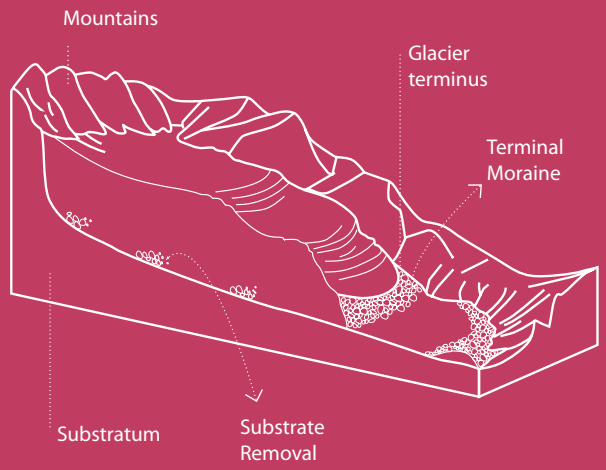


Illustration of the process of erosion and transport of substrate because of glacier movement.

Valley. How does a glacier form? It is formed by the accumulation of snow in an elevated area, for example, the upper part of a valley or mountain. These accumulation areas are called cirques, from which, owing to the effect of the accumulated mass and gravity, the snow is transformed into ice and the ice begins to descend slowly, forming a tongue; the more snow, the more ice formation and the greater the force of displacement exerted on the old ice.

How do they leave their marks and shape their landscape? The glacier behaves like a bulldozer. When it grows its front part works like the shovel of this machine, it moves forward drilling and flattening the ground and scraping the slopes of the hills, removing sediments, and pushing everything that crosses its path. Consequently, it generates large accumulations of soil or moraines in the areas of greatest advance of its ice tongues, which are deposited and abandoned when the glacier retreats because it melts. Then the moraines that resemble mounds are a clue that, in that place, a glacier passed through. The second piece of evidence concerns the shape of the valley. Given that the glacier behaves like a bulldozer blade, as it advances, it drags sediment and smoothes the ground, leaving a relatively flat valley floor with a characteristic "U" shape. Both characteristics can be observed as you travel through Olivares Valley.

One interesting element regarding the glaciers of the Maipo Basin is their location in Chile. Being the central zone under a hot and dry climate in the summer in the Mediterranean climate, how is it possible that a glacier complex of this size exists? The answer lies in the perfect synchrony between the uplift of the mountain range and the subsequent sequence of very cold periods that began to occur 2.5 million years ago. The rise of the Andes Mountains generated a high-altitude mountain massif, with elevations of over 6,000 meters above sea level around the upper Olivares basin. At these altitudes, successive glacial ages allowed valleys and mountains to be covered with ice, forming huge ice fields. As the Earth began to warm up, glaciers were maintained by the low temperatures that still exist in the high Andean sectors. In other words, if the mountain range were lower or the temperature warmer, we would not have the Juncal Sur glacier or the Olivares Alfa, Beta and Gamma. Another characteristic that has contributed to the conservation of these glaciers is their south-west orientation since these slopes are more protected from the sun. In summary, the altitude, the glacial periods, the maintenance of low high Andean temperatures and the orientation of certain slopes have made it possible to have the glacier complex located in the upper Olivares basin. These glacier complexes are also repeated in other sectors of mountain basins of the Central Andes, such as the Aconcagua, Colorado, Maipo, Cachapoal and Tinguiririca rivers.

Lateral Moraine and Juncal Chico Hill

The Glaciares de Santiago National Park protects the glaciers located in the upper sectors of the Olivares and Colorado Valleys. Both valleys together have 208.5 km2 covered with ice, which represents 46% of the total ice surface in the Metropolitan Region of Santiago. Within the Olivares Valley in particular, there are 188 glaciers with a total surface area of 86 km2. This park was created not only to protect this key water resource but also because of its invaluable value for research and recreational possibilities for tourists.

Olivares Beta Glaciers and Barentín Hill

LANDMARK 22 LAGUNITA COLORADA

Coordinate (UTM WGS/84)	70°11'19"O 33°09'39"S
Altitude (m.a.s.l.)	3880
Accumulated distance (km)	41,8

Landmark n°22 Lagunita Colorada owes its name to the color of its waters, which in turn can be explained by the minerals that are dragged as sediments by the waters that form it, coming from the thawing of the Olivares Beta glacier.

The minerals carried by the waters have ferrous compositions, which partly explains not only the colors of the landscape but also the toponymy (Cordillera Ferrosa, Lagunita Colorada) and the mining activity in the nearby valleys.

From this lagoon, there are also good views of the Altar mount, which is located to the west, and the Nevado del Plomo and Risopatrón are located to the east. It is also possible to observe the Olivares Alfa glacier (not visible), located at the head of this valley.

From Landmark n°22 Lagunita Colorada, you must return parallel to the Nacimientos stratum, without crossing it, passing through Landmarks n°20 Salto Píderit and N° Nineteen Laguna Barrosa to Laguna Picarte (Landmark n°18), where the camp was set up. From Landmark n°22. Lagunita Colorada to Landmark n°18 Laguna Picarte are approximately 4 km long.

Lagunita Colorada
Valle del Olivares Circuit
Section 3 | Landmark 22

LANDMARK 23 LAGUNA SIERRA BLANCA

Coordinate (UTM WGS/84)	70°08'02"O 33°08'46"S
Altitude (m.a.s.l.)	3934
Accumulated distance (km)	44,6

From the Landmark n°18 Laguna Picarte border, the lagoon on its north side ascends a short and steep ravine, taking the Federación mount as a reference, until it reaches a terrace halfway between the lagoon and the mountain.

Continue along this terrace in an easterly direction (towards the Plomo snow-capped mountain) until you reach the stream that feeds the Picarte Lagoon, whose waters come from the glaciers of the Federación Mount. The stream was parallel upstream and crossed before narrowing. After crossing, it continues upstream along the estuary until Landmark n°23 Laguna Sierra Blanca.

The Sierra Blanca Lagoon takes its name from the range of peaks that project to the north, separating the Olivares Gamma Glacier from the Juncal Sur Glacier. The Sierra Blanca is composed, from north to south, of the Federación, Picarte, and Olivares mountains, all of which are over five thousand meters above sea level.

From Landmark n°23, Laguna Sierra Blanca continues eastward towards an obvious lateral moraine that descends from the mount of the Federation. It is a gradual ascent through a rocky terrain. Once on the moraine, it continues to ascend to 4150 m, where the Landmark n°24 Mirador Juncal Sur is located.

Laguna Sierra Blanca
Valle del Olivares Circuit
Section 3 | Landmark 23

LANDMARK 24 MIRADOR JUNCAL SUR

Coordinate (UTM WGS/84)	70°07'33"O 33°08'27"S
Altitude (m.a.s.l.)	4146
Accumulated distance (km)	45,8

The landmark n°24 Mirador Juncal Sur was perhaps the best viewpoint for the entire glacier section. From here on, you can observe the great tongue of the Juncal Sur glacier, one of the largest glaciers in central Chile. This glacier in its upper zone branches into two arms bordering Juncal Chico Mount. They are kilometers of ice that give birth to the South Juncal River, one of the branches that conforms to the Olivares River.

From Landmark n°24 Mirador Juncal Sur, it is possible to continue ascending the moraine for approximately 700 linear meters (150 m of vertical drop) to gain another perspective on the feeding area of the Juncal Sur glacier. From the landmark n°24 Mirador Juncal Sur, you will also be able to observe the great summits of the sector, such as the Juncal or the Nevado del Plomo, the latter reaching over 6000 m high. These summits, as impassable barriers, constitute the limit between Chile and Argentina.

From Landmark n°24, Mirador Juncal Sur goes down the lateral moraine in a southerly direction, heading towards the pass that joins this moraine with Loma Rabona, which is easily distinguishable in that direction. The pass, called the Piedras Negras pass, is a connection point between the landmarks, as landmarks n°24, n°25, and n°27 can be connected to the Picarte Lagoon.

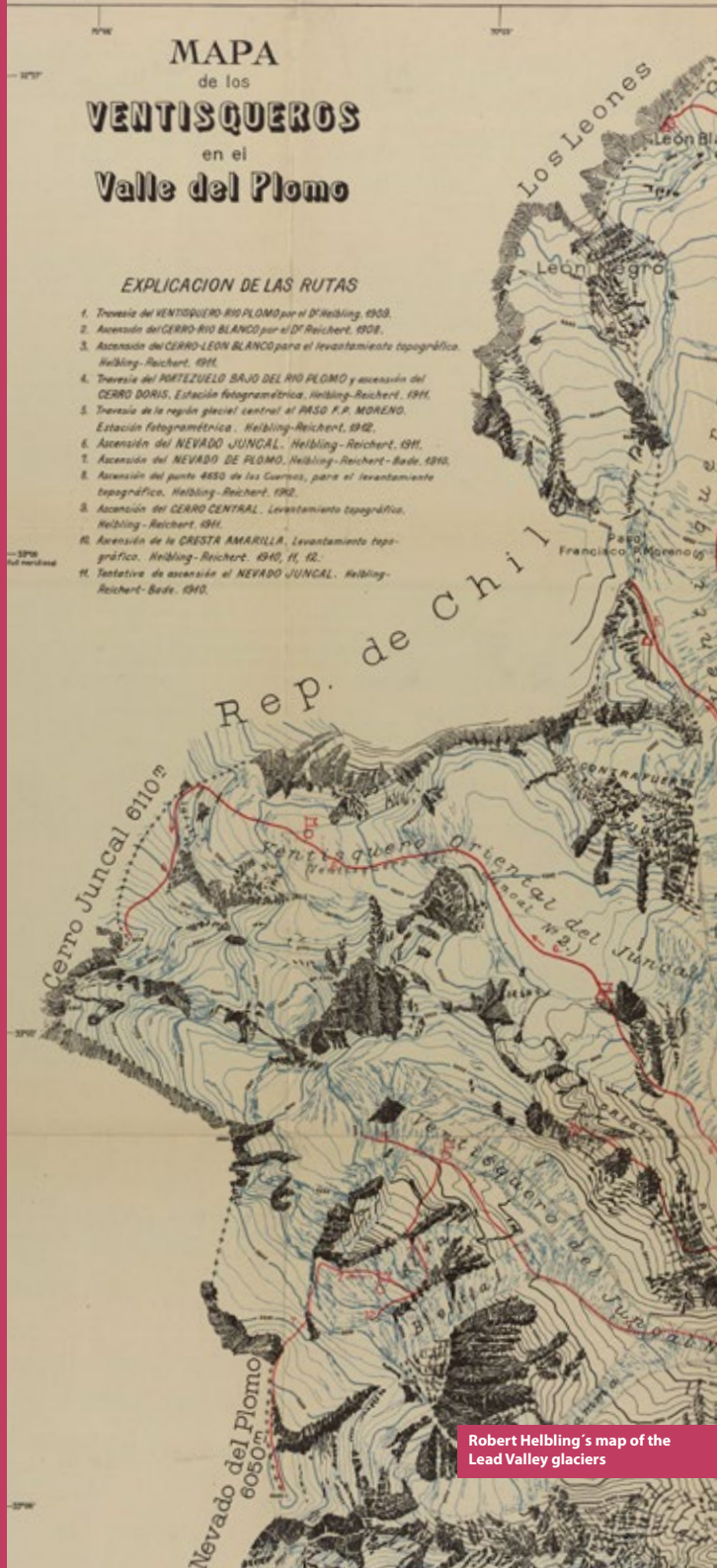
The Piedras Negras pass starts descending through a caisson towards the Juncal Sur glacier basin. It will be a little more than 700 m of walking from the pass to reach Landmark n°25 Laguna Rabona.

Mirador Juncal Sur
Valle del Olivares
Circuit
Section 3 |
Landmark 24

EXPLORATIONS IN THE UPPER SECTOR

In contrast to the lower sector of the basin, exploration, and knowledge of the upper sector of the Olivares Valley came later. Towards the end of the 19th century and the beginning of the 20th century, new actors and motivations appeared that pushed the exploration of the basin to places other than the Pircas Pass. In February 1912, members of the German Gymnastic Club, led by Carlos Griebel and guided by the muleteer José Alvarado, attempted to reach this mountain pass. Federico Reichert, commissioned by the Argentine government from the eastern slope of the Andes and accompanied by Robert Helbling and Ana Bade, climbed Nevado del Plomo in January 1910. From this summit they were able to observe in detail all this imposing area, marveling at its immense glaciation. Following this ascent, Reichert and his companions spent nearly five years exploring the high Mendoza Mountain range, discovering a glacier system that drains into the Atlantic Ocean: the Alto del Río Plomo glacier complex. In addition to making the first ascents of these mountains, they also climbed the Polleras and Tupungato mountains for the first time. These explorations later allowed Helbling to make a remarkable map of snowdrifts in the trans-Andean valley of the Plomo River.

Although on the Chilean side the Olivares and Juncal Sur glaciers could possibly have been seen in the distance by Gustav Brant and Rodolfo Luck during their ascent of Cerro El Plomo in 1895, the glaciers are still visible on the Chilean side, the truth is that the pedestrian recognition of the upper Olivares River basin would only begin to be revealed in the first decades of the 20th century. Perhaps the first photographic record of the Gran Salto corresponds to Federico Fickenscher who in company of Rudolf Backhaus, Heriberto Trewhela and muleteers in February 1915 visited it using the route of the Cepo Pass. Fickenscher would return to the Gran Salto with two muleteers in February 1925, this time accessing through El Alfalfal, on which occasion he visited the Pircas Pass and the Esmeralda Gorge. Fickenscher's excursions allowed him to produce, in collaboration with Wilhelm Klatt, a Hiking Chart for the Central Cordillera, which produced two editions in 1929 and 1935. Thanks to the accounts of explorer Humberto Barrera, we know that engineer Ruperto Bahamonde made three reconnaissance surveys of the upper course of the Olivares River prior to 1935, reaching an altitude of up to 4,000 meters. These incursions not only meant that Bahamonde was the first to reach the terminal part of the Olivares glaciers, but also that he was able to access the upper zone through one of the sides of the Loma Rabona. These incursions not only meant that Bahamonde was the first to reach the terminal part of the Olivares glaciers, but also that he was able to access the upper zone through one of the sides of the Loma Rabona. Bahamonde continued his explorations, this time accessing from what is now the Los Bronces mine, reaching up



Robert Helbling´s map of the Lead Valley glaciers

to 3,700 meters altitude at the Saavedra lagoon. Through this same access, the miner Arístides Saavedra and his companions managed to climb up to a 4,800-meter pass in their vain attempt to discover the legendary Derrotero de Picarte.

In February 1935, Humberto Barrera, together with Bahamonde and four other Chileans, would access the upper zone of the basin through the Saavedra Lagoon, motivated by recognizing the high peaks that enclose the glaciers of the so-called "Cordillera Morada" to the northwest. In this expedition Barrera was able to adequately describe the Morada mountain range and found that the Olivares glacier system forms a separate group from the Juncal Sur glacier. The natural division between the two glacier systems is formed by a range of hills that runs from north to south almost perpendicular to the Morada mountain range, which is called Sierra Blanca. During this expedition he also climbed two main peaks higher than 5000 meters: the Bahamonde and Anec hills, and named three other hills, one of them Picarte, in homage to the legendary Chilean patriot and originator of the mining legend of the area, and the Saavedra Lagoon. The same name, Picarte, is given by Barrera to the river that originates at the confluence of the Nacimiento stream, coming from the Olivares Alfa glacier, with the Nevado del Negro stream, coming from the Olivares Beta glacier. This Picarte river is the one that falls to the west of the Loma Rabona, forming the Olivares waterfall. A month later, in March 1935, but entering from the Olivares River, Sebastián Kruckel, Karl Waltz and Otto Pfenniger, ascended a new summit in the bordering cordon, which they named Risopatrón, in homage to the great Chilean geographer who died in 1930. The explorations carried out by Bahamonde and Barrera verified the existence of two glaciers, Olivares and Juncal Sur, which were separated by the Sierra Blanca and converged further downstream to give rise to the Olivares River, which also allows us to know that the Olivares was a single large glacier that was not yet divided, as we would know later. In 1938, Barrera took part in a second expedition with two parts. The first was the first ascent of Cerro Negro in the Cordillera Morada Mountain range. To do so, he accessed from the Disputada mine in Las Condes, returning by the same route. The second part consisted of a trip that started in Farellones, crossed via the Cepo portage to the Olivares River to visit the Gran Salto. The return was via the lower course of the Olivares River to El Alfalfal and from there crossed to La Ermita. The surveys carried out by Barrera served to correct the errors in the first version of Klatt and Fickenscher's map in a new edition of their chart in 1935.

In 1942 Carlos Píderit, together with Benito Kleim and Jorge Silva, made the first crossing of the Olivares glacier and climbed the Iver and Barentín. Together with these first ascents, the importance of this expedition is that they named two summits that were unnamed until then: Nevado del Olivares and Cerro Federación, and attest

Olivares Alfa Glacier

that around this time the Olivares glacier, which was a single glacier mass for Barrera, was divided into two arms that Píderit calls Olivares Alfa and Olivares Beta.

The incursions of Barrera, Píderit, Kruckel and Pfenniger triggered an increase in the number of visits motivated by ascents of the Olivares system and Juncal Sur. Thus, Píderit returned in 1948 to climb Cerro Federación, Asociación and Olivares, while Wolfgang Förster, Eberhard Meier and Wilhelm Niehaus in 1950 penetrated the Juncal Sur glacier for the first time and climbed the Chilean slope of Nevado del Plomo. One of the novelties of their report is that they note an advance of the Juncal Sur glacier up to almost the Gran Salto itself and discover iron bars embedded in the rock, probably placed by miners during the ascent to the east of the Loma Rabona. These findings of remains of mining artifacts following the Picarte route were not the only ones. In January 1951, Manuel Bazán and his colleagues, on the occasion of the first ascent to Picarte, reported finding broken shoes and remains of wood at the foot of the mountain. Around 1956, the French glaciologist Louis Lliboutry appeared on the scene and described the glacier system of the sector with a scientific approach. Lliboutry made approximately 10 expeditions to the central zone of Chile, studying this system in great depth. Among other things, he notes the increases and retreats experienced by the Olivares and Juncal Sur glaciers, which led him to subdivide the Olivares Beta glacier into two, leaving the original name to the larger tongue and assigning the name Olivares Gamma to the one between the Sierra Blanca and the rocky spur that projects south of Bahamonde. Lliboutry also calls the Píderit waterfall the waterfall that forms on a rocky cliff whose waters come from the Olivares Gamma glacier.

Just as Lliboutry's explorations and studies have inspired new glaciologists, who, to this day, venture into the area to carry out studies and monitor the retreats of the Olivares and Juncal Sur glaciers, so too have Lliboutry's explorations and studies have inspired new glaciologists, who to this day venture into the area to carry out studies and monitor the retreats of the Olivares and Juncal Sur glaciers. The legends of Picarte and the stories of Risopatrón, Reichert, Barrera, and Píderit have been food for thought motivated new adventurers and explorers who search for high peaks of the valley for their own sporting treasures.

Louis Lliboutry

LANDMARK 25 LAGUNA RABONA

Coordinate (UTM WGS/84)	70°07'41"O 33°09'25"S
Altitude (m.a.s.l.)	3796
Accumulated distance (km)	52,0

The landmark n°25 Laguna Rabona is a small lagoon located at the foot of the eastern slope of Loma Rabona, from which it takes its name. It is also possible to observe a small, high Andean Plain.

From this landmark, you will have to continue descending slightly in a northeasterly direction, following the estuary that drains the lagoon for approximately 300 m until it is connected by small bodies of water. From there, the stream turns south and continues its descent. At this point, it is advisable to separate from the stream and continue the cross-country for approximately 500 linear meters. Walk north along this plain for approximately 600 m to a large balcony where landmark #26 Mirador Frontal is located.

Laguna Rabona
Valle del Olivares
Circuit
Section 3 |
Landmark 25

LANDMARK 26 MIRADOR FRONTAL

Coordinate (UTM WGS/84)	70°07'04"O 33°08'56"S
Altitude (m.a.s.l.)	3744
Accumulated distance (km)	53,7

The landmark n°26 Mirador Frontal allows observation of the front of the Juncal Sur glacier and the great mountains that protect it, such as the Nevado Juncal, Nevado Plomo, and Risopatrón Mountains.

From Landmark n°26 Mirador Frontal, return along the same route, passing Landmark n°25 Laguna Rabona to Piedras Negras pass, and begin to ascend the slope of Loma Rabona. You must skirt the top of the mount on its western side until you reach the balcony that houses Landmark n°25 Mirador Loma Ramona.

Mirador Frontal
Valle del Olivares
Circuit
Section 3 |
Landmark 26

LANDMARK 27 MIRADOR LOMA RABONA

Coordinate (UTM WGS/84)	70°07'39"O 33°10'05"S
Altitude (m.a.s.l.)	3245
Accumulated distance (km)	59,3

The landmark n°27 Mirador Loma Rabona is a splendid balcony used to observe the entire projection of the Olivares Valley to the south, highlighting the great mountains that enclose the valley on both sides. It is also impressive to perceive the almost kilometer-long vertical drop in Loma Rabona. Be careful and do not approach extremes.

The Landmark n°27 Mirador Loma Rabona is also the last landmark in the circuit. From there, you must return along the same road to Piedras Negras pass, where you can descend to Laguna Picarte.

The return to the beginning of the journey was completed using the same route. Laguna Picarte considers two days for return, with the possibility of spending the night in Vega Honda or Morrena Alta (if there is water).

Mirador Loma Rabona
Valle del Olivares Circuit
Section 3 | Landmark 27

COMPLEMENTARY CIRCUITS

The following routes are complementary to the Olivares Valley circuit and are recommended only for people with knowledge and experience in trekking and mountaineering.

JUNCAL SUR TRAVERSE

From landmark n°18 Laguna de Picarte, you can make a different return than the ascent of the Gran Salto del Olivares. To do so, one must continue in an easterly direction towards the landmark n°26 Mirador Frontal. This landmark extended along the terrace to the front of the glacier. Climb up one of the lateral moraines and then, when the glacier flattens out, it crosses it at its width. This crossing will require cramps, while on the other side of the valley, it descends along it following the level of a terrace until before the valley descends to the Olivares River. At this point, campsite (Españoles campsite). From this camp, descend following the apachetas through steep terrain that, in the last third, will require short climbing. Upon reaching the valley, continue on this side of the Olivares River to the Fierro Stream (in front of landmark n°13 Morrena Alta) where the second camp is set up. The following day we cross the Olivares River fording it in the section between landmark n°12 Estero Esmeralda and landmark n°11 Vega Honda. After crossing, it continues along the circuit until its beginning.

CROSSING TO YERBA LOCA

From the landmark n°18 Laguna de Picarte, it is possible to continue towards Yerba Loca Park. To do so, you must continue in a westerly direction towards landmark n°22 Laguna Colorada. From there, it continued through the valley to the Olivares Alfa glacier. Cross this glacier to reach the pass separating the Olivares River Basin from the Yerba Loca Stream Basin. From landmark n°18 Laguna de Picarte, there were three more days to Santiago (6 to 7 days). Your camps were set up in Olivares Alfa and Piedra de Carvajal. It is recommended to coordinate the departure from Yerba Loca in advance because there is no public transportation.

CROSSING OF THE OLIVARES VALLEY TO CEPO VALLEY

A third interesting route is to connect the Olivares River with the Molina River, a tributary of the Mapocho River. To do this, from landmark n°9 Vega Amarilla, take a trail that ascends the western slope of the Olivares Valley (partly following the valley of the Paramillos stream) until you reach the Cepo pass. From there you must descend to Piedra Numerada, where the camp is set up. From there it is possible to leave through Valle Nevado or La Parva. From landmark n°9 Vega Amarilla, consider two additional days to reach Santiago. It is also possible to return to Cajón del Olivares, making a circuit going down Jarilla Stream. Coordinate departure in advance because there is no public transportation from this sector to Santiago.

CONNECTION OF OLIVARES RIVER WITH THE PIRCAS PASS

This excursion can be started from landmark n°11 Vega Honda (camping site) to access the Pircas pass, one of the historic mountain passes.To do so, the Olivares River must be crossed by fording it in the section between landmark n°11 Vega Honda and landmark n°12 Estero Esmeralda and then take a trail that starts north of the Las Pircas stream and follow it up to 3600 meters above sea level where the camp is set up. From there it will be possible to visit the pass located at 4800 meters of altitude. The round trip from Vega Honda required three additional days.

OLIVARES RIVER CONNECTION WITH CAJÓN ESMERALDA

This excursion can be started during the day from landmark n°11 Vega Honda (camping site). It is necessary to follow the landmark n°12 Esmeralda stream and, without crossing it, to take a track that is born on its south side. This will gain altitude to access the valley. Once inside you will be able to see the front of the Esmeralda glacier, one of the glaciers that cover the slopes of the El Plomo massif.

OLIVARES RIVER CROSSING TO LA JARILLA RAVINE

A route that connects the Olivares River valley, La Jarilla ravine, Quempo range, and Cepo range, with two interesting high passes. First, the route crosses the Quempo Pass (3960m), which is the northern limit of a mountain range of the same name. The following day, we crossed the Cepo Pass (4060m), which is the northern limit of the mountain range of the same name and from which we descended to Vega Amarilla (landmark n°9). On the third day, we returned to the beginning of the route (La Jarilla ravine).

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