# THE EXPLORERS CLUB FLAG 24 REPORT

## Alerce Field Study, Cochamo Valley, Chile

## 15 February – 6 March, 2010

Lago Vidal Gormaz

**Jason Paterniti, MN'10**

President, Global Exploration & Overlanding Society
Member of The Royal Geographical Society

# Contents:



# Summary:

This Flag Report describes the findings from the exploration of the Cochamo Valley region of Chile undertaken to identify previously undocumented stands of the endangered Alerce tree (Fitzroya Cupressoides). The expedition was conducted between 15 February and 6 March, 2010 over an area 5,400 $km^2$. Two Alerce stands were located and surveyed and two other sites were identified.

# Introduction:

The Alerce is amongst the largest, oldest and unfortunately most endangered tree on the planet. Due to a combination of over-harvesting as well as extensive loss of habitat, experts estimate that only 15 percent of the original Alerce population remains.

Alerce are only known to exist in the southern hemisphere, primarily in the temperate rainforests of Chile and Argentina. This habitat provides the unique combination of moisture, elevation, soil, light and temperature conditions necessary for the Alerce to thrive. However, temperate rainforests, which cover

an area just 3% the size of the world's endangered tropical rain forests, continue to be destroyed at an alarming rate.

**2010 Alerce Expedition Team, family and friends**: (*F.L.T.R*): Don Manuel Altamirano, Sebastian Lazo, Don Juan Maladonado (Horse Guide), Martin Zegers (Expedition Guide), Sonia Bahamonde, Maria Green, Cote Zegers (Expedition Leader), Marcos Rojas (Horse Guide), Jason Paterniti MN'10, Nicole Watson (Expedition Member), German Noguera, Elvira Swinburn.

For Chile, whose commodity based economy depends on finding a means to sustainably manage their natural resources, the near destruction of the Alerce and its temperate rainforest habitat, serves as a grim reminder of the consequences of indiscriminate consumption of finite resources.

Protecting the Alerce from further destruction has a practical scientific value, as the information contained within their growth rings can help us advance our understanding of climate change and thus hopefully better inform our decisions concerning global warming.

In November 2009, as part of our first expedition to the area, we attempted to locate and catalog previously undocumented Alerce stands thought to exist deep in the Valdivian forest. We undertook this expedition in order to help raise the global profile of this magnificent tree as well as that of the endangered temperate rainforest. Additionally, we hoped to confirm the existence of a massive (and hence ancient) Alerce rumored to exist deep in the forest which, if found, could help us extend our understanding of historical climate changes.

We selected the Cochamo Valley region of Chile because:

- Few studies have been made of Alerce in this area
- The valley does not enjoy protected status as a National Park or Nature Sanctuary
- Unless protected trees are identified and monitored, this area is at risk of further exploitation and development

Late season snow made the only trail providing access into Cochamo impassable during our first attempt. A second expedition was scheduled for February 2010, the results of which are summarized herein.

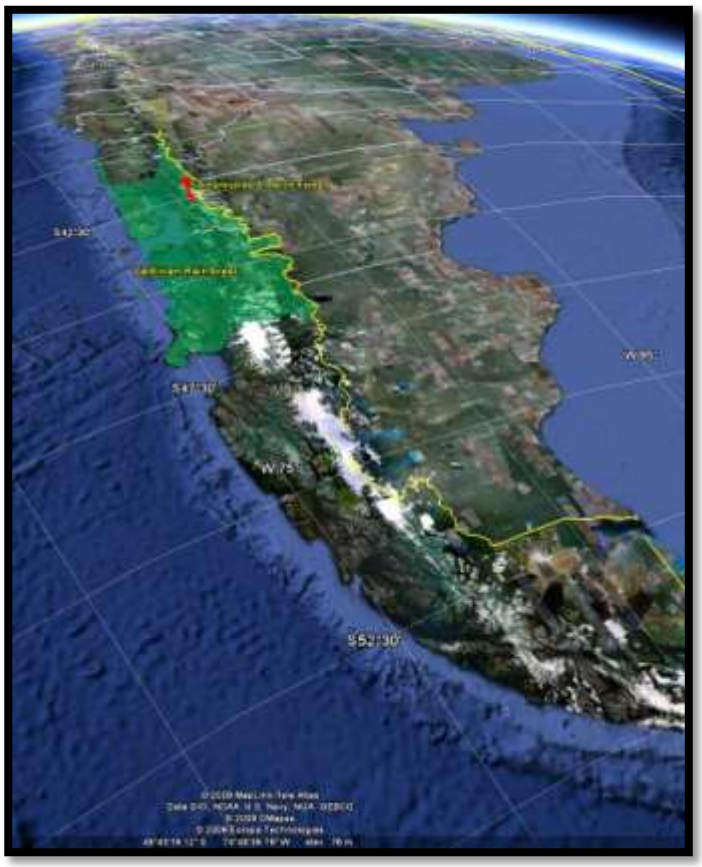
# Objectives:

- Contribute to our understanding of Chile's endangered temperate rainforests by exploring some of the more remote regions of the Valdivian Rainforest.
- Identify the locations and date previously undocumented Alerce (Fitzroya Cupressoides) trees in the Cochamo Valley of Chile.
- Confirm the existence and location of a particularly old Alerce rumored to exceed 20 meters in circumference.

# Background:

Chile's varied geography contains at least ten distinct forest types including three regions of temperate rainforest: the Magellanic, the North Patagonia and the Valdivian which collectively cover 7.6 million hectares, roughly 25 percent of the Earth's total. (Wilcox, 1996, p. 21).

The Valdivian forest is named after Pedro de Valdivia, a founder of Chile and one of Francisco Pizarro's Conquistadors who conquered the Incas.



**Valdivian Rainforest (Green), Remaining Alerce Forest (Red)**

Characteristics of a temperate rainforest include:

- Broadleaf evergreen flora
- More than 1,400 mm annual rainfall
- More than 10% of the total rain fall occurs in summer
- Mean temp. not more than 16° during the warmest month
- Frequently overcast conditions in summer
- Infrequent fires
- Winter dormancy in plants

(Alaback)

Within the Valdivian temperate rainforest, there exist at least seven distinct sub classifications of forest type. Of these, the Alerce forest represents one of the most endangered and ecologically valuable forest types in the world. The Alerce's range at one time extended from the coastal mountains south of the city of Valdivia east to the wetter valleys on the Argentine side of the Andes and south to the slopes of the Michinmahido Volcano—a range of 150 miles long and 50 miles wide (Wilcox, 1996). However, early on the indigenous populations of Patagonia recognized the tree's value as a building material and began logging the tree long before Spanish and then German immigrants migrated to the region, at which point, the speed of destruction increased exponentially.

**The Alerce:** ***photo credit: Cote Zegers***

## Alerce
## (Fitzroya Cupressoides)

Fitzroya is a monotypic genus in the cypress family -Cupressaceae with a single species, Fitzroya Cupressoides, native to the Andes mountains of southern Chile and Argentina. While the scientific name of the genus honors Robert Fitz Roy, captain of Darwin's H.M.S. Beagle, common names include Lahuan (the Mapuche Native American name), Alerce (South American Spanish), and Patagonian Cypress (Wikipedia).

## Alerce Habitat:

| | |
|---|---|
| **Altitude:** | 500 - 2000 m. |
| **Watering conditions:** | Humid areas, with almost constant rainfall. The tree does not thrive in areas which are exposed to dry periods (generally not longer than 1 month). |
| **Light conditions:** | Prefers full exposure and will not readily regenerate in shady conditions. If broad leaved trees predominate its habitat, the Alerce will "hibernate" waiting for fire to destroy the less hearty surrounding trees, allowing the Alerce to emerge through the opening in the canopy. The tree prefers level areas or slopes facing north. |
| **Soil:** | Thrives in poorly draining, peaty sandy soil with low pH levels not suitable for other types of trees[1] |
| **Trees associated with Alerce:** | Coihue (Nofagus dombeyi),Ulmo (Eucryphia corifolia),Luma (Amomyrtus Luma), Canelo (Drimys winteri),Manio (Podocarpus nubigena), Tepa (Laureliopsis philippiana), Olivillo (Aextoxicon punctatum)<br>*Source:* (chilefora.com) |

From a conservation perspective, Alerce are valuable because they are extremely slow growing (less than 1 millimeter a year) and thus are essentially non-renewable in our life-times. Alerce are useful for climate change measurement as like most trees, each year it forms a new layer of wood underneath the bark known as a "ring". The size of these rings expands and contracts or "surges" based on factors of temperature and rainfall. Due to their resistance to rot as well as the age that these trees can reach, Alerce are especially useful to climate researchers because they can be used in the development of long chronologies. (Holmes, 1985) Despite how little remains of these forests they are at risk of becoming extinct due to illegal poaching or are located in areas of interest for potential hydro-electric development.

To appreciate how rare these trees truly are consider this journal entry located in the Royal Geographical Society's archives from Charles Darwin's 1826 survey of South America:

> *"So great the difficulty of obtaining a spar of [Alerce], that when I wished to procure a new mast for the Adelaide, I offered four times the value of an alerse spar to the natives, besides the assistance of twenty men, and tackles, &c. to assist in conveying it to the beach. The temptation was almost too great to be withstood; but the man to whom I applied, who had before been employed to get masts for a schooner in the Chilean service, and a flag staff for the town, said that it would take his own party two months to bring one to the beach….the trees were distant, and there were two or three ridges of heights to cross, that would cause much delay. The facility with which these people usually handle timber was sufficient proof to me that such a task, if refused by them, must be very difficult indeed, and I gave it up*"-Captain King (Fitz-Roy R. , 1839, pp. 282-283)

[1]The horizontal roots of the trees are thought to be so efficient at recapturing nutrients from the forest floor that the soil around these trees becomes unsustainable for other flora. (Hemming)

**Preservation Efforts:**

In 1976, the Chilean government designated the Alerce a Natural Monument and outlawed the cutting of live trees, although it is legal to harvest them when fallen. In the same year, the Convention on International Trade in Endangered Species (CITES, Appendix 1) prohibited the international sale of Alerce products. Unfortunately, large-scale clearing activity in the past, combined with the Alerce's very slow growth, poor regeneration, and illegal cutting, seriously impedes any notable increase in the species (AFI)**.**

The World Conservation Union (IUCN) Conifer Specialist Group considers the Alerce endangered, and despite above-mentioned conservation efforts, is facing a very high risk of extinction in the wild in the near future.

# Expedition Members & Areas of Responsibility:

Our expedition was carrying Flag 24. First flown in 1929 as part of Harry C. Raven's American Museum Anatomical Expedition to Central Africa, Flag 24 is in relatively good shape considering it has spent the last 80 years in and out of the field. Most recently, Flag 24 spent 2007/08 in Antarctica as part of Glen E. Liston's Norwegian –U.S. IPY Scientific Traverse.

**Jose "Cote" Zegers** Chile. Expedition Leader. Agricultural Engineer, Pontifica Universidad Catholica, Expertise in South American Temperate Forest Ecology. Leader of 2009 Ventisquero Expedition. cotezegers@hotmail.com

**Jason Paterniti** USA. Project Sponsor. Member of the Ventisquero Expedition in 2009. President of the Global Exploration & Overlanding Society (www.G-EOS.com), a non-profit society dedicated to promoting safe and environmentally sustainable exploration and conservation. jpaterniti@g-risk.com

**Martin Zegers** Chile. Expedition Guide. martanzg@yahoo.com

**Nicole Watson** USA. Expedition Member & Co-Author

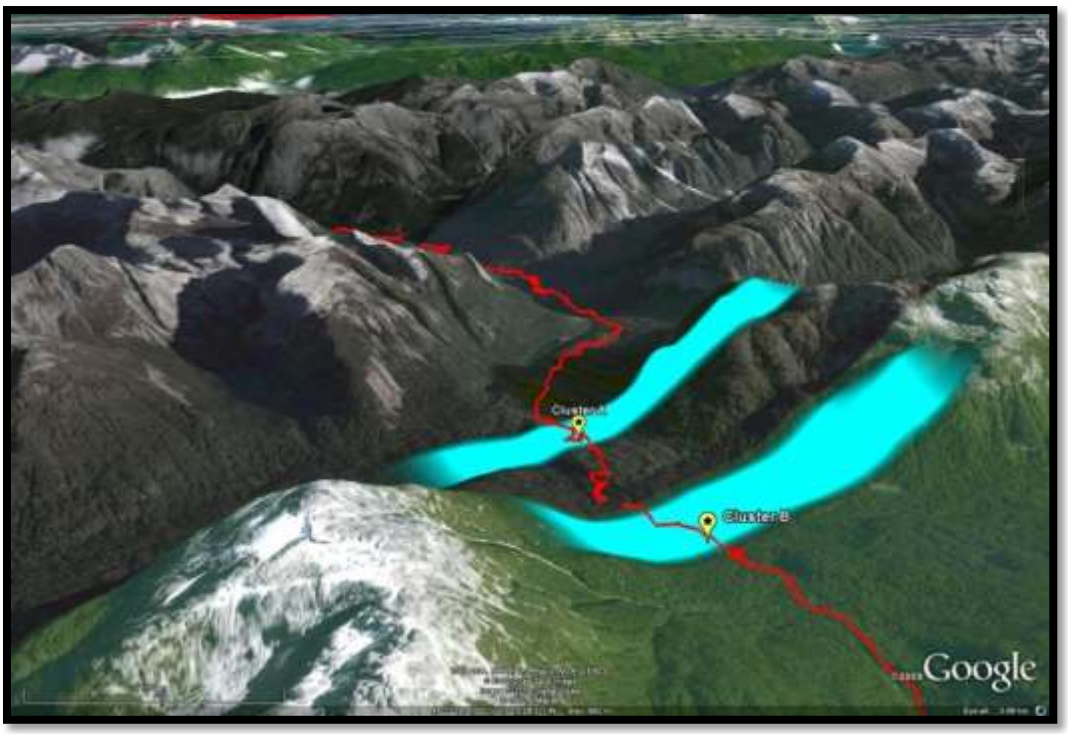
**Support Team:** Juan Maldonado, Marko Rojas

# Orientation:

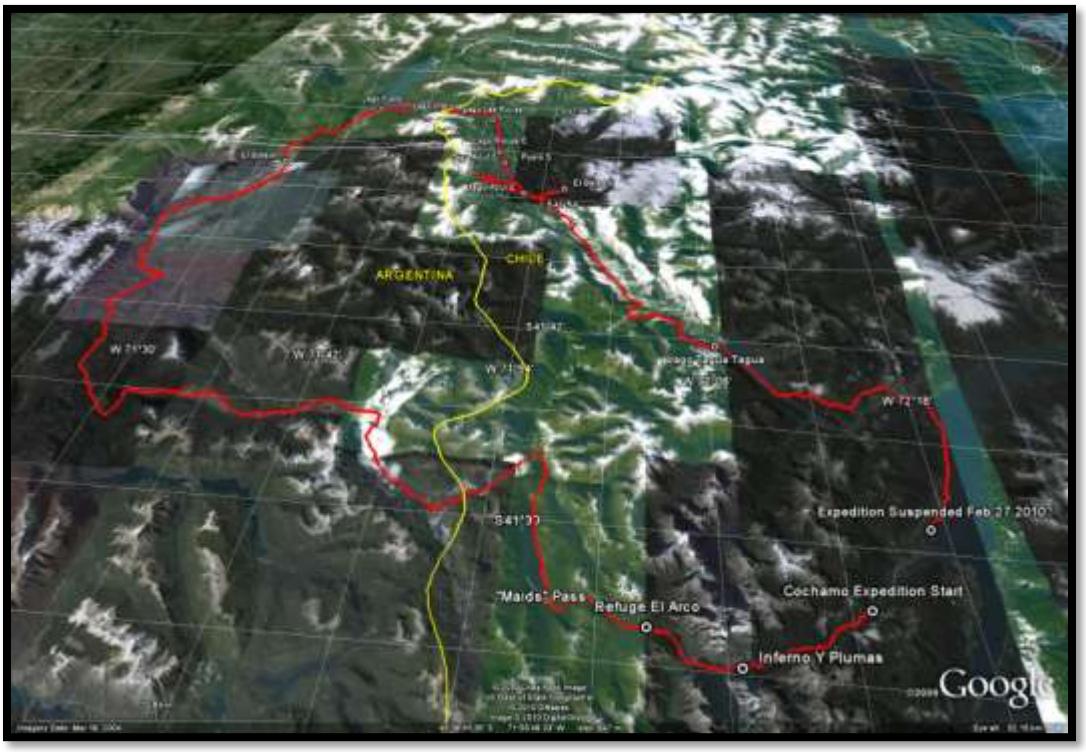
Most of the surviving Alerce stands are located in the higher slopes of the Andes, or in isolated valleys at elevations above 700 meters. Their remaining habitat ranges from 40 S to 44S and in the coastal mountains and on the island of Chiloe from 39 S to 42.5 S (Wilcox, 1996, p. 26) Our field study was conducted in the Cochamo Valley located in Llanquihue province**,** Los Lagos Region, Chile. Los Lagos, or Region X, is one of Chile's 15 first order administrative divisions. Geographically Region X covers the southernmost portion of the Andes Mountains to the west and south and low plains to the east.

Within the Cochamo valley, we were specifically looking for pockets of the trees at 700 meters or higher. Based on numerous interviews with locals familiar with the valley, we had identified two areas of interest where we expected to find Alerce clusters.

These sites were marked using Google Earth and later plotted onto a Garmin GPS 60csx loaded with Chile specific topographical maps.




**Expedition Route:**



Our plan was to take a preliminary survey of the entire Cochamo Valley by horseback. We would explore this remote long narrow valley crossing the Andes into Argentina, and then make a large loop through more open ground back to Chile. In Chile we would conduct more detailed studies of the areas identified.

**Logistics:**

We used horses to carry the team, supplies and equipment through the more remote sections of our route (approximately 75km) which is typically dry during February/March. Trucks, boats and transporting gear on foot were also required at various points.

# Dating Methodologies:

Rumors of massive Alerce's living far in the forest out of the reach of loggers are at least as old as Darwin's survey of South America:

> *"The largest alerse tree that has been found by any Calbucano during the last forty years measured thirty feet in girth (circ of 9.15 meters), at five feet from the ground; and more than seventy six feet to the first branches. The two largest trees seen by Mr. Douglas, in his excursions for me, measured one twenty four (7.31 meters) and the other twenty-two feet round (6.7meters), at five feet from the from the ground: but these were dead trees, hollow in the centre. He saw none above ten feet in circumference (3 meters), that were quite sound. Report however says, that in the Cordillera, out of the reach of the Calbuco woodsmen, there are enormous trees, from thirty (9 meters) to forty (12.2 meters) in girth"- Robert Fitz-Roy, 1839* (Fitz-Roy R. , 1839)

Many sources cite that Charles Darwin reported finding a specimen 40 meters in circumference. We also had heard rumors of massive Alerce, including one whose circumference exceeds 20 meters, which would make it well over 6 meters in diameter, or 6,000+ years.

**Preparing to measure one of the larger Alerce trees located in "Cluster A"**

In 1993, an Alerce specimen from Chile was dated as 3,622 years old. This gives it the second-greatest fully verified (by counting growth rings) age for any living tree, after the Great Basin Bristlecone Pine which has been dated to 4,800+ years (Wikipedia). Rick Klein, an expert on the Alerce, conducted a three year study of ring counts and diameter extrapolations over hundreds of hectare of clear cut forest. He concluded that regardless of coastal or Andean location, high or low altitude, the diameter of the Alerce expands at a consistent average rate of 4/5 millimeters annually. Thus a tree which is 2 meters in diameter is very likely to be minimally 2,000 years old. In support of his findings, Klein cites similar conclusions reached by Paul Alaback, Nate Stephenson and Daniel Gonzalez. (Klein, 2010)

During our survey we attempted to take uniform circumference measurements at 4 ½ feet above ground level. Many of the Alerce were located on extremely uneven ground and here we followed common practice of estimating 4½ feet from where the tree enters the ground along the axis of the tree. (americanforests.org/resources). All of the larger trees we measured had significant amounts of loose bark as well as very rough surfaces with deep ravines further complicating the measuring process.

**(See Appendix I for specific data sample information).**

# Expedition Detail and Findings:

**15 February, 2010**
**Santiago, Chile**

We arrive in Chile from Washington D.C. via Miami. Our first week is spent planning the route as well as organizing the horses and gear. The American contingent also takes advantage of this time to get in a few days riding to prepare for the trek.

**22 February, 2010**
**Santiago, Chile**

Today starts just before 3am as we have to catch the 5am flight to Puerto Montt, which will be our jumping off point to Cochamo. Half the team flies while the other half drives the gear and supplies down in a truck overnight for the 1,000 km trip from Santiago to Puerto Montt. In addition to avoiding 10 hours in a packed truck, the plane flight affords a stunning view of sunrise over the Andes.

The truck arrives from Santiago just after 9am. After collecting and reorganizing supplies, food and gear, we head towards our initial target area in the Cochamo valley 180 kilometers south east of Puerto Varas. Our route took us west on R 225 from Puerto Varas along Lago Llanquihue and passing the town of Ensenada. At S41 °22'47 W 72 °17'16 the sealed road gave way to gravel. Heading east we reached the trail head along the Cochamo River at S 41 ° 29'45", W 72 ° 15'40".

**Cochamo Trail Head**
**S 41 °27'20.8"**
**W 72° 13'.13.1"**

After transferring gear and supplies from the trucks to the horses, we head north east through a humid and lower altitude section (50 meters above sea level) of the Valdivian forest. This area contains trees typical of the temperate rainforest such as: Coihue, Arrayan, Luma, Ulmo, Olivillo and Manio trees.

**Transferring gear on to the horses at the Trailhead**

On our first morning we covered 12.8 kilometers in 2 ½ hours at an average pace of 4.1 km/h. After lunch we continue on another 6.5 kilometers through increasingly difficult terrain.

This section of the trail is known as the "Inferno y Paloma" by the locals and at various points our team had to dismount and let the horses navigate through wet & rocky sections of the trail as best they could.

Just before sunset, we stop in an area called La Junta, S 41 °24'36", W 72° 05'.30". We are well short of our intended overnight bivouac for the night.

**Don Juan leading one of the pack horses up the Inferno**

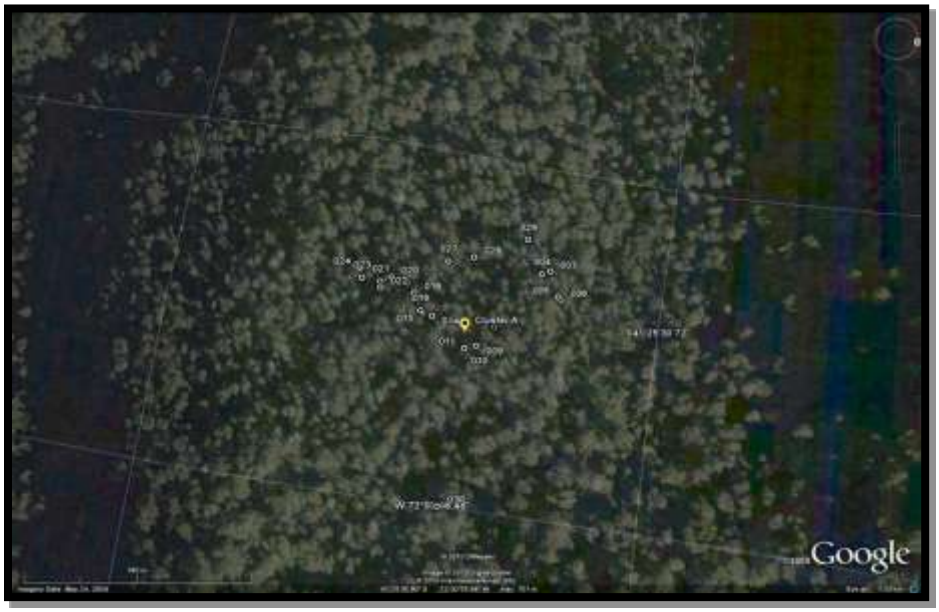
**Base Camp: Horses grazed, we slept**

This area has become increasingly popular with rock climbers from around the world. Its 1,000 meter granite walls are often compared to Yosemite in the USA. We passed through a refuge which serves as a base camp for the Trinidad Mountain.

**23 February, 2010**
**Base Camp 1**

We depart after breakfast making for Cluster A which should be located approximately three hours from base camp. Around S 41 °24', 56" W 72° 03'.57" we were forced to dismount as the trail conditions again deteriorated.

The forest is essentially undisturbed in this area of Chile. However, even though the area is remote, Alerce clusters are few and spatially discontinuous. We found the first set of Alerce trees located at an altitude of 662 to 700 meters.




In this area we catalogued 34 Alerce with No. 30 measuring approximately 11.15 meters in circumference, 3.5 meters in diameter.


**Flag 24 with Alerce "No. 30": Estimated to be 3,500-5,000+ years old**

Additional Alerce trees were identified further to the south of Cluster A. The forest is extremely dense and mountainous in this area and it took us up to 30 minutes to move from one tree to another. Non native bamboo, introduced by the Spaniards in the 1600s, thrives in this area and provides dense undergrowth called *quila* which forms a web like thicket that is almost impossible to pass through.

**Navigating the forest through the *quila* to an Alerce was a challenge at times**

**Cluster B**
S 41 °25’16”,
W 72° 02’.43”


Approximately two kilometers from Location A, we reached our second cluster of Alerce at approximately 687 meters. Here we catalogued 26 trees including 4 Alerce of significant size an altitude of up to 717 meters. Further into the forest our guides said there is a tree whose circumference exceeds 20 meters. However they did not know its location and its existence could not be verified.

After taking preliminary measurements we moved further along the trail to look for additional Alerce clusters.

Continuing east from Location B we began to climb rapidly and the trail again became increasingly difficult. At S 41 °26'03", W 72° 00'.44" we passed through the worst section of the trail called the "Nanas" or maid's path. Here one of the horses fell, injuring Marcos, one of our guides. A bit further on, one of the pack horses lost its footing and injured its rear back leg.

We officially crossed the Andes in the dark that evening. With the light of the moon we made it down out of the mountains to a pasture, finally reaching our bivouac location after 13 hours, in which we managed only 15 kilometers at an overall moving speed of just 2.3 kilometers/hr.

We found refuge along the shore of Lago Vidal Gormaz at the house of Sonia Bahamonde and Manuel Altamirano, who rented us a pasture for our horses to graze. They invited us into their cabin for bread and tea - a small two room structure - which got very cozy with 12 people, cats, dogs and a piping hot stove.

**Lago Vidal Gormaz**

**24 February 2010**

S 41 °27’11”
W 71° 57’.28”

In the morning we pack up early as we are going to try to make it across the border today. The injured pack horse was unable to continue and we had to leave her at the farm to recover from her injuries.

**Manso River:**

S 41 °33’57”
W 71° 55’52”

We followed a path which ran along the western edge of Lago Vidal for 16.5 km. The path is relatively dry and flat and we managed almost 5 km/hr or double the previous day’s pace.

We needed to push hard today to make up time lost yesterday as we need to reach the frontier with Argentina before sunset when the customs post closes.

**Chilean/Argentine Border**

We arrived at the Chilean border around 6pm. Here we met a local cowboy or “huaso” who said that ten years ago his uncle found an Alerce tree which measured over two ropes lengths in an area not far from Cluster A. In Chile a “rope” is typically eight people long or 8 x 1.5 meters =12 meters which would mean a tree of 22 to 24 meters circumference.

Having cleared customs on the Chilean side we again mounted up and continued on another 2.5 kilometers crossing a large wooden suspension bridge to reach the Argentine border at S 41 °30’57” W 71° 50’.44”.

It was not possible to cross into Argentina with Chilean horses so we arranged for a truck to meet us at the border to take us to El Bolson where we would overnight before looping back to Cochamo.

**Lago Puelo, Argentina**

**25 February 2010**

Returning to Cochamo in Chile involved multiple lake crossing starting with Lago Puelo 20 kilometers south of El Bolson. In Puelo, we hire a jet boat which at speed draws only 4 inches allowing us to pass through the rapids separating Lago Puelo from Lago Inferior. We crossed the border back into Chile by boat at S 42 °06'11" W 71° 43'.59".

**Shallow rapids separating Lago Puelo and Lago Inferior**

The captain, a native of California who moved to Chile in 1967, drops us off at the end of the lake and graciously helped us hump the gear up the hill to the customs post.

As we no longer had the horses, we carry all of our gear on our backs.

A few kilometers hike from Lago Inferior we arrive at Lago las Rocas.

No roads exist in this area so we arrange for another boat to transport us across the lake.

Traveling due north we arrived at the other end where we hiked a few more kilometers to Lago Azul, where we had arranged for yet another boat to transport us to the Puelo river where our trucks would be waiting to take us the last 6 kilometers to El Balseo, our temporary base camp along the Puelo river.

**Lago Azul**

**El Balseo, Chile**

Today we rested and were able to re-stock for the second leg of the expedition. Tomorrow we will head back to Cochamo to meet with another local guide who claims he can lead us to the Alerce whose circumference exceeds 20 meters. Given the difficulty of the trails we encountered, we will leave the horses and most of our gear and instead hike in on foot back to Location A which is approximately 18 kilometers from the trailhead in order to expand our search area of the first location. We will then overnight near Location A and in the morning head toward the two new sites.

**27 February 2010**
**El Balseo, Chile**

We are woken in the night by tremors. However as our sat phone, our only link to the outside world is turned off to save batteries, we are totally unaware of events unfolding to the north of us.

The plan for today is to travel by truck 40 kilometers to the Lago Tagua Tagua ferry which connects Llallande Grande to Cochamo. In Cochamo, we will meet with a local guide named Don Lucio and head back to the trailhead where we will camp overnight. We will spend three days conducting a wider area search around Clusters A & B as well as investigate two new locations.

Around 1130am while on the ferry to Cochamo we get our first news about the magnitude of the earthquake which has struck Chile to the north of us. Information is confused at this point but we hear that a significant earthquake has created widespread damage around the area of Concepcion, a town 500 kilometers to the north of us (we later learn that a magnitude 8.8 earthquake and tsunami has created widespread damage killing over 700). This news is of great concern for our team, as our guides have family in Concepcion.

After a brief meeting, the unanimous decision is made to suspend the expedition and focus our efforts on trying to reach family members and friends located to the north of our present location.

The trip to Puerto Varas from El Balseo along the Puelo River was approximately 195 kilometers and took 3 hours 45 minutes by truck and ferry. In Puerto Varas we stocked up on non perishable food, water and diesel fuel for the trip. We grab a quick meal and then get on the road just after 6pm.

Structural damage was soon evident even this far south and we found that fuel were available, was being heavily rationed. Roads conditions are good as far north as Valdivia 250 kilometers north of Puerto Varas, we attempt to buy extra fuel containers but all the stores have already run out of both fuel and containers.

**Collapsed bridges over 350 kilometers from the epicenter**

Around midnight road conditions along the main north south route 5 begin to deteriorate as we get closer to Temuco. Near Collipulli, our trucks take different routes with one vehicle heading towards Concepcion to rescue the five year old niece and two year old nephew of our guides while we continue north towards Santiago to try to reach some friends who have gone missing in the capital. 500 kilometers south of Santiago, just before the town of Mulcen, we are forced to detour over 100 kilometers east to the town of Quilaco and then head back west along local dirt roads to navigate around a collapsed main bridge on Route 5 which spans the Rio Biobío. The area has suffered heavy damage and is without electricity or water. All along this route entire villages have decamped on the side of the road the locals fearful of returning to their homes for fear of structural damage and or more earthquakes. We are amazed that despite the carnage all along the make shift highway local residents have cleared a path and are even out directing traffic. We would find throughout the next days that this was not an isolated situation.

Just past Putagan, Route 5 becomes again impassable and we are forced to divert for 20 kilometers along the L-202 a secondary road. Bridges where standing, must be crossed with caution as the wide gaps have opened up between the bridge and the ground.

We are able to rejoin the main road at San Javier. Once back on Route 5, the way is passable but we encounter long stretches of road which was been cleaved into ravines 100's of meters long and up to 3 meters wide and 3 to 10 meters deep. We are often force to divert across the central median which has been broken down to allow for traffic to move across to the other side of the divided highway. There are mountains of asphalt and rock debris which has been push upwards forming ridges perpendicular to the road sometimes 2 to 4 meters high in places. A number of vehicles are strewn along the road some over turned some crushed under fallen over passes. We have a near miss with a truck that has crashed upside down in a massive pothole in the middle of the highway.

Around sunrise, 1,262 kilometers from our starting point yesterday morning, we arrive at the outskirts of Santiago which is without power but appears to be reasonably intact relative to the damage incurred to the south. Our trip ends 100kms north of Santiago where we are able to find lodgings with electricity food and water.

Later we learn that the second truck makes it to Concepcion around midnight. Road conditions around the epicenter are not surprisingly almost impassable. Fortunately we had been driving in 4x4 pickups with low range capabilities which allowed them to climb up over the destroyed bridges and heaps of rubble.

Upon reaching Concepcion they spend the night in the garden of a house with the children but as aftershocks of up to magnitude 6.7 make sleeping impossible. Security

issues begin to become a concern as minority of inhabitants migrate from scavenging for the food and necessities they need to survive to more unfortunately looting of private residences.

At first light on Sunday 28 February, Martin and Maria depart from Concepcion with the two and five year old and begins to attempt to make their way north towards Santiago arriving safely back in the capital some 10 hours later.

On Thursday March 4th, Martin, Cote and others join a military convoy heading back south with a lorry packed with flour, water, avocados and other foodstuff for the victims in the areas around Concepcion. Reaching the coast, they found that the tsunami had created widespread damage to the towns and that almost all of the older houses made of mud had been destroyed. Most of the people had moved into the hills camping on high ground for fear of more tremors. The Chilean half of our expedition team turned first responders distributed food and aid in towns that had not yet been reached by the government.

We wish to thank all of our friends and family who generously made financial donations to support this effort, your assistance had a direct and meaningful impact on the lives of a great many people in need.

# Conclusions:

The second expedition to identify and document Alerce trees in the Cochamo valley of Chile was partially successful in meeting its objectives. We were able to locate and begin to catalog the two areas we had identified for study. Within these areas we identified and catalogued over 50 Alerce including 7 with a diameter of 2.6 meters of more, the largest of which over 3.5 meters. Additionally we identified two additional target areas of interest. However, the giant Alerce tree rumored to exist deep in the forest continues to elude us. A third expedition is being planned for next spring (November 2010) to continue our search.

## Questions:

- How do the ages of tree line Alerce located above 1,000 meters compare to swamp or forest Alerce given they are protected from man but more exposed to natural elements?
- What common conditions are found near the largest Alerce?
- Do Alerce "create" or contribute to their preferred habitat of poorly draining, peaty sandy soil with low pH levels not suitable for other types of trees?

## Acknowledgments:

Geographic images courtesy of Google Earth

Photographs courtesy of Nicole Watson and Cote Zegers

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# Appendix I: Sampling Data

| No. | Cluster | Location | elevation (meters) | circ (meters) | diameter (meters) | Estimate Age Range (years) | |
|---|---|---|---|---|---|---|---|
| 1 | A | S41 25.573 W72 03.186 | 662 | 9.14 | 2.91 | 2,909 | 4,293 |
| 2 | A | S41 25.561 W72 02.959 | 683 | <6 | <2 | < 2,000 | |
| 3 | A | S41 25.564 W72 02.959 | 688 | <6 | <2 | < 2,000 | |
| 4 | A | S41 25.568 W72 02.957 | 686 | <6 | <2 | < 2,000 | |
| 5 | A | S41 25.559 W72 02.944 | 682 | <6 | <2 | < 2,000 | |
| 6 | A | S41 25.557 W72 02.943 | 682 | <6 | <2 | < 2,000 | |
| 7 | A | S41 25.585 W72 02.919 | 695 | <6 | <2 | < 2,000 | |
| 8 | A | S41 25.590 W72 02.907 | 695 | <6 | <2 | < 2,000 | |
| 9 | A | S41 25.591 W72 02.906 | 695 | <6 | <2 | < 2,000 | |
| 10 | A | S41 25.589 W72 02.897 | 695 | <6 | <2 | < 2,000 | |
| 11 | A | S41 25.596 W72 02.904 | 693 | <6 | <2 | < 2,000 | |
| 12 | A | S41 25.607 W72 02.919 | 695 | <6 | <2 | < 2,000 | |
| 13 | A | S41 25.606 W72 02.920 | 695 | <6 | <2 | < 2,000 | |
| 14 | A | S41 25.612 W72 02.920 | 694 | <6 | <2 | < 2,000 | |
| 15 | A | S41 25.616 W72 02.921 | 694 | <6 | <2 | < 2,000 | |
| 16 | A | S41 25.617 W72 02.922 | 694 | <6 | <2 | < 2,000 | |
| 17 | A | S41 25.621 W72 02.929 | 696 | <6 | <2 | < 2,000 | |
| 18 | A | S41 25.621 W72 02.932 | 696 | <6 | <2 | < 2,000 | |
| 19 | A | S41 25.625 W72 02.938 | 698 | <6 | <2 | < 2,000 | |
| 20 | A | S41 25.632 W72 02.940 | 698 | <6 | <2 | < 2,000 | |
| 21 | A | S41 25.636 W72 02.936 | 699 | <6 | <2 | < 2,000 | |
| 22 | A | S41 25.636 W72 02.933 | 699 | <6 | <2 | < 2,000 | |
| 23 | A | S41 25.644 W72 02.937 | 699 | <6 | <2 | < 2,000 | |
| 24 | A | S41 25.646 W72 02.943 | 700 | 7.5 | 2.39 | 2,387 | 3,523 |
| 25 | A | S41 25.635 W72 02.938 | 698 | <6 | <2 | < 2,000 | |
| 26 | A | S41 25.634 W72 02.939 | 698 | <6 | <2 | < 2,000 | |
| 27 | A | S41 25.609 W72 02.955 | 694 | <6 | <2 | < 2,000 | |
| 28 | A | S41 25.598 W72 02.960 | 691 | <6 | <2 | < 2,000 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 29 | A | S41 25.576 W72 02.977 | 688 | <6 | <2 | < 2,000 | |
| 30 | A | S41 25.596 W72 02.808 | 701 | 11.15 | 3.55 | 3,549 | 5,237 |
| 31 | single | S41 25.648 W72 02.637 | 720 | <6 | <2 | < 2,000 | |
| 32 | single | S41 25.650 W72 02.617 | 719 | <6 | <2 | < 2,000 | |
| 33 | single | S41 25.651 W72 02.615 | 718 | <6 | <2 | < 2,000 | |
| 34 | B | S41 25.697 W72 02.294 | 695 | <6 | <2 | < 2,000 | |
| 35 | B | S41 25.691 W72 02.283 | 694 | <6 | <2 | < 2,000 | |
| 36 | B | S41 25.701 W72 02.120 | 693 | <6 | <2 | < 2,000 | |
| 37 | B | S41 25.700 W72 02.119 | 694 | <6 | <2 | < 2,000 | |
| 38 | B | S41 25.695 W72 02.114 | 694 | <6 | <2 | < 2,000 | |
| 39 | B | S41 25.689 W72 02.111 | 694 | <6 | <2 | < 2,000 | |
| 40 | B | S41 25.680 W72 02.105 | 695 | <6 | <2 | < 2,000 | |
| 41 | B | S41 25.663 W72 02.102 | 695 | 10.4 | 3.31 | 3,310 | 4,885 |
| 42 | B | S41 25.660 W72 02.107 | 694 | <6 | <2 | < 2,000 | |
| 43 | B | S41 25.657 W72 02.108 | 694 | <6 | <2 | < 2,000 | |
| 44 | B | S41 25.666 W72 02.083 | 694 | <6 | <2 | < 2,000 | |
| 45 | B | S41 25.640 W72 02.009 | 697 | <6 | <2 | < 2,000 | |
| 46 | B | S41 25.641 W72 01.997 | 698 | <6 | <2 | < 2,000 | |
| 47 | B | S41 25.646 W72 01.984 | 698 | <6 | <2 | < 2,000 | |
| 48 | B | S41 25.646 W72 01.980 | 698 | <6 | <2 | < 2,000 | |
| 49 | B | S41 25.644 W72 01.974 | 699 | <6 | <2 | < 2,000 | |
| 50 | B | S41 25.644 W72 01.974 | 698 | <6 | <2 | < 2,000 | |
| 51 | B | S41 25.643 W72 01.974 | 699 | <6 | <2 | < 2,000 | |
| 52 | B | S41 25.644 W72 01.954 | 700 | 9.6 | 3.06 | 3,056 | 4,509 |
| 53 | B | S41 25.645 W72 01.884 | 704 | <6 | <2 | < 2,000 | |
| 54 | B | S41 25.648 W72 01.877 | 704 | <6 | <2 | < 2,000 | |
| 55 | B | S41 25.647 W72 01.860 | 704 | <6 | <2 | < 2,000 | |
| 56 | B | S41 25.628 W72 01.800 | 718 | 9.2 | 2.93 | 2,928 | 4,321 |
| 57 | B | S41 25.630 W72 01.800 | 716 | <6 | <2 | < 2,000 | |
| 58 | B | S41 25.622 W72 01.806 | 716 | 8.4 | 2.67 | 2,674 | 3,945 |
| 59 | B | S41 25.613 W72 01.800 | 717 | <6 | <2 | < 2,000 | |