

Supplementary material

1. Table of sites included in this work and PAGES LOTRED-2k South American and Global fulfilled criteria

Site	LOTRED-2K South American Criteria				LOTRED-2K Global Criteria		
	CONTROL2	AGE500	RES200	MIN1500	DUR500	TOP_END	1000_MID
L.Trébol	X		X	X	X	Partially	
L. Theobald	X		X	X	X	Partially	X
L. Mosquito	X	X	X	X	X	Partially	X
M. Pollux	X		X	X	X	Partially	X
Bajo de la Quinta	X		X	X	X	Partially	X
M. PAA	X		X	X	X	Partially	X
M. PAB	X	X	X	X	X	X	X
M. Cerro Frías	X		X	X	X		
Río Rubens bog	X	X	X	X	X	X	X
M. Paisano Desconocido	X		X	X	X	Partially	X
Mallín La Tercera	X		X	X	X	Partially	X
M. Cabo Vírgenes	X	X	X	X	X	Partially	X

CONTROL2: > 1 chronological control in 2K

AGE500: 1 numerical age < 500 yr

RES200: 200yr minimum average sample interval.

MIN1500: Minimal age less than 1500 yr BP

DUR500: a minimum length of 500 yr

TOP_END: The timeline must be constrained by at least one chronological control point near the end (most recent) part of the record and another near the oldest part of the record. Sites which partially fulfil this criteria, lack of recent chronological control (<200 cal yrs BP).

1000_MID: When older than 1000 years, records must include at least one additional age nearly midway between the other two

2. Paleohydric pollen index construction of each record

Lake Trébol above/below hydric availability ratio=

(Drymis+Escallonia+Hydrangea+Myrtaceae+Nothofagus+Saxegothaea) /
(Acaena+Apiaceae+Amaranthaceae+Asteraceae subf. Asteroideae+Asteraceae subf. Cichoroideae+
Asteraceae tribe Mutisiae+Caryophyllaceae+Cupressaceae+Misodendrum+Euphorbiaceae+
Gallium+Gaultheria+Lomatia+Maytenus+Plantago+Poaceae+Rhamnaceae+Ribes+Rosaceae+
Schinus+Solanaceae)

Lake Theobald above/below hydric availability ratio=

(Aristotelia+Drymis+Escallonia+Fuchsia+Nothofagus+Saxegothaea) / (Acaena+Adesmia
+Amaranthaceae+Apiaceae+Arjona+Asteraceae subf. Asteroideae+Asteraceae tribe Mutisiae+
Azorella+Berberis+Calceolaria+Caryophyllaceae+Colletia+Cupressaceae+Discaria
+Embothrium+Empetrum+Galium+Geraniaceae+Lomatia+Malvaceae+Misodendrum+Phacelia+
Plantago+Poaceae+Portulacaceae+Ribes+Sisyrinchium+Solanaceae+Specularia+Urticaceae)

Lake Mosquito above/below hydric availability ratio=

(Drymis+Escallonia+Lomatia+Misodendrum+Nothofagus+Myrtaceae+Saxegothaea+Cupressaceae+
Maytenus) / (Acaena+Amaranthaceae+Asteraceae subf. Asteroideae+Asteraceae subf.
Cichoroideae+Asteraceae tribe Mutisiae+Caryophyllaceae+Poaceae+Rhamnaceae+Solanaceae)

Mallín Pollux above/below hydric availability ratio=

(Drimys+Escallonia+Hydrangea+Myrtaceae+Nothofagus+Pilgerodendron+Pseudopanax) /
(Acaena+Adesmia+Amaranthaceae+Apiaceae+Misodendrum+Asteraceae subf. Asteroideae+
Asteraceae tribe Mutisiae+Berberis+Brassicaceae+Caryophyllaceae+Embothrium+Ericaceae+
Lamiaceae+Phacelia+Plantago+Poaceae+Polygonaceae+Ranunculaceae+Rhamnaceae+Ribes+
Wahlenbergia)

Bajo de la Quinta above/below hydric availability ratio=

(Zygophyllaceae+Chuquiraga+Fabaceae subf. Caesalpinioideae+Bougainvillea+Monttea+Poaceae
+Rosaceae +Ranunculaceae+Malvaceae+Plumbaginaceae+Cyperaceae) /
(Cactaceae+Ephedra+Hyalis+Calyceraceae +Chenopodiaceae)

Mallín Península Avelaneda Alto above/below hydric availability ratio=

(Adenocaulon type+Drymis+Maytenus disticha+Nonthofagus+Viola) / (Misodendrum,
Acaena+Apiaceae+ Asteraceae subf. Asteroideae+ Asteraceae tribe Mutisiae +Berberis
+Calceolaria +Caryophyllaceae+Chenopodiaceae+Draba+Embothrium+Empetrum+Escallonia
+Galium+Gaultheria+Iridaceae+ Lamiaceae+Lathyrus+ Malvaceae +Mulinum+Nassauvia
type+Osmorhiza type+Phacelia +Plantago+Rhamnaceae +Ribes +Rosaceae+Sysirinchium
+Urticaceae)

Mallín Península Avellaneda Bajo above/below hydric availability ratio=

(Drymis+Misodendrum+Nothofagus) / (Acaena+Amaranthaceae+ Asteraceae subf. Asteroideae+ Asteraceae tribe Mutisieae+Berberis+Calceolaria+Calyceraceae+Caryophyllaceae +Chenopodiaceae+Embothrium+Empetrum+Euphorbiaceae+Fabaceae+Gaultheria+Iridaceae +Lamiaceae+Liliaceae+Mulinum+Orchidaceae+Poaceae+Ranunculaceae+Solanaceae)

Mallín Cerro Frías above/below hydric availability ratio=

(Misodendrum+Nothofagus) / (Apiaceae+ Asteraceae subf. Asteroideae+ Asteraceae subf. Cichoroideae+Asteraceae tribe Mutisieae+Berberis+Caryophyllaceae+Empetrum+Euphorbiaceae+ Ephedra+Fabaceae+Lamiaceae+Liliaceae+Monocotyledoneae+Orchidaceae+Plantago+Poaceae +Ranunculaceae+Rosaceae+Rubiaceae+Scrophulariaceae+Solanaceae+Valeriana+Verbenaceae)

Río Rubens bog above/below hydric availability ratio=

(Drymis+Escallonia+Misodendrum+Nothofagus+Pseudopanax) / (Acaena+Adesmia+ Amaranthaceae+Apiaceae+Armeria+ Asteraceae subf. Asteroideae+ Asteraceae tribe Mutisieae+Berberis+Brassicaceae+Caryophyllaceae+Cerastium type+Ephedra+Ericaceae+ Fabaceae+Nassauvia type+ Plantago+Poaceae+Ribes+Rubiaceae+Schinus+Scrophulariaceae+ Urticaceae+Verbena)

Mallín Paisano Desconocido above/below hydric availability ratio=

(Acaena+Asteraceae tribe Mutisieae+Brassicaceae+Calceolaria+Caryophyllaceae+Empetrum+ Gaultheria+Geraniaceae+Hypochaeris+Monocotyledoneae+Onagraceae+Plumbaginaceae+Poaceae+Ranunculaceae) / (Adesmia+ Asteraceae subf. Asteroideae+Azorella+Chenopodiaceae+Lycium +Mulinum+Nassauvia type+Schinus)

Mallín La Tercera above/below hydric availability ratio=

(Campanulaceae+Convolvulaceae+Empetrum+Euphorbiaceae+Gaultheria+Lamiaceae+Liliaceae +Malvaceae+Poaceae+Polemoniaceae+Ranunculaceae+Rubiaceae+Valeriana) / (Asteraceae subf. Asteroideae+Azorella+Fabaceae+Ephedra+Mulinum+Nassauvia type+Plantago+Solanaceae)

Mallín Cabo Vírgenes above/below hydric availability ratio=

(Asteraceae subf. Cichoroideae+Caryophyllaceae+Cyperaceae+Empetrum+Fabaceae +Juncaginaceae+Lamiaceae+ Monocotyledoneae+Osmorhiza+Perezia+ Poaceae+Rubiaceae +Triglochin+Valeriana) / (Asteraceae subf. Asteroideae+Azorella+Berberis+Chenopodiaceae+ +Ephedra+Nassauvia+Rosaceae +Solanaceae+Brassicaceae)

3. Mallín Península Avellaneda Alto chronology, pollen and charcoal records analysis

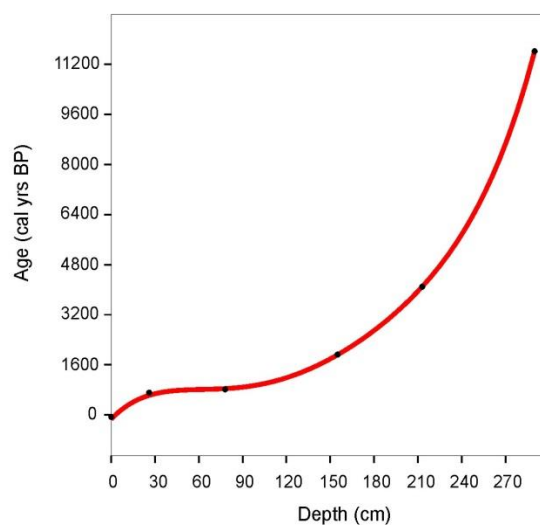
3.1. Radiocarbon dates from Mallín Península Avellaneda Alto

Radiocarbon dates were calibrated using the CALIB Rev 7.0.1 software (Stuiver et al., 2005). All radiocarbon dates were calibrated with the Southern Hemisphere curve (SHCal13) (Hogg et al., 2013). Material analyzed: bulk organic matter.

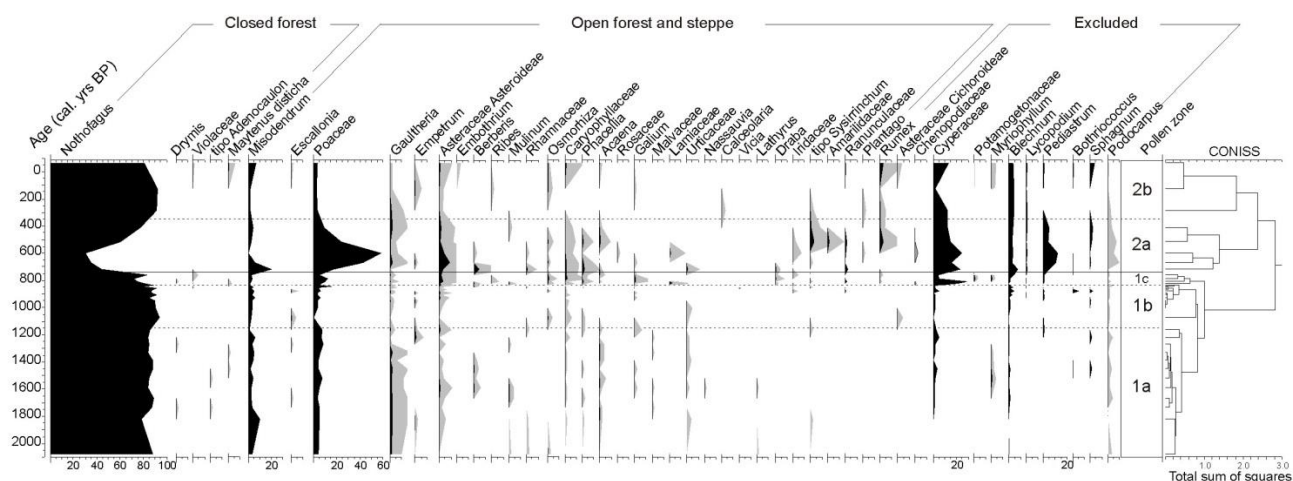
Sample depth (cm)	Age ¹⁴ C yr BP	Age cal yrs BP	Lab. Cod.
0-1	-	-60	n/a
26-27	835±44	711	AA99350
78-79	948±35	819	AA96517
155-156	2013±37	1928	AA96516
218-219	3782±40	4094	AA89352
291-292	10112±69	11613	UBA23299

3.2. Age-depth Model of Mallín Península Avellaneda Alto

An age-depth model based on five AMS radiocarbon dates and the assignment of a modern age (AD 2010) to the surface of the sequence was performed using PAST software (Hammer et al., 2001) applying a five degree polynomial function $(4.307 \times 10^{-08}(\text{depth})^5 - 2.994 \times 10^{-05}(\text{depth})^4 + 0.008215(\text{depth})^3 - 0.9424(\text{depth})^2 + 48.58(\text{depth}) - 60)$.



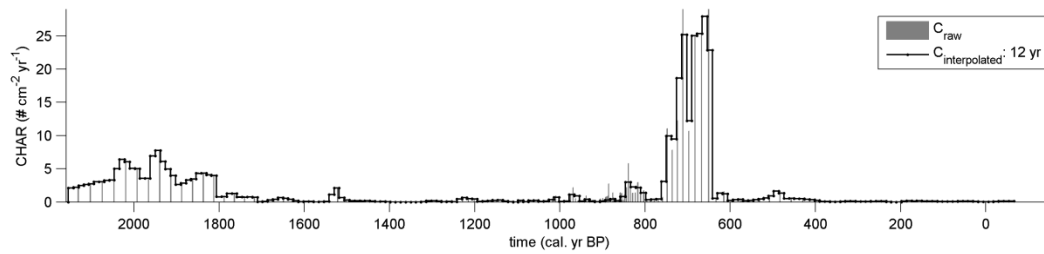
3.3. Mallín Península Avellaneda Alto pollen diagram (in percentages) and pollen zones obtained by cluster analysis.



Pollen Zone	Age (cal yrs BP)	Pollen characteristics
2b	Present-350	Re-establishment of <i>Nothofagus</i> , accompanied by a decrease in palynological richness, low presence of herbs and shrubs. Inferred vegetation: Closed forest with poorly developed understory vegetation.
2a	350-730	The <i>Nothofagus</i> values drops abruptly to 30-40%, with an increase of herbs and shrubs values. Poaceae reaches the highest values of the record (60%). Inferred vegetation: Open forests and grass steppe mosaic.
1c	730-830	<i>Nothofagus</i> slightly decrease favoring the development of some herbs and shrubs, such as: Asteraceae subf. Asteroideae, Caryophyllaceae, <i>Phacellia</i> and <i>Galium</i> . The major pick in Cyperaceae values took place in this zone. Inferred vegetation: Mixed of closed forest and forest gaps.
1b	830-1150	Rise of the <i>Nothofagus</i> values and a decrease of pollen richness. Inferred vegetation: Closed forest with poorly developed understory vegetation.
1a	1150-2150	Dominance of <i>Nothofagus</i> (up to 80%). Low values (<10%) of Poaceae, Gaultheria, Asteraceae subf. Asteroideae and other herbs. Inferred vegetation: Mixed of closed forest and forest gaps.

3.4. Charcoal accumulation rates of Mallín Península Avellaneda Alto

Charcoal particles $> 250 \mu\text{m}$ and between 250 and $125 \mu\text{m}$ were summed together as they show the same patterns. Charcoal concentrations (number of particles/ cm^3) were multiplied by sedimentation rate (cm/yr) to obtain the charcoal accumulation rate (CHAR; particles/ cm^2/yr) of each sample. Charcoal data were interpolated to constant 12 years, corresponding approximately to the median temporal resolution of the record. All statistical treatments were done using the program CharAnalysis, written by Philip E. Higuera (<http://CharAnalysis.googlepages.com>).



4. Bajo de la Quinta and La tercera chronology

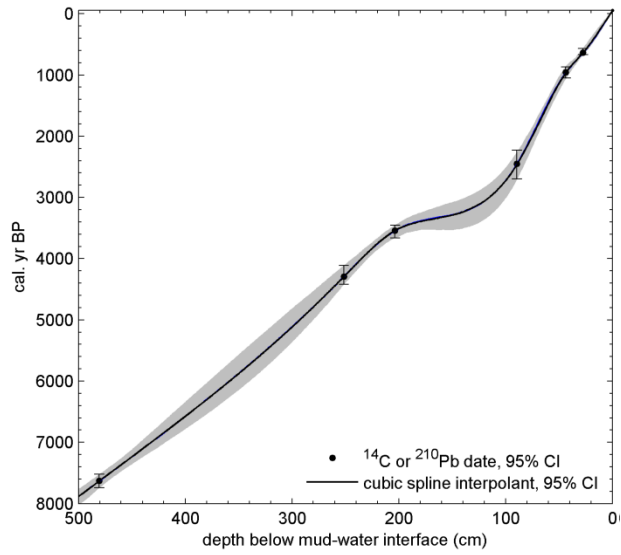
4.1. Radiocarbon dates from Bajo de la Quinta (BQ) and Mallín La Tercera (LT)

Radiocarbon dates were calibrated using the CALIB Rev 7.0.1 software (Stuiver et al., 2005). All radiocarbon dates were calibrated with the Southern Hemisphere curve (SHCal13) (Hogg et al., 2013). Material analyzed bulk organic matter.

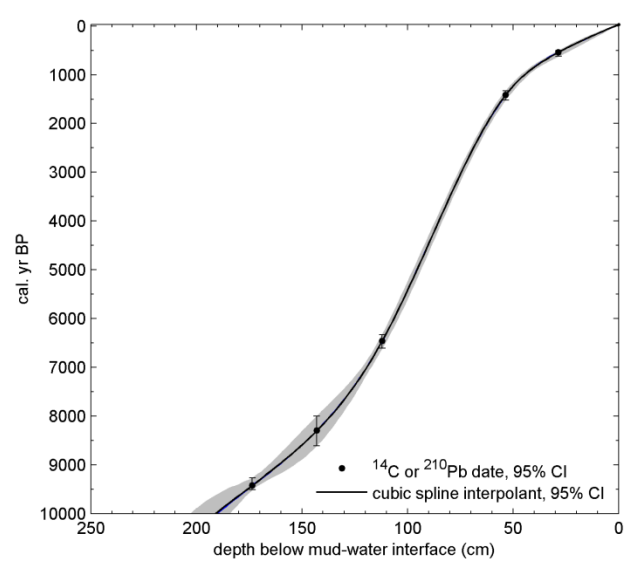
	<i>Sample depth (cm)</i>	<i>Age ¹⁴C yr BP</i>	<i>Age cal yr BP</i>	<i>Lab. Cod.</i>
<i>BQ</i>	0-1	-	-59	n/a
	27-28	721±24	637	D-AMS 008818
	43-44	1097±35	956	AA96518
	89-90	2422±68	2452	AA92539
	203-204	3358±37	3540	AA92540
	251-252	3909±50	4292	AA93730
	480-181	6821±58	7629	AA88053
<i>LT</i>	0-1	-	-35	n/a
	28-29	565±37	536	D-AMS 008819
	53-54	1570±37	1412	AA87093
	111-113	5717±45	6459	AA76035
	142-144	7540±160	8298	A4335
	173-174	8439±52	9424	AA87094

4.2. Age-depth Models of Bajo de la Quinta (BQ) and Mallín La Tercera (LT)

Age-depth models based on AMS radiocarbon dates were performed using MCAge software (Higuera et al., 2009).



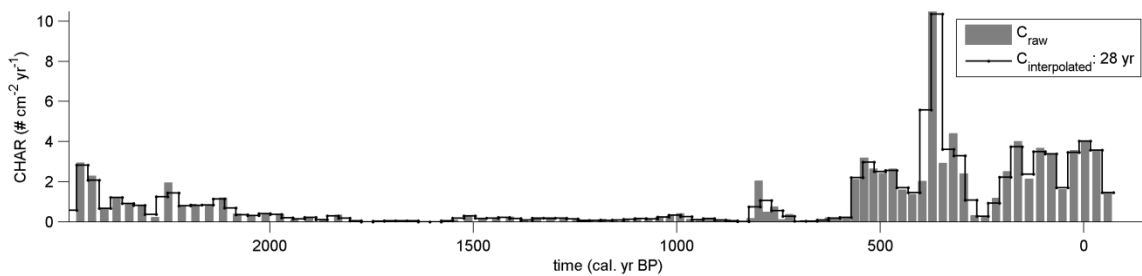
BQ Age-Depth Model



LT Age-Depth Model

4.3. Charcoal accumulation rates of Bajo de la Quinta

Charcoal particles $> 250 \mu\text{m}$ and between 250 and $125 \mu\text{m}$ were summed together as they show the same patterns. Charcoal concentrations (number of particles/ cm^3) were multiplied by sedimentation rate (cm/yr) to obtain the charcoal accumulation rate (CHAR; particles/ cm^2/yr) of each sample. Charcoal data were interpolated to constant 28 years, corresponding approximately to the median temporal resolution of the record.



Section 5. Pollen indicators classification of Local dataset records

Site Name: Mallín Península Avellaneda Alto

Vegetation description: This site is a highland peatbog (600 m a.s.l.) surrounded by closed Nothofagus pumilio forests. Understory vegetation is adapted to shaded condition dominated by rosette herbs such as Adenocaulon and Viola. Also, ferns and Maytenus disticha develop under shaded conditions. Farther east open vegetation dominates with Poaceae, hairy herbs and shrubs (Mulinum) cover open patches. Paleohydric pollen index for this site reflects changes in canopy closure. We assume that during periods of above (below) hydric balance, closed (open) canopy patches would develop at the record surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species or species distribution
Adenocaulon type	Adenocaulon chilense	Positive	Mesophytic rosette herb	Sottile et al., 2015
Nothofagus	Nothofagus pumilio	Positive	Mesophytic tree	Donoso, 2006
Drymis	Drymis winteri	Positive	Shade tolerant Mesophytic tree	Donoso, 2006
Maytenus disticha	Maytenus disticha	Positive	Shade tolerant dwarf shrub	Sottile et al., 2015
Viola	Viola spp.	Positive	Shade tolerant herb	Sottile et al., 2015
Misodendrum	Misodendrum spp.	Negative	Parasitic- open canopy	Peri & Ormaechea, 2013. Moreno et al., 2014.
Acaena	Mostly Acaena magellanica, Acaena splendens, Acaena poeppigiana, Acaena pinnatifida	Negative	Hairy herbs	Sottile et al., 2015
Apiaceae	Bolax sp.	Negative	Dwarf shrub	Correa MN (1969-1999)
Asteraceae subf. Asteroideae	Senecio spp. Gamochaeta spp.	Negative	Hairy shrubs and herbs	Sottile et al., 2015
Asteraceae tribe Mutisieae	Perezia spp. Leucheria spp.	Negative	Sclerophilous and hairy herbs	Sottile et al., 2015, Correa MN (1969-1999)
Berberis	Berberis microphyla	Negative	Sclerophilous shrub	Sottile et al., 2015
Calceolaria	Calceolaria	Negative	Heliophilous herbs	Correa MN (1969-1999)

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Caryophyllaceae	Cerastium arvense Stellaria nemorum	Negative	Heliophyllous hairy herbs	Sottile et al., 2015
Chenopodiaceae	Chenopodium sp.	Negative	Sclerophilous herb	Correa MN (1969-1999)
Draba	Draba sp.	Negative	Heliophilous herb	Boelcke et al., 1985 Correa MN (1969-1999)
Embothrium	Embothrium coccineum	Negative	Heliophilous tree	Donoso, 2006
Empetrum	Empetrum rubrum	Negative	Dwarf shrub	Sottile et al., 2015
Escallonia	Escallonia rubra Escallonia virgata	Negative	Mesophytic heliophilous shrub	Sottile et al., 2015 Pisano & Dimitri, 1973.
Galium	Galium spp.	Negative	Heliophilous herb-vine	Sottile et al., 2015 Pisano & Dimitri, 1973.
Gaultheria	Gaultheria mucronata	Negative	Sclerophilous shrub	Sottile et al., 2015
Iridaceae	Sisyrinchium sp. Solenomelus sp.	Negative	Helio- erectophilous herbs	Sottile et al., 2015 Boelcke et al., 1985 Correa MN (1969-1999)
Lamiaceae	Scutellaria nummulariifolia	Negative	Heliophilous herb	Boelcke et al., 1985 Correa MN (1969-1999)
Lathyrus type	Lathyrus sp.	Negative	Heliophilous hairy herb	Sottile et al., 2015
Malvaceae	Lecanophora subacaule	Negative	Hairy herb	Boelcke et al., 1985 Correa MN (1969-1999)
Mulinum	Mulinum spp.	Negative	Sclerophilous shrub	Sottile et al., 2015
Nassauvia type	Nassauvia spp.	Negative	Sclerophilous herb	Boelcke et al., 1985 Correa MN (1969-1999)
Phacelia	Phacelia nana	Negative	Hairy herb	Sottile et al., 2015
Osmorhiza type	Osmorhiza chilensis	Negative	Mesophytic herb	Sottile et al., 2015 Boelcke et al., 1985 Correa MN (1969-1999)
Plantago	Plantago uniglumis Plantago semperviroides	Negative	Sclerophilous herb and dwarf shrub	Boelcke et al., 1985 Correa MN (1969-1999)

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Poaceae	Festuca spp. Poa spp.	Negative	Helio-erectophilous herbs	Sottile et al., 2015 Boelcke et al., 1985 Correa MN (1969-1999)
Rhamnaceae	Discaria chacaye	Negative	Slerophilous shrub	Sottile et al., 2015 Boelcke et al., 1985 Correa MN (1969-1999)
Ribes	Ribes spp.	Negative	Heliophylous shrub	Sottile et al., 2015 Boelcke et al., 1985 Correa MN (1969-1999)
Rosaceae	Geum magellanicum	Negative	Heliosclerophilous shrub	Boelcke et al., 1985 Correa MN (1969-1999)
Sysirinchium	Sysirinchium spp.	Negative	Helio-erectophilous herb	Sottile et al., 2015
Urticaceae	Urtica magellanica	Negative	Hairy herb	Boelcke et al., 1985 Correa MN (1969-1999)

Site Name: Mallín Península Avellaneda Bajo

Vegetation description: this is a lowland peatbog (215 m a.s.l.) surrounded by patches of mixed *Nothofagus pumilio* and *Nothofagus antarctica* forests and open shrub-grass patches dominated by *Mulinum spinosum*, *Poa* spp. and *Festuca* spp. Other sclerophilous and heliophilous shrubs and herbs such as *Berberis buxifolia*, *Empetrum rubrum*, *Cerastium arvense*, *Lathyrus magellanicus* also develop in open canopy patches. Paleohydric pollen index for this site reflects changes in forest patches versus steppe patches abundance around the record area. We assume that during periods of above (below) hydric balance, forest (shrub-grass steppe) patches would develop at the record's surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Drymis	<i>Drymis winteri</i>	Positive	Forest patches	Donoso, 2006
Misodendrum	<i>Misodendrum</i> spp.	Positive	Parasitic of <i>N. Antarctica</i> and <i>N. pumilio</i>	Peri & Ormaechea, 2013. Moreno et al., 2014.
Nothofagus	<i>Nothofagus pumilio</i>	Positive	Forest patches	Donoso, 2006
Acaena	Mostly <i>Acaena magellanica</i> , <i>Acaena splendens</i> , <i>Acaena poeppigiana</i> , <i>Acaena pinnatifida</i>	Negative	Shrub-grass patches	Sottile et al., 2015
Amaranthaceae	<i>Nitrophila australis</i>	Negative	Shrub-grass patches	Correa MN (1969-1999)
Asteraceae subf. Asterodeae	<i>Senecio</i> spp. <i>Gamochaeta</i> spp.	Negative	Shrub-grass patches	Sottile et al., 2015
Asteraceae tribe Mutisieae	<i>Perezia</i> spp. <i>Leucheria</i> spp.	Negative	Shrub-grass patches	Sottile et al., 2015, Correa MN (1969-1999)
Berberis	<i>Berberis microphylla</i>	Negative	Shrub-grass patches	Sottile et al., 2015
Calceolaria	<i>Calceolaria</i>	Negative	Shrub-grass patches	Correa MN (1969-1999)
Calyceraceae	<i>Boopis filifolia</i> <i>Gamocarpha selliana</i>	Negative	Shrub-grass patches	Correa MN (1969-1999)

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Caryophyllaceae	Cerastium arvense Stellaria nemorum	Negative	Shrub-grass patches	Sottile et al., 2015
Chenopodiaceae	Chenopodium sp.	Negative	Shrub-grass patches	Correa MN (1969-1999)
Embothrium	Embothrium coccineum	Negative	Shrub-grass patches	Donoso, 2006
Empetrum	Empetrum rubrum	Negative	Shrub-grass patches	Sottile et al., 2015
Euphorbiaceae	Euphorbia sp.	Negative	Shrub-grass patches	Correa MN (1969-1999)
Fabaceae	Lathyrus sp. Vicia sp.	Negative	Shrub-grass patches	Sottile et al., 2015
Gaultheria	Gaultheria mucronata	Negative	Shrub-grass patches	Sottile et al., 2015
Iridaceae	Sisyrinchium sp. Solenomelus sp.	Negative	Shrub-grass patches	Sottile et al., 2015 Boelcke et al., 1985; Correa MN (1969-1999)
Lamiaceae	Scutellaria nummulariifolia	Negative	Shrub-grass patches	Boelcke et al., 1985 ; Correa MN (1969-1999)
Liliaceae	Tristagma patagonicum	Negative	Shrub-grass patches	Boelcke et al., 1985 ; Correa MN (1969-1999)
Mulinum	Mulinum spp.	Negative	Shrub-grass patches	Sottile et al., 2015
Orchidiaceae	Chloraea spp. Gavililea spp.	Negative	Shrub-grass patches	Sottile et al., 2015
Poaceae	Poa spp. Festuca spp.	Negative	Shrub-grass patches	Boelcke et al., 1985; Correa MN (1969-1999)
Ranunculus	Anemone multifida	Negative	Shrub-grass patches	Sottile et al., 2015
Solanaceae	Solanum sp.	Negative	Shrub-grass patches	Correa MN (1969-1999)

Site Name: Mallín Paisano Desconocido**Vegetation description:**

The core Mallín Paisano Desconocido (48° 58' S; 72° 14' W; Fig. 1) was obtained from the northeastern shore of Lago San Martín from the peat-bog located in a small canyon. *Nothofagus antartica* patches and grass steppe mosaic covers the eastern península Chacabuco (1 km to the east of Mallín Paisano Desconocido). The grass steppe area surrounding the peat bog is covered by *Festuca pallens* and *Festuca argentina*. A shrub steppe, associated to rocky slopes, under lower water availability, is dominated by *Nardophyllum obtusifolium* associated with *F. pallens* and high proportion of *Berberis*, *Senecio*, *Baccharis*, *Mulinum*, *Azorella* and *Schinus*. . Paleohydric pollen index for this site reflects changes in steppe communities between more mesic grass, herbs or shrub species versus more sclerophilous/ xerophytic shrub species abundance around the record area. We assume that during periods of above (below) hydric balance, mesic grass, herbs or shrub species (more sclerophilous/xerophytic shrub) patches would develop at the record's surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Acaena	Mostly Acaena ovalifolia, Acaena poeppigiana, Acaena pinnatifida	Positive	Mesic herbs	Sottile et al., 2015; Correa MN (1969-1999);
Asteraceae tribe Mutisieae	Perezia spp. Leucheria spp.	Positive	Mesic herbs	Sottile et al., 2015, Correa MN (1969-1999)
Brassicaceae	Cardamine sp.	Positive	Mesic herb	Correa MN (1969-1999)
Calceolaria	Calceolaria spp.	Positive	Mesic herbs	Correa MN (1969-1999)
Caryophyllaceae	Cerastium arvense Stellaria nemorum	Positive	Mesic herbs	Sottile et al., 2015
Empetrum	Empetrum rubrum	Positive	Mesic shrub	Sottile et al., 2015
Gaultheria	Gaultheria mucronata	Positive	Mesic shrub	Sottile et al., 2015
Geraniaceae	Geranium molle	Positive	Mesic herbs	Sottile et al., 2015; Correa MN (1969-1999)
Hypochaeris	Hypochaeris incana	Positive	Mesic herbs	Sottile et al., 2015; Correa MN (1969-

				1999)
Monocotyledoneae	Sisyrinchium sp. Solenomelus sp. Tristagma patagonicum	Positive	Mesic herbs	Boelcke et al., 1985; Correa MN (1969-1999)
Onagraceae	Oenothera odorata	Positive	Mesic herbs	Boelcke et al., 1985; Correa MN (1969-1999)
Plumbaginaceae	Armeria maritima	Positive	Mesic herbs	Boelcke et al., 1985; Correa MN (1969-1999)
Poaceae	Festuca gracillima, F. pallens, Stipa speciosa Poa rigidifolia	Positive	Mesic herbs	Boelcke et al., 1985; Correa MN (1969-1999)
Ranunculaceae	Anemone multifida	Positive	Mesic herbs	Sottile et al., 2015
Adesmia	Adesmia boronoides	Negative	Xerophytic shrub with succulent glandulous leaves	Boelcke et al., 1985; Correa MN (1969-1999)
Asteraceae subf. Asteroideae	Senecio filaginoides Nardophyllum bryoides. Baccharis magellanica Chilodactylum diffusum.	Negative	Hairy and sclerophilous shrubs	Correa MN (1969-1999)
Azorella	Azorella trifurcata	Negative	Xerophytic dwarf shrub	Correa MN (1969-1999)
Chenopodiaceae	Chenopodium sp.	Negative	Succulent xerophytic herb	Correa MN (1969-1999)
Lycium	Lycium chilense	Negative	Sclerophilous shrub	Correa MN (1969-1999)
Mulinum	Mulinum spinosum	Negative	Xerophytic shrub	Correa MN (1969-1999)
Nassauvia type	Nassauvia glomerulosa; N. ulicina	Negative	Xerophytic Dwarf shrub	Correa MN (1969-1999)
Schinus	Schinus sp.	Negative	Xerophytic shrub	Correa MN (1969-1999)

Site Name: Mallín La Tercera

Vegetation description: La Tercera area is located in the southern shore of Lake San Martin (49° 11'S; 72° 22'W), at the grass steppe at 15 km to the Subantarctic Forest – Patagonian Steppe ecotone. Wetlands, such as Mallín La Tercera, are common in depressions within glacial deposits. Around Lake San Martin, the grasslands are dominated by *Festuca*. Other grasses found in the area are *Poa ligularis* and *Stipa chrysophylla*. Also, *Carex andina*, *Polygala darwiniana* are present. To the east, the dwarf-shrub steppe grows in areas where the precipitation is lower than 200 mm mean annual precipitation and is characterized by woody elements of low height and cover. The main species are *Nassauvia*, *Chuquiraga*, *Acantholippia*, *Brachyclados* and *Ephedra*. The herbs *Plantago patagonica* and *P. correae* are native species of this vegetation unit. Paleohydric pollen index for this site reflects changes in steppe communities between more mesic grass, herbs or shrub species versus more sclerophilous shrub / xerophytic herbs species abundance around the record area. We assume that during periods of above (below) hydric balance, mesic grass, herbs or shrub species (more sclerophilous shrub / xerophytic herbs) patches would develop at the record's surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Campanulaceae	<i>Pratia repens</i>	Positive	Mesic herb	Correa MN (1969-1999);
Convolvulaceae	<i>Convolvulus arvensis</i>	Positive	Mesic herb	Correa MN (1969-1999)
Empetrum	<i>Empetrum rubrum</i>	Positive	Mesic shrub usually common in humid soils	Correa MN (1969-1999)
Euphorbiaceae	<i>Euphorbia</i> sp.	Positive	Mesic herb	Correa MN (1969-1999)
Gaultheria	<i>Gaulthera mucronata</i>	Positive	Mesic shrub	Sottile et al., 2015
Lamiaceae	<i>Scutellaria nummulariifolia</i>	Positive	Mesic herb	Boelcke et al., 1985 ; Correa MN (1969-1999)
Liliaceae	<i>Tristagma patagonicum</i>	Positive	Mesic herb	Boelcke et al., 1985 ; Correa MN (1969-1999)
Malvaceae	<i>Lecanophora subcaule</i>	Positive	Mesic herb	Boelcke et al., 1985 Correa MN (1969-1999)
Poaceae	<i>Festuca gracillima</i> , <i>F. pallens</i> , <i>Stipa speciosa</i> <i>Poa rigidifolia</i>	Positive	Mesic herb	Boelcke et al., 1985; Correa MN (1969-1999)
Polemoniaceae	<i>Gilia laciniata</i>	Positive	Mesic herb	Correa MN (1969-1999)

Ranunculaceae	Anemone multifida Caltha sp.	Positive	Mesic herb	Sottile et al.,2015; Correa MN
Valeriana	Valeriana carnosa	Positive	Mesic herb	Correa MN (1969- 1999)
Asteraceae subf. Asteroideae	Senecio filaginoides Nardophyllum bryoides. Baccharis magellanica Chiliotrichum diffusum. Brachyclados sp., Acantholipia sp.,	Negative	Sclerophilous shrubs	Correa MN (1969- 1999)
Azorella	Azorella trifurcata	Negative	Xerophytic Dwarf shrub	Correa MN (1969- 1999)
Fabaceae	Adesmia boronoides	Negative	Sclerophilous shrub	Correa MN (1969- 1999)
Ephedra	Ephedra triandra	Negative	Xerophytic herb	Correa MN (1969- 1999)
Mulinum	Mulinum spinosum	Negative	Xerophytic shrub	Correa MN (1969- 1999)
Nassauvia type	Nassauvia glomerulosa; N. ulicina	Negative	Xerophytic Dwarf shrub	Correa MN (1969- 1999)
Plantago	Plantago uniglumis Plantago sempervivoides	Negative	Sclerophilous herb and dwarf shrub	Boelcke et al., 1985 Correa MN (1969-1999)
Solanaceae	Lycium chilense	Negative	Sclerophilous shrub	Correa MN (1969- 1999)

Site Name: Mallín Cabo Vírgenes

Vegetation description: It is located at 52° 19'45''S; 68°23'W. Vegetation communities belong to Magallanian steppe, dominated by *Festuca gracillima*, which extends by plateaus and slopes. Under different hydric balance conditions we can distinguish a dry steppe of *F. gracillima* with *Nardophyllum bryoides*, *Berberis* and cushion plants (*Nassauvia*, *Ephedra*) and a more humid steppe where *F. gracillima* is accompanied by *Chilodactylus diffusum* and *Empetrum rubrum* shrublands. Mallines are present in valleys and ravines. Paleohydric pollen index for this site reflects changes in steppe communities between humid steppe species versus dry steppe species around the record area. We assume that during periods of above (below) hydric balance, humid steppe species (dry steppe species) would develop at the record's surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Asteraceae subf. Cichoroideae	<i>Hypochaeris</i> spp.	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Caryophyllaceae	<i>Colobanthus subulatus</i> , <i>Cerastium arvense</i>	Positive	humid steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Cyperaceae	<i>Carex andina</i> , <i>C. argentina</i>	Positive	humid steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Empetrum	<i>Empetrum rubrum</i>	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Fabaceae	<i>Lathyrus magellanicus</i> , <i>Adesmia boronioides</i>	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Juncaginaceae	<i>Triglochin</i> spp.	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Lamiaceae	<i>Satureja darwinii</i>	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Monocotyledoneae	<i>Sysirinchium arenarium</i>	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Osmorhiza	<i>Osmorhiza chilensis</i>	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Perezia	<i>Perezia recurvata</i>	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN

				(1969-1999)
Poaceae	Festuca gracillima, F. pallescens, Poa rigidifolia	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Rubiaceae	Galium aparine	Positive	humid steppe species	Boelcke et al., 1985 ; Correa MN (1969-1999)
Valeriana	Valeriana carnosa	Positive	humid steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Asteraceae subf. Asteroideae	Nardophyllum bryoides, Senecio magellanicus	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Azorella	Azorella fuegianum	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Berberis	Berberis buxifolia, B. heterophylla	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Chenopodium	Chenopodium sp.	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Ephedra	Ephedra frustillata	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Nassauvia	Nassauvia ulicina, N. fuegiana	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Rosaceae	Acaena magellanica	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Solanaceae	Lycium ameghinoi	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)
Brassicaceae	Draba sp. Xerodraba sp.	Negative	Dry steppe species	Boelcke et al., 1985 Correa MN (1969-1999)

Site Name: Bajo de la Quinta

Vegetation description: The predominant geofoms and soil types in this landscape determine spatial heterogeneity of vegetation ranging from psammophytic/halophytic community on the sand dunes along the coast (*Hyalis argentea*, *Calycera crassifolia* and *Atriplex lampa*, *Suaeda divaricata* dominate on depressions with salty soils) to xerophytic shrublands to inland such as, *Larrea divaricata*, *Chuquiraga erinaceae*, *Senna aphylla*, *Bougainvillea spinosa*, *Monttea aphylla*. Xerophytic shrublands are associated with clay loam soils. These substrates allow greater water availability, related to a higher storage capacity, which favors shrub, grass and herbs development. So, water availability and different edaphic conditions are probably leading to this community differentiation. Monte shrub communities are organized as two-phase mosaic composed by a phase of perennial grasses and shrub-dominated patches alternating with sparse cover (Ares et al., 2003; Bertiller et al., 2004; Bisigato et al., 2009). Ephedra and Cactaceae present morphological features to support long periods of below hydric balance conditions. Paleo hydric pollen index for this site reflects changes in Monte shrub steppe species abundances comparing highly drought tolerant species versus low drought tolerant species around the record area. We assume that during periods of above (below) hydric balance, low drought tolerant species (highly drought tolerant species) patches would develop at the record's surrounding areas.

Pollen type	Species source	Pollen-hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Zygophyllaceae	<i>Larrea divaricata</i>	Positive	low drought tolerant species	León et al. 1998 Marcos y Mancini 2012 a Marcos y Mancini 2012b Ares et al., 2003; Bertiller et al., 2004; Bisigato et al., 2009
Asteraceae sub. Asteroideae	<i>Chuquiraga erinaceae</i>	Positive	low drought tolerant species	León et al. 1998 Marcos y Mancini 2012 a Marcos y Mancini 2012b Ares et al., 2003; Bertiller et al., 2004; Bisigato et al., 2009
Fabaceae Subf. Caesalpinoideae	<i>Senna aphylla</i>	Positive	low drought tolerant species	León et al. 1998 Marcos y Mancini 2012 a Marcos y Mancini

				2012b Ares et al., 2003; Bertiller et al., 2004; Bisigato et al., 2009
Nyctagynaceae	Bougainvillea spinosa	Positive	low drought tolerant species	Ares et al., 2003; Bertiller et al., 2004; Bisigato et al., 2009
Scrophulariaceae	Monttea aphylla	Positive	low drought tolerant species	León et al. 1998 Marcos y Mancini 2012 a Marcos y Mancini 2012b Ares et al., 2003; Bertiller et al., 2004; Bisigato et al., 2009
Poaceae	Stipa ligularis	Positive	low drought tolerant species	Marcos y Mancini 2012 b
Rosaceae	Acaena magellanica	Positive	low drought tolerant species	León et al. 1998
Ranunculaceae	Ranunculus cymbalaria	Positive	low drought tolerant species	León et al. 1998
Malvaceae	Malvastrum	Positive	low drought tolerant species	León et al. 1998
Plumbaginaceae	Limonium brasiliense	Positive	low drought tolerant species	León et al. 1998
Cyperaceae	Several species	Positive	low drought tolerant species	León et al. 1998 Marcos y Mancini 2012a
Cactaceae	Cereus aethiops	Negative	high drought tolerant species	León et al. 1998
Ephedrae	Ephedra ochreatea	Negative	high drought tolerant species	León et al. 1998
Asteraceae sub. Asteroideae	Hyalis argentea Baccharis spp.	Negative	high drought tolerant species	Marcos y Mancini 2012a Marcos y Mancini 2012 b Fontana, 2005
Calyceraceae	Calycera crassifolia	Negative	high drought tolerant species	Marcos y Mancini 2012a Marcos y Mancini 2012b Fontana, 2005
Chenopodiaceae	Atriplex lampa	Negative	high drought tolerant species	León et al. 1998 Marcos y Mancini, 2012
Chenopodiaceae	Suaeda divaricate	Negative	high drought tolerant species	León et al. 1998 Marcos y Mancini, 2012

Site Name: Lake Trébol

Vegetation description: Lake El trébol is surrounded by a closed and highly diverse mixed *Nothofagus dombeyi*-*Austrocedrus chilensis* forest (Ezcurra and Brion, 2005). Today this site is highly impacted by urbanization. Paleohydric pollen index for this site reflects changes in canopy closure. We assume that during periods of above (below) hydric balance, closed (open) canopy patches would develop at the record surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Drymis	<i>Drymis winteri</i>	Positive	Shade tolerant mesophytic tree	Donoso, 2006
Escallonia	<i>Escallonia alpina</i>	Positive	Shade tolerant mesophytic shrub	Donoso, 2006
Hydrangea	<i>Hydrangea integerrima</i>	Positive	Mesophytic Vine	Donoso, 2006
Myrtaceae	<i>Luma apiculata</i> <i>Amomyrtus luma</i>	Positive	Mesophytic trees	Donoso, 2006
Nothofagus	<i>Nothofagus dombeyi</i> , <i>Nothofagus pumilio</i>	Positive	Mesophytic trees	Donoso, 2006
Saxegothea	<i>Saxegothea conspicua</i>	Positive	Mesophytic tree	Donoso, 2006
Acaena	Mostly <i>Acaena magellanica</i> , <i>Acaena splendens</i> , <i>Acaena poeppigiana</i> , <i>Acaena pinnatifida</i>	Negative	Open canopy herbs	Sottile et al., 2015
Apiaceae	<i>Osmorhiza</i> sp. <i>Mulinum</i> spp.	Negative	Open canopy herbs and shrubs	Correa MN (1969-1999)
Amaranthaceae	<i>Nitrophila australis</i>	Negative	Open canopy herbs	Correa MN (1969-1999)
Asteraceae subf. Asterodeae	<i>Chiliodendron rosmarinifolium</i> <i>Senecio</i> spp. <i>Gamochaeta</i> spp.	Negative	Open canopy shrubs and herbs	Sottile et al., 2015
Asteraceae subf. Cichoroideae	<i>Hypochaeris</i>	Negative	Open canopy herbs	Correa MN (1969-1999)
Asteraceae tribe Mutisieae	<i>Mutisia</i> sp. <i>Perezia</i> spp. <i>Leucheria</i> spp.	Negative	Sclerophilous and hairy herbs	Correa MN (1969-1999)
Caryophyllaceae	<i>Cerastium</i> , <i>Arenaria</i> , <i>Stellaria</i>	Negative	Open canopy herbs	Correa MN (1969-1999)
Cupressaceae	<i>Austrocedrus chilensis</i> ; <i>Podocarpus</i>	Negative	Xerophytic tree	Donoso, 2006

Misodendrum	Misodendrum spp.	Negative	Parasitic of Nothofagus associated to open canopy	Peri & Ormaechea, 2013. Moreno et al., 2014.
Euphorbiaceae	Euphorbia sp. Colliguaya sp.	Negative	Open canopy herbs/shrub	Correa MN (1969-1999)
Berberis	Berberis spp.	Negative	Sclerophilous open canopy shrub	Correa MN (1969-1999)
Galium	Galium spp.	Negative	Open canopy herbs	Correa MN (1969-1999)
Gaultheria	Gaultheria spp.	Negative	Sclerophilous open canopy shrub	Correa MN (1969-1999)
Lomatia	Lomatia hirsta	Negative	Open canopy trees	Donoso, 2006
Maytenus	Maytenus boaria	Negative	Open canopy trees	Donoso, 2006
Plantago	Plantago spp.	Negative	Open canopy herbs	Correa MN (1969-1999)
Poaceae	Several species	Negative	Open canopy herbs	Correa MN (1969-1999)
Rhamnaceae	Discaria chacaye	Negative	Sclerophilous open canopy shrub	Correa MN (1969-1999)
Ribes	Ribes spp.	Negative	Open canopy shrubs	Correa MN (1969-1999)
Rosaceae	Rubus sp.	Negative	Open canopy herb	Correa MN (1969-1999)
Schinus	Schinus patagonicus	Negative	Sclerophilous open canopy shrub	Correa MN (1969-1999)
Solanaceae	Lycium sp.	Negative	Sclerophilous open canopy shrub	Correa MN (1969-1999)

Site Name: Lake Theobald

Vegetation description: The slopes above 1500 m asl are dominated by deciduous forest of *Nothofagus pumilio* and *Nothofagus antarctica* intercalated with humid forest elements like *Fitzroya cupressoides*, *Drimys winteri*, *Berberis*, *Azara microphylla*, *Escallonia alpina* and *Gaultheria caespitosa* are common in the underbrush together with diverse herbs and grasses (*Lycopodium paniculatum*, *Sisyrinchium* sp., *Blechnum auriculatum*. Between 1000 and 1500 m asl the humid forest with *N. dombeyi*, *Saxegothaea conspicua* and *Laurelia philippiana* extends on the slopes. Paleohydric pollen index for this site reflects changes between deciduous forest and humid forest abundance around the record area. We assume that during periods of above (below) hydric balance, humid (deciduous) forest patches would develop at the record surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Aristotelia	<i>Aristotelia chilensis</i>	Positive	Humid forest	Donoso, 2006
Drymis	<i>Drymis winteri</i>	Positive	Humid forest	Donoso, 2006
Escallonia	<i>Escallonia</i> sp.	Positive	Humid forest	Correa MN (1969-1999)
Fuchsia		Positive	Humid forest	Correa MN (1969-1999)
Nothofagus	<i>Nothofagus obliqua</i> , <i>Nothofagus pumilio</i>	Positive	Humid forest/ Closed canopy	Donoso, 2006
Saxegothaea	<i>Saxegothaea conspicua</i>	Positive	Humid forest	Donoso, 2006
Acaena	Mostly <i>Acaena magellanica</i> , <i>Acaena splendens</i> , <i>Acaena poeppigiana</i> , <i>Acaena pinnatifida</i>	Negative	Deciduous forest/ open canopy species	Sottile et al., 2015
Adesmia	<i>Adesmia</i> spp.	Negative	Deciduous forest/ open canopy species	Correa MN (1969-1999)
Amaranthaceae	<i>Nitrophila australis</i>	Negative	Deciduous forest/ open canopy species	Correa MN (1969-1999)
Apiaceae	<i>Eryngium</i> spp.	Negative	Deciduous forest/ open canopy species	Correa MN (1969-1999)
Arjona	<i>Arjona tuberosa</i>	Negative	Open canopy species	Correa MN (1969-1999)
Asteraceae subf. Asterodeae	<i>Senecio</i> spp. <i>Gamochaeta</i> spp.	Negative	Deciduous forest/ open canopy species	Sottile et al., 2015

Asteraceae tribe Mutisieae	Perezia spp. Leucheria spp.	Negative	Open canopy species	Sottile et al., 2015, Correa MN (1969-1999)
Azorella	Azorella spp.	Negative	Open canopy species	Correa MN (1969-1999)
Berberis	Berberis spp.	Negative	Open canopy species	Correa MN (1969-1999)
Calceolaria	Calceolaria spp.	Negative	Open canopy species	Correa MN (1969-1999)
Caryophyllaceae	Colobanthus, Stellaria, Silene, Cerastium	Negative	Open canopy species	Correa MN (1969-1999)
Colletia	Colletia hystrix	Negative	Open canopy species	Correa MN (1969-1999)
Cupressaceae	Astrocedrus chilensis	Negative	Open canopy species	Donoso, 2006
Discaria	Discaria chacaye	Negative	Open canopy species	Correa MN (1969-1999)
Embothrium	Embothrium coccineum	Negative	Open canopy species	Donoso, 2006
Empetrum	Empetrum rubrum	Negative	Open canopy species	Correa MN (1969-1999)
Galium	Galium spp.	Negative	Open canopy species	Correa MN (1969-1999)
Geraniaceae	Geranium spp. Erodium sp.	Negative	Open canopy species	Correa MN (1969-1999)
Lomatia	Lomatia hirsta	Negative	Open canopy species	Donoso, 2006
Malvaceae		Negative	Open canopy species	Correa MN (1969-1999)
Misodendrum	Misodendrum spp.	Negative	Parasitic of N. antarctica and N. pumilio	Peri & Ormaechea, 2013. Moreno et al., 2014.
Phacelia	Phacelia secunda	Negative	Open canopy species	Correa MN (1969-1999)
Plantago	Plantago spp.	Negative	Open canopy species	Correa MN (1969-1999)
Poaceae	Several species	Negative	Open canopy species	Correa MN (1969-1999)
Portulacaceae		Negative	Open canopy species	Correa MN (1969-1999)
Ribes	Ribes spp.	Negative	Open canopy species	Correa MN (1969-1999)
Sisyrinchium	Sisyrinchium spp.	Negative	Open canopy species	Correa MN (1969-1999)
Solanaceae	Fabiana imbricate	Negative	Open canopy species	Correa MN (1969-1999)
Specularia	Specularia spp.	Negative	Open canopy species	Correa MN (1969-1999)
Urticaceae	Urtica sp.	Negative	Open canopy species	Correa MN (1969-1999)

Site Name: Lake Mosquito

Vegetation description: The vegetation in the vicinity of lake Mosquito is dominated by *Austrocedrus chilensis* with *N. dombeyi* to the West and matorral (*Discaria chacaye*, *Maytenus boaria*, *Schinus patagonicus*) and steppe elements (*Stipa speciosa*, *Festuca pallens*) as well as introduced pastures for cattle to the East. *Salix* sp. extends in the coastal margins. Paleohydric pollen index for this site reflects changes in forest patches versus steppe patches abundance around the record area. We assume that during periods of above (below) hydric balance, forest (shrub-grass steppe) patches would develop at the record's surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Drymis	<i>Drymis winteri</i>	Positive	Forest patches	Donoso, 2006
Escallonia	<i>Escallonia</i> sp.	Positive	Forest patches	Correa MN (1969-1999)
Lomatia	<i>Lomatia hirstia</i>	Positive	Forest patches	Correa MN (1969-1999)
Misodendrum	<i>Misodendrum</i> spp.	Positive	Forest patches	Correa MN (1969-1999)
Myrtaceae	<i>Amomyrtus luma</i>	Positive	Forest patches	Donoso, 2006
Nothofagus	<i>Nothofagus obliqua</i> , <i>Nothofagus pumilio</i>	Positive	Forest patches	Donoso, 2006
Saxegothaea	<i>Saxegothaea conspicua</i>	Positive	Forest patches	Donoso, 2006
Cupressaceae	Mostly <i>Austrocedrus chilensis</i>	Positive	Forest patches	Donoso, 2006
Maytenus	<i>Maytenus boaria</i>	Positive	Forest patches	Donoso, 2006
Acaena	Mostly <i>Acaena magellanica</i> , <i>Acaena splendens</i> , <i>Acaena poeppigiana</i> , <i>Acaena pinnatifida</i>	Negative	shrub-grass steppe	Sottile et al., 2015
Amaranthaceae	<i>Nitrophila australis</i>	Negative	shrub-grass steppe	Correa MN (1969-1999)
Asteraceae subf. Asterodeae	<i>Senecio</i> spp. <i>Chilodactylis</i> spp. <i>Gnaphalium</i> spp.	Negative	shrub-grass steppe	Correa MN (1969-1999)
Asteraceae subf. Cichorioideae	<i>Hypochaeris</i> spp.	Negative	shrub-grass steppe	Correa MN (1969-1999)
Asteraceae tribe Mutisieae	<i>Mutisia</i> spp. <i>Perezia</i> spp. <i>Leucheria</i> spp.	Negative	shrub-grass steppe	Sottile et al., 2015, Correa MN (1969-1999)
Caryophyllaceae	<i>Stellaria</i> spp.	Negative	shrub-grass steppe	Correa MN (1969-

	Cerastium sp. Arenarum sp.			1999)
Poaceae	Several species	Negative	shrub-grass steppe	Correa MN (1969-1999)
Rhamnaceae	Discaria chacaye	Negative	shrub-grass steppe	Correa MN (1969-1999)
Solanaceae	Lycium sp.	Negative	shrub-grass steppe	Correa MN (1969-1999)

Site Name: Mallín Pollux

Vegetation description: The vegetation of uplands east and southeast of Lago Pollux is pastureland marked by fallen and burnt logs, testimony to primarily 20th century clearing of the deciduous Subantarctic *Nothofagus pumilio* forest for ranching activities (Markgraf et al., 2007). Remnants of this forest still cover the hills to the north and east of Lago Pollux. Evergreen *Nothofagus betuloides* and other rainforest elements are found as remnants about 10km west of L. Pollux. A dense shrub belt of *Nothofagus antarctica* and *Escallonia rubra* covers the drier areas of the Cyperaceae fen. Eastward vegetation steppe is dominated by Poaceae with many shrubby taxa in the Asteraceae family and great diversity of herbs (Markgraf et al., 2007). Paleohydric pollen index for this site reflects changes in forest patches versus steppe patches abundance around the record area. We assume that during periods of above (below) hydric balance, forest (shrub-grass steppe) patches would develop at the record's surrounding areas.

Pollen type	Species source	Pollen- hydric balance type indicator (relative to this record)	Plant functional type	References about morphoecological features of plant species
Drymis	<i>Drymis winteri</i>	Positive	Evergreen forest type	Donoso, 2006
Escallonia	<i>Escallonia virgata</i> <i>Escallonia rubra</i>	Positive	Deciduous Forest type/ growing surrounding fens	Correa MN (1969-1999) Markgraf et al., 2007
Hydrangea	<i>Hydrangea integerrima</i>	Positive	Evergreen forest type	Markgraf et al., 2007
Myrtaceae	<i>Amomyrtus luma</i>	Positive	Evergreen forest type	Donoso, 2006
Nothofagus	<i>Nothofagus betuloides</i> , <i>Nothofagus pumilio</i> and <i>Nothofagus antarctica</i>	Positive	Evergreen and deciduous forest types	Donoso, 2006
Pilgerodendrum	<i>Pilgerodendrum uviferum</i>	Positive	Evergreen forest types	Donoso, 2006
Pseudopanax	<i>Pseudopanax laetevirens</i>	Positive	Evergreen forest type	Correa MN (1969-1999)
Misodendrum	<i>Misodendron</i> spp.	Positive	<i>Nothofagus</i> parasitic plant	Correa MN (1969-1999)
Acaena	<i>Acaena magellanica</i> , <i>Acaena splendens</i> , <i>Acaena poeppigiana</i> , <i>Acaena pinnatifida</i>	Negative	Mostly steppe types except for <i>Acaena ovalifolia</i>	Sottile et al., 2015

Adesmia	Adesmia spp.	Negative	Steppe type	Correa MN (1969-1999)
Amaranthaceae	Nitrophila australis	Negative	Steppe type	Correa MN (1969-1999)
Apiaceae	Mulinum spp. Osmorhiza sp.	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Asteraceae subf. Asteroideae	Senecio spp. Chiliotrichium spp. Baccharis spp. Gamochaeta spp.	Negative	Open canopy/ Steppe type	Sottile et al., 2015
Asteraceae tribe Mutisieae	Perezia spp. Leucheria spp. Chuquiraga sp.	Negative	Steppe type	Sottile et al., 2015, Correa MN (1969-1999)
Berberis	Berberis spp.	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Brassicaceae	Cardamine sp. Draba sp. Xerodraba sp.	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Caryophyllaceae	Stellaria sp. Colobanthus sp.	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Embothrium	Embothrium coccineum	Negative	Open canopy type	Donoso, 2006
Ericaceae	Gaultheria spp.	Negative	Open canopy type	Correa MN (1969-1999)
Lamiaceae	Satureja spp.	Negative	Open canopy type/ Steppe type	Correa MN (1969-1999)
Phacelia	Phacelia secunda	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Plantago	Plantago spp.	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Poaceae	Several species (e.g. Festuca sp. Agrostis sp. Holcus sp.)	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Poligonaceae	Rumex spp.	Negative	Open canopy/ Steppe type	Correa MN (1969-1999)
Ranunculaceae	Ranunculus spp. Anemone spp.	Negative	Open canopy/ or growing under drier fens	Correa MN (1969-1999)
Rhamnaceae	Discaria seratifolia	Negative	Steppe type	Correa MN (1969-1999)
Ribes	Ribes spp.	Negative	Open canopy type	Correa MN (1969-1999)
Wahlenbergia	Wahlenbergia spp.	Negative	Steppe type	Correa MN (1969-1999)