ANNEX 23
SUPPLEMENTING OF BASELINE
STUDY OF LAND ARTHROPODS PRESENT IN THE MEADOW IN THE
AREA OF ENGORDA AND BOSQUE IN THE SECTOR OF AUCAYES-
MAITENES, CORDILLERA ANDINA CENTRAL

1 INTRODUCTION

The Central Area in Chile is considered all over the world as a "hot spot" of wildlife biodiversity, with a high priority in conservation (Myers et al. 2000). Within this area the Central Andean range of mountains has an abundance of wildlife with different species, most of them native. Ecosystems present in the high hills of the Andes are essential to the development of their biological cycles. It is estimated that they might be biological corridors of migratory species (Peña, 1998).

Arthropods, insects in particular, due to their biological diversity and great number are good indicators of biodiversity (Anderson & Vondracek, 1999). Also, they play important roles in the ecosystems as well as to keep the biological diversity, as predators, herbivorous, pollinator, decomposers, and preys to numerous species (Moroni 1977, Collins & Thomas 1989).

Studies referred to insects associated to ecosystems in the Andes central range of mountains sign a large variety and the character of native species. However, studies about their distribution and dispersion are scarce (Vidal & Guerrero, 2007). In terms of conservation the arthropods of this area should be considered as inadequately known.

2 OBJECTIVES

The objective of the present study is to conduct a prospection of the arthropods associated to two of the ecosystems present in the Sector of Alto Maipo, Central Andes highland: 1) Highland meadow in Sector Engorda and 2) Sclerophyllous forest in Sector Aucayes-Maitenes as to identity species that might be affected by the Alto Maipo Project.

The specific objectives are as follow:

- Assess the specific make up of land arthropods present in both areas.
- Describe the relative significant number of species of arthropods gathered.
- Identify those species that might be impacted by the Project considering criteria such as whether they are native, specificity of the habitat or host and restricted distribution.
3 METHODOLOGY

3.1 SITES OF THE STUDY

Site selection for the sampling was based on the ecosystems to be intervened by the Project. That is, environments that were representative of the areas to be intervened during the different activities associated to the location and execution of the Project. Once these ecosystems are defined, representative sectors are the selected as to establish the sampling points of the arthropods. Finally two areas of study were established representing the main ecosystems to intervene:

- Highland Meadow, Sector Engorda. Approximate location UTM coordinates: 19 H 407500 6265000. Approximately Height: 2500m. Sampling points were established in this area of the study for flying arthropods and epigeal.

- Schlerophyllous Forest, Sector Aucayes-Maitenes. Approximate location UTM coordinates: 19 H 382500 6287500. Approximately Height: 1250m. Sampling points for foliage arthropods and epigeal were established in this area.

Details about the composition and distribution of the vegetation in these areas can be found in the respective Baseline (Chapter 5).

3.2 SAMPLING METHODOLOGIES FOR ARTHROPODS

Sampling was conducted in March 15-16, 2008. This date coincides with the end of the reproductive period of many insect species which ensures that results will be a representative sample of the biodiversity of these organisms associated to the environments under the prospect.

3.2.1 Meadows in Sector Engorda

Butterflies

Determination of the composition and abundance of butterflies associated to the meadows in the Sector Engorda was done based on observations in three daily transects located parallel to the course of Maipo ravine. A 30m distance was considered between transects. Transects had an approximate surface area of 1,000m and 10 meter wide. UTM coordinates of the extension of transects were 19 H 407090 6259224 to 19 H 407837 6259406. Approximate time to cover each transect was 1 hour. Specimens observed in each transect were captured using an air entomological net. Determinations were conducted as per Peña & Ugarte, 1996. The specimens were released once the determination was completed.

Epigeal Arthropods

Three sampling sectors were established to determine the composition and relative abundance of epigeal arthropods (soil) associated to the meadows in Sector Engorda. Table 1 shows the location points. Five barber-type intersection traps were buried at each sector using a mixture of 50% alcohol and vehicle refrigerant. The traps were buried for 24 hr.
The collected material was transferred to plastic jars and taken to the laboratory for further review. The material was reviewed using stereoscopic lenses and the specimens were identified and counted. The determinations were done in accordance with specific entomological keys for each group (see Bibliography).

3.2.2 Forest in Sector Aucayes-Maitenes

Foliage Arthropods

Three daily transects located parallel to the course of Colorado Ravine were established to determine the composition and relative abundance of foliage arthropods associated to Sector Aucayes-Maitenes. A 10m distance was considered between transects. Transects had an approximate coverage of 200m. UTM coordinates for the extension of transects were 19 H 382893 6288301 to 19 H 382998 6288173. Approximate time to cover each transect was 1 hour. Capturing of arthropods associated to foliage was done by beating the branches, approximately 10 per tree in 10 trees in the transect. 60 trees were sampled in two days. The material was received in nets, transferred to glass containers to be further taken to the laboratory. The material was reviewed using stereoscopic lenses and the specimens were identified and counted. The determinations were done in accordance with specific entomological keys for each group (see Bibliography).

Epigeal Arthropods

Three sampling sectors were established to determine the composition and relative abundance of epigeal arthropods associated to the forest in Sector Aucayes-Maitenes. Table 1 shows the location points. Five barber-type intersection traps were buried at each sector using a mixture of 50% alcohol and vehicle refrigerant. The traps were buried for 24 hr. The collected material was transferred to plastic jars and taken to the laboratory for further review. The material was reviewed using stereoscopic lenses and the specimens were identified and counted. The determinations were done in accordance with specific entomological keys for each group (see Bibliography).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Location points Barber traps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Points of meadows Sector Engorda</td>
<td>UTM Coordinates (m)</td>
</tr>
<tr>
<td>1</td>
<td>19 H 407138 6259202</td>
</tr>
<tr>
<td>2</td>
<td>19 H 407123 6259255</td>
</tr>
<tr>
<td>3</td>
<td>19 H 407103 6259422</td>
</tr>
<tr>
<td>Points Bosque Sector Aucayes- Maitenes</td>
<td>UTM Coordinates (m)</td>
</tr>
<tr>
<td>1</td>
<td>19 H 382970 6288171</td>
</tr>
<tr>
<td>2</td>
<td>19 H 382950 6288206</td>
</tr>
<tr>
<td>3</td>
<td>19 H 382944 6288224</td>
</tr>
</tbody>
</table>

3.3 IDENTIFICATION CRITERIA FOR SPECIES THAT CAN BE IMPACTED BY THE PROJECT

Identification of those species that might be impacted by the Project considering criteria such as whether they are native, specificity of the habitat or host, restricted distribution, and degree
of movement (vagility). The information was obtained from data available in specific bibliography (see Bibliography) when existing.

It should be pointed out that the fauna of arthropods in Chile is not yet considered for categorization under states of conservation mainly due to lack of information (Díaz-Paéz et al., 2004).

4 RESULTS

4.1 MEADOWS SECTOR ENGORDA

Butterflies

98 individuals represented in 6 species and 4 families of Lepidoptera (butterflies) were detected in observations in the meadows in Sector Engorda (Table 2). The most prominent species is *Yramea lathonioides* (61.2%) (Table 3). Out of the 6 species detected, 2 are native and 3 are from both Chile and Argentina. In the species detected *Yramea lathonioides* has a high level of specificity in the use of habitat and restricted altitude distribution, being preferably present in high grass environments (1,700 and 3,200 m.a.s.l) (Table 2). The rest of the species are widely geographically distributed and are present in different types of habitat. However, for most of them their specific ecological requirements and hosts are yet unknown (Table 2).
## Table 2
List of Species of Butterflies detected in meadows in Sector Engorda

<table>
<thead>
<tr>
<th>Specie</th>
<th>Local name</th>
<th>Longitudinal Distribution</th>
<th>Altitude Distribution</th>
<th>Native from</th>
<th>Habitat</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HESPERIIDAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Butleria elwesi</em> Evans, 1939</td>
<td>Hesperia de Elwes</td>
<td>Regions V- X</td>
<td>Coastal - Andean</td>
<td>Chile, Argentina (Neuquén-Chubut)</td>
<td>Several environments</td>
<td>Not known</td>
</tr>
<tr>
<td><strong>LYCANIDAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Strymon eurytulus</em> Hubner, 1819</td>
<td>Licena tornasol común</td>
<td>Regions III- X</td>
<td>Coastal - Andean</td>
<td>Chile</td>
<td>Several environments</td>
<td>Not known</td>
</tr>
<tr>
<td><strong>NYMPHALIDAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Yramea lathonioides</em> (Blanchard 1982)</td>
<td>Mariposa pintada de la altura</td>
<td>Regions III- XII</td>
<td>1,700-3,200 m.a.s.l.</td>
<td>Chile, Argentina (from Mendoza to the south)</td>
<td>Pajonales</td>
<td>Not known</td>
</tr>
<tr>
<td><em>Vanessa carye</em> (Hubner, 1806)</td>
<td>Mariposa colorada común</td>
<td>Regions I- XII</td>
<td>Coastal - Andean</td>
<td>From Venezuela to Chile</td>
<td>Several environments</td>
<td>Several species of family Malvaceae</td>
</tr>
<tr>
<td><em>Cosmosatyrus chilensis chilensis</em> (Guerín, 1832)</td>
<td>Satirido negro común</td>
<td>Regions III- XII</td>
<td>Coastal - Andean</td>
<td>Chile, Argentina (Chubut-Santa Cruz)</td>
<td>Natural grass and bushes</td>
<td>Not known</td>
</tr>
<tr>
<td><strong>PIERIDAE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tatochila autodice blanchari</em> (Butler, 1881)</td>
<td>Mariposa blanca común</td>
<td>Regions I- X</td>
<td>Coastal - Andean</td>
<td>Chile</td>
<td>Several environments</td>
<td>Different species (e.g., <em>Brassica, Tropaeolum</em>)</td>
</tr>
</tbody>
</table>

## Table 3
Relative Abundance of Species of Butterflies, Meadows in Sector Engorda

<table>
<thead>
<tr>
<th>Specie</th>
<th>Relative Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Butleria elwesi</em> Evans, 1939</td>
<td>1.02%</td>
</tr>
<tr>
<td><em>Strymon eurytulus</em> Hubner, 1819</td>
<td>1.02%</td>
</tr>
<tr>
<td><em>Yramea lathonioides</em> (Blanchard 1982)</td>
<td>61.2%</td>
</tr>
<tr>
<td><em>Vanessa carye</em> (Hubner, 1806)</td>
<td>2.04%</td>
</tr>
<tr>
<td><em>Cosmosatyrus chilensis chilensis</em> (Guerín, 1832)</td>
<td>27.5%</td>
</tr>
<tr>
<td><em>Tatochila autodice blanchari</em> (Butler, 1881)</td>
<td>7.14%</td>
</tr>
</tbody>
</table>
Epigeal Arthropods

Samplings taken in the meadows in Sector Engorda recorded a total of 187 specimens from 11 species of epigeal arthropods (Table 4). The most diversified order was Coleopterous (6 spp). The most prominent species were Eupodidae sp. (68.89%) and *Iridomyrmex humilis* (17.64%) (Table 5). A total of 6 species are native from Chile, most of them with wide geographical distribution, and low specificity in use of habitat. However, for most cases information is unknown about host or about any other specific ecological requirement (Table 4).

<table>
<thead>
<tr>
<th>Specie</th>
<th>Local name</th>
<th>Longitudinal Distribution</th>
<th>Altitude Distribution</th>
<th>Native from</th>
<th>Habitat</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACARI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eupodidae sp.</td>
<td>Acaro rojo</td>
<td>Not known</td>
<td>Not known</td>
<td>Familia Cosmopolita</td>
<td>Wetlands</td>
<td>Not specified</td>
</tr>
<tr>
<td>COLEOPTERA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruchidae</td>
<td>Lithraeus sp.</td>
<td>Bruco</td>
<td>Not specified</td>
<td>Up to 3500 masl</td>
<td>Chile</td>
<td>Forest and scrubland</td>
</tr>
<tr>
<td>Carabidae</td>
<td>Mimodromius chilensis</td>
<td>Cascarudo</td>
<td>Regions IV- X</td>
<td>Up to 3500 masl</td>
<td>Chile</td>
<td>Forest and scrubland</td>
</tr>
<tr>
<td>Curculionidae</td>
<td>Cylydrorhinus sp.</td>
<td>Gorgojo</td>
<td>Regions III- X</td>
<td>Up to 4000 masl</td>
<td>Chile</td>
<td>Low vegetation</td>
</tr>
<tr>
<td>Staphylinidae</td>
<td>Eudera sculpitlis</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Chile</td>
<td>Forest and scrubland</td>
<td>Not specified</td>
</tr>
<tr>
<td>Staphylinidae</td>
<td>Atheta obscuripennis</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Chile</td>
<td>Forest and scrubland</td>
<td>Not specified</td>
</tr>
<tr>
<td>Tenebrionidae</td>
<td>Scotobius punctatus</td>
<td>Tenebrio</td>
<td>Regions III- IX</td>
<td>Not specified</td>
<td>Chile</td>
<td>Several environments</td>
</tr>
<tr>
<td>HOMOPTERA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psyllidae</td>
<td>Psyllidae sp.</td>
<td>Saltadores</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Familia Cosmopolita</td>
<td>Several environments</td>
</tr>
<tr>
<td>Cicadellidae</td>
<td>Exitianus obscurinervis</td>
<td>Langostino venas oscuras</td>
<td>Regions I- VI</td>
<td>Not specified</td>
<td>America</td>
<td>Several environments</td>
</tr>
<tr>
<td>HYMENOPTERA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formicidae</td>
<td>Iridomyrmex humilis</td>
<td>Hormiga Argentina</td>
<td>Regions I- XII</td>
<td>Not specified</td>
<td>Cosmopolitan</td>
<td>Several environments</td>
</tr>
</tbody>
</table>
Table 5  
Relative Abundance of Epigeal Arthropods collected in meadows in Sector Engorda

<table>
<thead>
<tr>
<th>Specie</th>
<th>Relative Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eupodidae sp.</td>
<td>68.89%</td>
</tr>
<tr>
<td>Lithraeus sp.</td>
<td>0.53%</td>
</tr>
<tr>
<td>Mimodromius chilensis</td>
<td>0.53%</td>
</tr>
<tr>
<td>Curculionidae Cylydrorhinus sp.</td>
<td>1.6%</td>
</tr>
<tr>
<td>Eudera sculptilis</td>
<td>3.2%</td>
</tr>
<tr>
<td>Atheta obscuripennis</td>
<td>0.53%</td>
</tr>
<tr>
<td>Tenebrionidae Scotobius punctatus</td>
<td>2.67%</td>
</tr>
<tr>
<td>Psyllidae sp.</td>
<td>3.74%</td>
</tr>
<tr>
<td>Exitianus obscurinervis</td>
<td>0.53%</td>
</tr>
<tr>
<td>Iridomyrmex humilis</td>
<td>17.64%</td>
</tr>
</tbody>
</table>

4.2 FOREST IN SECTOR AUCAYES-MAITENES

Foliage Arthropods

A total of 60 specimens were found in Sector Aucayes-Maitenes which include 10 species and 4 orders of insects (Table 6). The most diversified order in the species was Hemiptera (4 spp) while the most abundant was Leptoglossus chilensis (26.6%) (Table 7). 2 of the species detected are native and 3 are from both Chile and Argentina. Most have a wide geographic distribution and low specificity in the use of habitat and host (Table 6).
<table>
<thead>
<tr>
<th>Specie</th>
<th>Local name</th>
<th>Longitudinal Distribution</th>
<th>Altitude Distribution</th>
<th>Native from</th>
<th>Habitat</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COLEOPTERA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerambycidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongylaspes limae Guérin-Menéville, 1830</td>
<td>Cruz de Malta</td>
<td>Regions III- VIII</td>
<td>Not specified</td>
<td>South America</td>
<td>Several environments</td>
<td>Lenga, quillay and other native trees</td>
</tr>
<tr>
<td>Coccinellidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adalia angulifera Mulsant 1850</td>
<td>Chinita</td>
<td>Regions III- X</td>
<td>Not specified</td>
<td>Southern tip of America</td>
<td>Several environments</td>
<td>Different hosts</td>
</tr>
<tr>
<td>Curculionidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyphometopus sp. Blanchard, 1851</td>
<td>Gorgojo, burrito</td>
<td>Regions I- X</td>
<td>Not specified</td>
<td>Chile</td>
<td>Several environments</td>
<td>Native vegetation</td>
</tr>
<tr>
<td><strong>HEMIPTERA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coreidae</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Leptoglossus chilensis Spinola</td>
<td>Chinche del campo y frutales</td>
<td>Regions III- X</td>
<td>Not specified</td>
<td>Chile and Argentina</td>
<td>Several environments</td>
<td>Several fruit trees</td>
</tr>
<tr>
<td>Pentatomidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Podisus chilensis (Spinola)</td>
<td>Chinche de espina negra</td>
<td>Regions V- X</td>
<td>Not specified</td>
<td>Chile and Argentina</td>
<td>Several environments</td>
<td>Different species of native bushes and trees</td>
</tr>
<tr>
<td>Pentatomidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nezara viridula Lineo</td>
<td>Chinche verde de campo</td>
<td>Regions V-XII</td>
<td>Not specified</td>
<td>World distribution</td>
<td>Several environments</td>
<td>Different hosts</td>
</tr>
<tr>
<td>Reduviidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zelus cervicalis Stal</td>
<td>Chinche</td>
<td>Regions V-VI</td>
<td>Not specified</td>
<td>Introduced</td>
<td>Low vegetation, Central valley, low Andean hills</td>
<td>Different hosts</td>
</tr>
<tr>
<td><strong>HYMENOPTERA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formicidae</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Camponotus chilensis Smith, 1858</td>
<td>Hormigón negro</td>
<td>Regions III- X</td>
<td>Not specified</td>
<td>Chile and Argentina</td>
<td>Several environments</td>
<td>Different hosts</td>
</tr>
<tr>
<td>Formicidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camponotus distinguendus (Spinola)</td>
<td>Hormiga peluda blanca</td>
<td>Regions III- X</td>
<td>Not specified</td>
<td>Chile and Argentina</td>
<td>Several environments</td>
<td>Different hosts</td>
</tr>
<tr>
<td><strong>ORTHOPTERA</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acrididae</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trimerotopes ochraceipennis (Blanchard)</td>
<td>Langosta cordillerana</td>
<td>Regions I- XII</td>
<td>Coastal -3500m</td>
<td>Chile</td>
<td>Dry, open and sunny places</td>
<td>Different species of grass, herbaceous.</td>
</tr>
</tbody>
</table>
Table 7
Relative Abundance of Epigeal Arthropods collected in forest in Sector Aucayes-Maitenes

<table>
<thead>
<tr>
<th>Specie</th>
<th>Relative Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongylaspes limae Guérin-Menéville, 1830</td>
<td>1.66%</td>
</tr>
<tr>
<td>Adalia angulifera Mulsant 1850</td>
<td>18.33%</td>
</tr>
<tr>
<td>Cyphometopus sp. Blanchard, 1851</td>
<td>5%</td>
</tr>
<tr>
<td>Leptoglossus chilensis Spinola</td>
<td>26.6%</td>
</tr>
<tr>
<td>Podisus chilensis (Spinola)</td>
<td>3.33%</td>
</tr>
<tr>
<td>Nezara viridula Lineo</td>
<td>6.67%</td>
</tr>
<tr>
<td>Zelus cervicalis Stal</td>
<td>15%</td>
</tr>
<tr>
<td>Camponotus chilensis Smith, 1858</td>
<td>13.3%</td>
</tr>
<tr>
<td>Camponotus distinguendus (Spinola)</td>
<td>8.33%</td>
</tr>
<tr>
<td>Trimerotopes ochraceipennis (Blanchard)</td>
<td>1.66%</td>
</tr>
</tbody>
</table>

Epigeal Arthropods

A total of 56 specimens were found in the sclerophyllous forest in Sector Aucayes-Maitenes which include 12 species of insects (Table 8). The most diversified order was Coleoptera (5 spp). The most prominent species were Diplocoelus sp. (32.14%) and Camponotus chilensis (30.35%) (Table 9). 3 of the species detected are native and 2 are from both Chile and Argentina (Table 8). Most have a wide geographic distribution and low specificity in the use of habitat. In some cases information about host and other specific ecological requirements is unknown (Table 8).

Table 8
List of species of Epigean arthropods collected in foliage of sclerophyllus forest Sector Aucayes-Maitenes

<table>
<thead>
<tr>
<th>Specie</th>
<th>Local name</th>
<th>Longitudinal Distribution</th>
<th>Altitude Distribution</th>
<th>Native from</th>
<th>Habitat</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLATTARIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blattellidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blatella germanica (Lineo)</td>
<td>Barata germánica</td>
<td>Regions I- XII</td>
<td>Not specified</td>
<td>Cosmopolitan</td>
<td>Several environments</td>
<td>Different hosts</td>
</tr>
<tr>
<td>COLEOPTERA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archeocrypticidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Archeocrypticidae sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biphyllidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diplocoelus sp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carabidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Callidula nigrofasciata (Solier)</td>
<td>Carávido de manchas amarillas</td>
<td>Regions IV- X</td>
<td>Up to 1500 masl</td>
<td>Chile and Argentina</td>
<td>Rocky and bush environments</td>
<td>Not specified</td>
</tr>
<tr>
<td>Staphyllinidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atheta obscuripennis</td>
<td></td>
<td></td>
<td></td>
<td>Chile</td>
<td>Bush</td>
<td>Not specified</td>
</tr>
</tbody>
</table>
### Table 9

Relative Abundance of Epigeal Arthropods collected in sclerophyllus forest in Sector Aucayes-Maítenes

<table>
<thead>
<tr>
<th>Specie</th>
<th>Relative Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blatella germanica (Lineo)</td>
<td>1.78%</td>
</tr>
<tr>
<td>Archeocrypticidae sp.</td>
<td>1.78%</td>
</tr>
<tr>
<td>Diplocoelus sp.</td>
<td>32.14%</td>
</tr>
<tr>
<td>Callidula nigrofasciata (Solier)</td>
<td>1.78%</td>
</tr>
<tr>
<td>Atheta obscuripennis</td>
<td>1.78%</td>
</tr>
<tr>
<td>Nycterinus rugiceps australis Peña 1971</td>
<td>1.78%</td>
</tr>
<tr>
<td>Exitianus obscurinervis (Stal)</td>
<td>3.57%</td>
</tr>
<tr>
<td>Camponotus chilensis Smith, 1858</td>
<td>30.35%</td>
</tr>
<tr>
<td>Solenopsis gayi (Spinola)</td>
<td>1.78%</td>
</tr>
<tr>
<td>Iridomyrmex humilis (Mayr)</td>
<td>1.78%</td>
</tr>
<tr>
<td>Acheta assimilis (Fabricius)</td>
<td>8.9%</td>
</tr>
<tr>
<td>Hoplosphyrum griseus (Philippi)</td>
<td>12.5%</td>
</tr>
</tbody>
</table>
5  CONCLUSIONS

The Project area does not have preferred habitat or habitat mostly sensitive for populations of insects that have an interests of conservation for scientific, agricultural purposes or any other, likely to be impacted by the Project in terms of deterioration of the surface, intrinsic characteristics or their fragmentation.

Collection of arthropods in sectors La Engorda and Aucayes-Maitenes registered a total of 37 species in the following orders: LEPIDOPTERA, COLEOPTERA, HEMIPTERA, HOMOPTERA, HYMENOPTERA, BLATTARIA, and ORTHOPTERA, and ACARI (in the arachnids). Out of the total of species recorded, 12 are native from Chile and 8 from Chile and Argentina and most of them have a geographic distribution within the country and low specificity in the use of habitat. While this might suggest species have a low degree of susceptibility from the Project, there is an obvious lack of information about their host or any other specific ecological requirements.

Based on available information the butterfly Yramea lathonioides, could be potentially sensible to works in sector La Engorda -use of habitat and altitude distribution, as it is preferably in high grass areas, from 1,700 to 3,200 masl. However given its wide geographic distribution and continuous presence in high Andean habitat it is possible to conclude that PHAM entails no hazard to the population of this species. Also, intervention in the area of La Engorda will have a reduced magnitude or spatial expression therefore no significant effect is expected on the specimens of this species.

Finally, with regard to special measures for environmental management associated to the group of land arthropods, no impacts requiring specific measures are foreseen.
6 BIBLIOGRAPHY


ANEXO 23
APÉNDICE 1
REGISTRO FOTOGRÁFICO

Foto 1. Área de influencia del proyecto, Sector La Engorda.

Foto 2. Trampa de captura artrópodos epígeos, Sector Aucayes-Maitenes.