

## THE DRAGONFLIES OF SERRA DA ESTRELA NATURAL PARK, PORTUGAL (INSECTA, ODONATA)

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**Abstract:** The state of knowledge of the odonatofauna of Serra da Estrela Natural Park (Portugal) is presented with comments. Eleven species are recorded for the first time from the Park, including the legally protected *Coenagrion mercuriale* (Charpentier, 1840) and new records of *Oxygastra curtisii* (Dale, 1834) are presented. Furthermore, past and present records of *Aeshna juncea* (Linnaeus, 1758) and *Sympetrum flaveolum* (Linnaeus, 1758) from Portugal are discussed, and analysed in the context of their distribution in the Iberian Peninsula. Conservation relevance of the Serra da Estrela Natural Park on Portuguese Odonata and its threats are discussed and the necessity of further studies pointed out.

**Key words:** Odonata, faunistics, new records, conservation, Portugal, Serra da Estrela Natural Park.

### Los odonatos del Parque Natural de la Sierra de la Estrella, Portugal (Insecta, Odonata)

**Resumen:** Se presenta con comentarios el estado del conocimiento de la fauna odonatólogica del Parque Natural de la Sierra de la Estrella. Se citan por primera vez del Parque 11 especies, incluyendo la legalmente protegida *Coenagrion mercuriale* (Charpentier, 1840), así como nuevos registros de *Oxygastra curtisii* (Dale, 1834). Además, se discuten los registros pasados y actuales de *Aeshna juncea* (Linnaeus, 1758) y *Sympetrum flaveolum* (Linnaeus, 1758) de Portugal, analizándolos en el contexto de la distribución de dichas especies en la Península Ibérica. La relevancia del Parque Natural de la Sierra de la Estrella para la conservación de los odonatos portugueses y sus amenazas son discutidas, destacando la necesidad de más estudios.

**Palabras clave:** Odonata, faunística, nuevos registros, conservación, Portugal, Parque Natural de Sierra de la Estrella.

### Introduction

Serra da Estrela Natural Park (PNSE) is located in the western part of the central Iberian mountain chain and includes the highest mountain of continental Portugal (Serra da Estrela), attaining 1993 metres above sea level (asl) at Torre. The Park, whose most characteristic part is the high plateau (Planalto Central) situated above 1500 m asl, includes a remarkable variety of ecosystems that supports the richest regional biodiversity recorded in the country, comprising more than 900 species of vascular plants (Jansen, 2002) and more than 2,500 animal species (nearly 2,300 of which are insects). Concerning Odonata, which is the focus of the present contribution, the Park holds a profusion of adequate habitats including the source and higher watershed of a few rivers, a large number of small streams and ponds and several lakes, the biggest of which, Lagoa Comprida, is nearly 2 kilometres long.

Both national and foreign interest in this area's entomofauna started in the second half of the 19th century when a few expeditions were conducted and produced the first entomological records (Heyden, 1870; McLachlan, 1880, Oliveira, 1893, Santos, 1883a,b), some with precise locations. During the 20th century the number of recorded species increased in a steady but irregular manner, and the most significant period in this respect started around 1980, when the number of publications and species recorded increased very notably. This trend is followed in the 21st century, and in just nine years the number of publications as well as that of recorded species has increased significantly.

The present contribution derives from a study of the invertebrate fauna of PNSE of which the main goals were the inventory, cartography and ecological characterization

of the species that occur in the protected area (for further details see Grosso-Silva, 2005).

### Methods

In this paper we present new records obtained in fieldwork conducted by the authors, mainly during 2005 but also in the four preceding years, complemented with data resulting from the study of a set of specimens collected in the Park by Serafim and Carlos Aguiar during the 1980's. The fieldwork in 2005 was carried out chiefly from April to July and aimed specifically at Odonata.

Additionally all available literature was critically analysed (see Ferreira & Weihrauch, 2005) and all records from the Park area were compiled. Furthermore, aiming to clarify some doubtful records, critical specimens in the Portuguese collections of the Museu Zoológico da Universidade de Coimbra (MZCP), and the Instituto de Investigação Científica Tropical - Centro de Zoologia (IICT) were examined.

The identification of the specimens was based on Askew (1988) and Aguiar & Dommanget (1998).

### List format

The "MATERIAL EXAMINED" heading includes field observations (specimens captured for identification and then released, indicated by "obs.") and vouchers which are deposited in CIBIO/UP's collection. Some exuviae, which are preserved in the same collection, are indicated by "exuv.". Additionally in the "1980'S MATERIAL" section data is presented referring to specimens collected in the 1980's and

deposited nowadays in the first author's collection. Each record contains the locality code, date and number of specimens of each sex studied. The "REFERENCES" heading presents, for each species, the references that contain data from the Park and the localities recorded. A list of the 10x10 km UTM coordinates and the altitudinal range from which the species are recorded is also included. The sites' names and geographic information are presented in Appendix I.

## Results

The literature compilation and the field survey carried out yielded an inventory comprising 34 species, 11 of which are recorded for the first time from the Park. An additional nine species are here recorded for specific localities in the Park for the first time. Furthermore, 20 out of the 24 previously recorded species have been collected thus confirming their presence and improving the knowledge about their local distribution.

The data here presented refers to a total of 390 specimens, 251 of which were captured (Zygoptera: 183 in total, 126 captured; Anisoptera: 207 in total, 128 captured).

### Species list

#### Calopterygidae

- *Calopteryx haemorrhoidalis* (Vander Linden, 1825)

MATERIAL EXAMINED: **S-32**: 14-07-2005 (1 ♂ obs); **S-50**: 11-07-2005 (2 ♂♂ and 1 ♀); **S-51**: 11-07-2005 (1 ♀).

UTM (10x10): 29TPE37.

ALTITUDINAL RANGE: from 520 to 550 m.

REFERENCES: Santos (1883a) from "Serra da Estrella, Aôut (Ribeira d'Alva, 1395 m)".

COMMENTS: Second record for the Park.

- *Calopteryx virgo* (Linnaeus, 1758) *ssp. meridionalis* Selys, 1873

MATERIAL EXAMINED: **S-01**: 06-07-2005 (1 ♂ obs); **S-02**: 13-06-2005 (1 ♂ obs); **S-06**: 13-06-2005 (1 ♂ obs); **S-07**: 06-07-2005 (1 ♂ obs); **S-09**: 13-07-2005 (1 ♂ obs); **S-13**: 13-07-2005 (1 ♂ obs); **S-14**: 12-07-2005 (1 ♂ obs); **S-15**: 12-07-2005 (1 ♂ obs); **S-16**: 15-06-2005 (1 ♂); **S-18**: 12-07-2005 (1 ♀); **S-20**: 05-07-2005 (1 ♂ obs); **S-21**: 06-07-2005 (1 ♂ obs); **S-22**: 13-06-2005 (1 ♂); **S-23**: 06-07-2005 (1 ♂ obs); **S-27**: 06-07-2005 (1 ♂ obs); **S-28**: 06-07-2005 (1 ♂ obs); **S-30**: 11-07-2005 (1 ♂ obs); **S-34**: 14-07-2005 (1 ♂ obs); **S-35**: 14-08-2003 (1 ♂ obs); **S-36**: 14-08-2003 (1 ♂ obs), 14-07-2005 (1 ♂ obs); **S-37**: 07-07-2005 (1 ♂ obs); **S-40**: 11-07-2005 (1 ♂ obs); **S-41**: 20-08-2001 (1 ♂ obs), 04-07-2005 (1 ♂ obs); **S-44**: 11-07-2005 (1 ♂); **S-45**: 04-07-2005 (1 ♂ obs); **S-46**: 13-08-2003 (1 ♂ obs); **S-48**: 04-06-2004 (1 ♂ obs); **S-50**: 11-07-2005 (1 ♀); **S-51**: 11-07-2005 (1 ♂ obs); **S-52**: 04-07-2005 (1 ♀); **S-53**: 13-07-2005 (1 ♂ obs); **S-54**: 12-07-2005 (1 ♂ obs); **S-60**: 13-07-2005 (1 ♂ obs); **S-62**: 05-07-2005 (1 ♂ obs); **S-63**: 06-07-2005 (1 ♂ obs); **S-67**: 05-07-2005 (1 ♂ obs); **S-68**: 12-07-2005 (1 ♂ obs); **S-71**: 14-06-2005 (1 ♀); **S-73**: 12-07-2005 (1 ♂ obs); **S-74**: 12-06-2005 (1 ♂); **S-75**: 05-07-2005 (1 ♂ obs); **S-76**: 05-07-2005 (1 ♂ obs).

1980'S MATERIAL: **S-80**: 17-08-1984 (1 ♂ and 1 ♀).

UTM (10x10 KM): 29TPE05, 29TPE06, 29TPE07, 29TPE15, 29TPE16, 29TPE17, 29TPE18, 29TPE26, 29TPE27, 29TPE28, 29TPE29, 29TPE37, 29TPE38, 29TPE39.

ALTITUDINAL RANGE: from 310 to 1930 m.

REFERENCES: McLachlan (1880) from "Estrella", Santos (1883a) from "Serra da Estrella, Aôut, (Covão das Vaccas; Ribeira d'Alva 1395 m.)", Seabra (1939b) from "Serra da Estrêla", Malkmus (2002) mapped from 29TPE26 and 29TPE49.

- *Calopteryx xanthostoma* (Charpentier, 1825)

MATERIAL EXAMINED: **S-02**: 13-06-2005 (1 ♀); **S-16**: 15-06-2005 (1 ♂); **S-34**: 14-07-2005 (1 ♂ obs); **S-36**: 14-07-2005 (1 ♂ obs); **S-37**: 07-07-2005 (1 ♂ obs); **S-38**: 07-07-2005 (1 ♂ obs); **S-39**: 07-07-2005 (1 ♂ obs); **S-40**: 11-07-2005 (1 ♂ obs); **S-47**: 09-06-2005 (2 ♂♂ and 1 ♀); **S-50**: 11-07-2005 (1 ♂ obs); **S-51**: 11-07-2005 (1 ♂ obs); **S-52**: 04-07-2005 (1 ♂ obs).

1980'S MATERIAL: **S-77**: 16-08-1986 (1 ♂ and 1 ♀).

UTM (10x10 KM): 29TPE26, 29TPE27, 29TPE29, 29TPE37, 29TPE38, 29TPE48, 29TPE49.

ALTITUDINAL RANGE: from 270 to 1450 m.

REFERENCES: Malkmus (2002) mapped from 29TPE15.

COMMENTS: Recorded by Malkmus (2002) from one 10x10 Km UTM square partially occupied by the Park. Presence in the Park confirmed.

#### Lestidae

- *Lestes barbarus* (Fabricius, 1798)

MATERIAL EXAMINED: **S-04**: 07-07-2005 (1 ♂).

UTM (10x10 KM): 29TPE49.

ALTITUDINAL RANGE: 440 m.

COMMENTS: First record for the Park.

- *Lestes dryas* Kirby, 1890

MATERIAL EXAMINED: **S-04**: 07-07-2005 (1 ♂); **S-53**: 13-07-2005 (3 ♂♂ and 1 ♀).

UTM (10x10 KM): 29TPE16, 29TPE49.

ALTITUDINAL RANGE: from 440 to 1930 m.

REFERENCES: Santos (1883a) from "Serra da Estrella, Aôut (Lagoa Redonda, 1496 m.; Covão das Lapas).", Navás (1907) from "Serra da Estrella (Mattozo)". The name mentioned by Navás ("Mattozo") refers to the paper by Fernando Mattozo Santos, here cited as Santos (1883a).

- *Lestes virens* (Charpentier, 1825)

REFERENCES: Santos (1883a) from "Serra da Estrella, Aôut (Costa da Baleia)".

COMMENTS: It was not possible to confirm the presence of this species during the study, but it has since been seen at the Planalto Central in August – 2008 (A. Torralba Burrial, pers. comm.).

- *Lestes viridis* (Vander Linden, 1825)

MATERIAL EXAMINED: **S-51**: 11-07-2005 (2 ♂♂ and 1 ♀).

UTM (10x10 KM): 29TPE37.

ALTITUDINAL RANGE: 520 m.

REFERENCES: Santos (1883a) from "Serra da Estrella, Aôut (S. Romão 589 m.; Costa da Baleia)".

COMMENTS: Second record for the Park.

#### Coenagrionidae

- *Erythromma lindenii* (Selys, 1840)

MATERIAL EXAMINED: **S-27**: 06-07-2005 (1 ♂); **S-31**: 07-07-2005 (1 ♂ and 1 ♀); **S-52**: 04-07-2005 (1 ♂); **S-59**: 05-07-2005 (1 ♂).

1980'S MATERIAL: **S-77**: 29-08-1982 (1 ♂) and 29-08-1987 (1 ♂); **S-79**: 28-08-1982 (2 ♂♂).

UTM (10x10 KM): 29TPE06, 29TPE07, 29TPE17, 29TPE27, 29TPE48.

ALTITUDINAL RANGE: from 270 to 720 m.

COMMENTS: First record for the Park.

- *Ceriagrion tenellum* (Villers, 1789)

MATERIAL EXAMINED: **S-04**: 06-07-2005 (2 ♀♀), 07-07-2005 (1 ♂ obs); **S-10**: 15-08-2005 (1 ♂ and 1 ♀); **S-40**: 11-07-2005 (1 ♂ obs); **S-51**: 11-07-2005 (2 ♂♂); **S-53**: 13-07-2005 (1 ♂ obs); **S-59**: 05-07-2005 (1 ♀).

1980'S MATERIAL: **S-79**: 28-08-1982 (2 ♂♂ and 1 ♀).

UTM (10x10 KM): 29TPE06, 29TPE07, 29TPE15, 29TPE16, 29TPE37, 29TPE49.

ALTITUDINAL RANGE: from 420 to 1930 m.

COMMENTS: First record for the Park.

• *Coenagrion mercuriale* (Charpentier, 1840)  
MATERIAL EXAMINED: **S-02**: 13-06-2005 (1 ♀); **S-62**: 05-07-2005 (2 ♂♂).  
UTM (10x10 KM): 29TPE07, 29TPE29.  
ALTITUDINAL RANGE: from 420 to 500 m.  
COMMENTS: First record for the Park.

• *Enallagma cyathigerum* (Charpentier, 1840)  
MATERIAL EXAMINED: **S-05**: 14-07-2005 (1 ♂ obs); **S-47**: 09-06-2005 (2 ♂♂ and 1 ♀); **S-55**: 09-06-2005 (1 ♂ and 1 ♀); **S-56**: 21-08-2001 (8 ♂♂); **S-57**: 31-07-2003 (1 ♂ and 1 ♀); **S-58**: 03-08-2005 (1 ♂ obs); **S-65**: 10-06-2005 (1 ♀); **S-72**: 13-07-2005 (1 ♂ obs); **S-74**: 12-06-2005 (1 ♂).  
UTM (10x10 KM): 29TPE16, 29TPE17, 29TPE26, 29TPE38.  
ALTITUDINAL RANGE: from 840 to 1840 m.  
REFERENCES: Santos (1883a) from “Serra da Estrella, Aôut (Lagôa Redonda, 1494 m.)”; Navás (1907) from “Serra da Estrella (Mattozo)”; Malkmus (2002) mapped from 29TPE16, 29TPE17, 29TPE26, 29TPE27.

• *Ischnura graellsii* (Rambur, 1842)  
MATERIAL EXAMINED: **S-03**: 06-07-2005 (1 ♂); **S-22**: 13-06-2005 (1 ♀); **S-27**: 06-07-2005 (1 ♂); **S-31**: 07-07-2005 (1 ♂ obs); **S-40**: 11-07-2005 (1 ♂ and 1 ♀); **S-51**: 11-07-2005 (1 ♂); **S-59**: 05-07-2005 (1 ♂ obs).  
1980'S MATERIAL **S-77**: 29-08-1987 (1 ♂ and 1 ♀); **S-78**: 12-08-1987 (1 ♂); **S-79**: 28-08-1982 (3 ♂♂).  
UTM (10x10 KM): 29TPE06, 29TPE07, 29TPE16, 29TPE17, 29TPE28, 29TPE37, 29TPE48, 29TPE49.  
ALTITUDINAL RANGE: from 270 to 720 m.  
REFERENCES: Santos (1883a) from “Serra da Estrella, Aôut (Lagôa Redonda, 1490 m.)”.  
COMMENTS: Second record for the Park.

• *Ischnura pumilio* (Charpentier, 1825)  
MATERIAL EXAMINED: **S-04**: 07-07-2005 (1 ♀).  
1980'S MATERIAL: **S-77**, 29-08-1987 (1 ♀)  
UTM (10x10 KM): 29TPE06, 29TPE49.  
ALTITUDINAL RANGE: from 270 to 440 m.  
COMMENTS: First record for the Park.

• *Pyrrhosoma nymphula* (Sulzer, 1776)  
MATERIAL EXAMINED: **S-11**: 09-06-2005 (1 ♀); **S-12**: 20-05-2005 (1 ♂); **S-16**: 15-06-2005 (1 ♂ obs); **S-17**: 13-07-2005 (1 ♂ obs); **S-19**: 06-07-2005 (1 ♂ obs); **S-22**: 13-06-2005 (1 ♂); **S-25**: 12-06-2005 (1 ♂ obs); **S-26**: 06-07-2005 (1 ♂ obs); **S-27**: 06-07-2005 (1 ♂ obs); **S-30**: 11-07-2005 (1 ♂ obs); **S-33**: 07-07-2005 (1 ♂ obs); **S-37**: 07-07-2005 (1 ♂ obs); **S-39**: 07-07-2005 (1 ♂ obs); **S-40**: 11-07-2005 (1 ♂ obs); **S-41**: 04-07-2005 (1 ♂ obs); **S-44**: 11-07-2005 (1 ♂ obs); **S-50**: 11-07-2005 (1 ♀); **S-51**: 11-07-2005 (1 ♀); **S-52**: 04-07-2005 (1 ♂ obs); **S-62**: 05-07-2005 (1 ♂ obs); **S-63**: 06-07-2005 (1 ♂ obs); **S-64**: 19-05-2002 (1 ♂ obs); **S-65**: 10-06-2005 (1 ♂); **S-66**: 14-06-2005 (1 ♀); **S-70**: 12-07-2005 (1 ♂ obs); **S-71**: 14-06-2005 (1 ♀); **S-73**: 12-07-2005 (1 ♂ obs); **S-74**: 12-06-2005 (1 ♂ obs); **S-75**: 05-07-2005 (1 ♂ obs); **S-76**: 05-07-2005 (1 ♂ obs).  
1980'S MATERIAL: **S-78**: 12-08-1987 (1 ♂), **S-81**: 17-08-1984 (1 ♂ and 2 ♀♀).  
UTM (10x10 KM): 29TPE06, 29TPE07, 29TPE15, 29TPE16, 29TPE17, 29TPE18, 29TPE26, 29TPE27, 29TPE28, 29TPE37, 29TPE38, 29TPE49.  
ALTITUDINAL RANGE: from 330 to 1870 m.  
REFERENCES: Santos (1883a) from “Serra da Estrella, Aôut (Lagôa Redonda, 1496 m.; Covão das Lapas).”, Jödicke (1996) from “Ponte Cabaços (VI)”.

#### Platycnemididae

• *Platycnemis acutipennis* Selys, 1841  
MATERIAL EXAMINED: **S-03**: 06-07-2005 (1 ♂ and 1 ♀); **S-08**: 06-07-2005 (1 ♂); **S-37**: 07-07-2005 (1 ♀); **S-38**: 07-07-2005 (1 ♂);

**S-39**: 07-07-2005 (1 ♀); **S-51**: 11-07-2005 (1 ♂).  
1980'S MATERIAL: **S-77**: 14-08-1984 (3 ♂♂ and 1 ♀).  
UTM (10x10 KM): 29TPE37, 29TPE38, 29TPE39, 29TPE48, 29TPE49.  
ALTITUDINAL RANGE: from 270 to 940 m.  
COMMENTS: First record for the Park.

• *Platycnemis latipes* Rambur, 1842  
MATERIAL EXAMINED: **S-16**: 15-06-2005 (1 ♂ obs); **S-37**: 30-07-2003 (1 ♂), 07-07-2005 (1 ♂); **S-38**: 07-07-2005 (1 ♂ and 1 ♀); **S-39**: 07-07-2005 (1 ♂ and 1 ♀); **S-40**: 11-07-2005 (1 ♂ obs); **S-44**: 22-08-2001 (1 ♂ obs); **S-50**: 11-07-2005 (1 ♀); **S-54**: 12-07-2005 (1 ♂ obs).  
1980'S MATERIAL: **S-77**: 11-08-1982 (1 ♂), 14-08-1984 (5 ♂♂ and 1 ♀); 16-08-1986 (3 ♂♂ and 1 ♀) and 29-08-1987 (1 ♂).  
UTM (10x10 KM): 29TPE06, 29TPE26, 29TPE27, 29TPE37, 29TPE38, 29TPE48, 29TPE49.  
ALTITUDINAL RANGE: from 270 to 960 m.  
REFERENCES: Seabra (1939a) from “Serra da Estrela”.  
COMMENTS: Second record for the Park.

#### Aeshnidae

• *Aeshna cyanea* (Müller, 1764)  
1980'S MATERIAL: **S-78**: 12-08-1982 (1 ♂).  
UTM (10x10 KM): 29TPE16  
ALTITUDINAL RANGE: 1600 m.  
COMMENTS: First record for the Park.

• *Aeshna juncea* (Linnaeus, 1758)  
MATERIAL EXAMINED: **S-49**: 03-08-2005 (1 ♀); **S-72**: 13-07-2005 (1 exuv.).  
UTM (10x10 KM): 29TPE16, 29TPE27.  
ALTITUDINAL RANGE: from 1310 to 1790 m.  
REFERENCES: Santos (1883a) from “Serra da Estrella, Aôut (Ribeira d'Alva, 1397 m.)”; Navás (1906) from “Serra da Estrella (Mattozo)”, Compte Sart (1965) from “Sierra de la Estrella”, Brändle & Rödel (1994) from “Estrella-Gebirge (Distrikt Castelo Branco und Distrikt Guarda) 10-09-1991 Subalpine und alpine Landschaft, 1500-1700 m NN; kleiner, verlandeter Stausee bei Sabugeiro mit anmoorigen Stellen und einigen zufließenden Bächen.” and Malkmus (2002) mapped from 29TPE17.

• *Anax imperator* Leach, 1815  
MATERIAL EXAMINED: **S-05**: 14-07-2005 (1 ♂ obs); **S-17**: 13-07-2005 (1 ♂ obs); **S-21**: 06-07-2005 (1 ♂ obs); **S-23**: 06-07-2005 (1 ♂ obs); **S-25**: 12-06-2005 (1 ♀); **S-26**: 06-07-2005 (1 ♂ obs); **S-27**: 06-07-2005 (1 ♂); **S-31**: 07-07-2005 (1 ♂ obs); **S-39**: 07-07-2005 (1 ♂ obs); **S-47**: 09-06-2005 (1 ♀); **S-50**: 11-07-2005 (1 ♂ obs); **S-52**: 04-07-2005 (1 ♂ obs); **S-65**: 10-06-2005 (1 ♀).  
UTM (10x10 KM): 29TPE16, 29TPE17, 29TPE18, 29TPE26, 29TPE27, 29TPE37, 29TPE38, 29TPE48, 29TPE49.  
ALTITUDINAL RANGE: from 480 to 1590 m.  
REFERENCES: Malkmus (2002) mapped from 29TPE15, 29TPE17.  
COMMENTS: Recorded by Malkmus (2002) from two 10x10 Km UTM squares partially occupied by the Park. Presence in the Park confirmed.

• *Boyeria irene* (Fonscolombe, 1838)  
MATERIAL EXAMINED: **S-14**: 12-07-2005 (1 ♂ obs); **S-15**: 12-07-2005 (1 ♂ obs); **S-16**: 15-06-2005 (3 exuv.); **S-18**: 12-07-2005 (1 ♂ obs); **S-34**: 14-07-2005 (1 ♂ obs); **S-36**: 14-08-2003 (1 ♂ obs), 14-07-2005 (1 ♂ obs); **S-37**: 07-07-2005 (1 ♂); **S-39**: 07-07-2005 (1 ♂); **S-40**: 11-07-2005 (1 ♂ obs); **S-44**: 22-08-2001 (4 ♂♂), 11-07-2005 (1 ♂); **S-45**: 03-08-2005 (1 ♂ obs); **S-50**: 11-07-2005 (1 ♂ obs); **S-51**: 11-07-2005 (1 ♂ obs); **S-52**: 04-07-2005 (3 exuv.).  
UTM (10x10 KM): 29TPE15, 29TPE26, 29TPE27, 29TPE37, 29TPE38, 29TPE49.  
ALTITUDINAL RANGE: from 480 to 960 m.  
COMMENTS: First record for the Park.

## Gomphidae

• *Onychogomphus forcipatus* (Linnaeus, 1758) ssp. *unguiculatus* Vander Linden, 1823

MATERIAL EXAMINED: **S-16**: 15-06-2005 (1 ♂); **S-36**: 14-07-2005 (1 ♂ obs); **S-50**: 11-07-2005 (1 ♂ obs).

1980'S MATERIAL: **S-82**: 19-08-1986 (1 ♂).

UTM (10x10 KM): 29TPE26, 29TPE37, 29TPE38.

ALTITUDINAL RANGE: from 550 to 830 m.

REFERENCES: Malkmus (2002) mapped from 29TPE16.

COMMENTS: Second record for the Park.

• *Onychogomphus uncatus* (Charpentier, 1840)

MATERIAL EXAMINED: **S-14**: 12-07-2005 (1 ♂ obs); **S-15**: 12-07-2005 (1 ♂ obs); **S-16**: 15-06-2005 (1 ♂), 04-08-2005 (1 ♂); **S-18**: 12-07-2005 (1 ♂); **S-37**: 07-07-2005 (2 ♂♂); **S-38**: 07-07-2005 (1 ♂); **S-41**: 04-07-2005 (1 ♂ and 1 ♀); **S-44**: 11-07-2005 (2 ♂♂); **S-45**: 04-07-2005 (1 ♂); **S-52**: 04-07-2005 (2 ♂♂); **S-73**: 12-07-2005 (1 ♂); **S-75**: 05-07-2005 (1 ♂).

1980'S MATERIAL: **S-77**: 29-08-1982 (1 ♂ and 1 ♀), 18-08-1984 (1 ♂), 16-08-1986 (1 ♂ and 1 ♀) and 29-08-1987 (1 ♂).

UTM (10x10 KM): 29TPE06, 29TPE07, 29TPE15, 29TPE26, 29TPE27, 29TPE38, 29TPE48.

ALTITUDINAL RANGE: from 270 to 1080 m.

COMMENTS: First record for the Park.

## Cordulegastridae

• *Cordulegaster boltonii* (Donovan, 1807)

MATERIAL EXAMINED: **S-01**: 06-07-2005 (1 ♂ obs); **S-02**: 13-06-2005 (1 ♂ obs); **S-03**: 06-07-2005 (1 ♂ obs); **S-07**: 06-07-2005 (1 ♂); **S-08**: 06-07-2005 (1 ♂ obs); **S-09**: 13-07-2005 (1 ♂ obs); **S-13**: 13-07-2005 (1 ♂ obs); **S-14**: 12-07-2005 (1 ♂ obs); **S-15**: 12-07-2005 (1 ♂); **S-16**: 15-06-2005 (1 ♂ and 1 ♀); **S-17**: 13-07-2005 (1 ♂ obs); **S-18**: 12-07-2005 (1 ♂ obs); **S-20**: 05-07-2005 (1 ♂); **S-21**: 06-07-2005 (1 ♂); **S-22**: 13-06-2005 (1 ♂ obs); **S-23**: 06-07-2005 (1 ♂ obs); **S-24**: 06-07-2005 (1 ♂ obs); **S-27**: 06-07-2005 (1 ♂ obs); **S-29**: 06-07-2005 (1 ♂ obs); **S-30**: 11-07-2005 (1 ♂ obs); **S-32**: 14-07-2005 (1 ♂ obs); **S-35**: 14-08-2003 (1 ♂ obs); **S-36**: 14-08-2003 (1 ♂ obs), 14-07-2005 (1 ♂ obs); **S-39**: 07-07-2005 (1 ♂ obs); **S-41**: 20-08-2001 (3 ♂♂), 04-07-2005 (1 ♂); **S-44**: 11-07-2005 (4 ♂♂); **S-45**: 04-07-2005 (1 ♂); **S-52**: 04-07-2005 (1 ♂); **S-54**: 12-07-2005 (1 ♂ obs); **S-63**: 06-07-2005 (1 ♂ obs); **S-66**: 14-06-2005 (1 exuv.); **S-67**: 05-07-2005 (1 ♂ obs); **S-70**: 12-07-2005 (1 ♂ obs); **S-73**: 12-07-2005 (1 ♂); **S-74**: 12-06-2005 (2 ♂♂ and 1 ♀); **S-75**: 05-07-2005 (1 ♂ obs); **S-76**: 05-07-2005 (1 ♂ obs).

UTM (10x10 KM): 29TPE06, 29TPE07, 29TPE15, 29TPE16, 29TPE17, 29TPE18, 29TPE26, 29TPE27, 29TPE28, 29TPE29, 29TPE37, 29TPE38, 29TPE39, 29TPE49.

ALTITUDINAL RANGE: from 310 to 1500 m, but see comment below.

REFERENCES: McLachlan (1880) from "Cea", Navás (1907) from "Cea (Mac Lachlan)", Pfau (1985) from "Rio Zezere bei Mantelgas (Serra da Estrêla, Portugal)", Malkmus (2002) mapped from 29TPE15, 29TPE27, 29TPE28, 29TPE38.

COMMENTS: Regarding the altitudinal range, we watched a *Cordulegaster boltonii* "hill-topping" around the tower at Torre (1993 m) on 03-VIII-2005

## Corduliidae

• *Oxygastra curtisii* (Dale, 1834)

MATERIAL EXAMINED: **S-16**: 04-08-2005 (1 ♂ obs); **S-38**: 07-07-2005 (1 ♂).

1980'S MATERIAL: **S-77**: 16-08-1984 (1 ♂ and 1 ♀), 16-08-1986 (2 ♂♂); **S-79**: 1979 (1 ♂ and 1 ♀).

UTM (10x10 KM): 29TPE06, 29TPE26, 29TPE48.

ALTITUDINAL RANGE: from 270 to 600 m.

REFERENCES: Aguiar (1989) from "Rio Alva (próximo de Seia)".

COMMENTS: Second record for the Park.

## Libellulidae

• *Crocothemis erythraea* (Brullé, 1832)

MATERIAL EXAMINED: **S-04**: 07-07-2005 (1 ♂); **S-27**: 06-07-2005 (1 ♂); **S-51**: 11-07-2005 (1 ♂ obs).

1980'S MATERIAL: **S-79**: 28-08-1982 (2 ♂).

UTM (10x10 KM): 29TPE06, 29TPE17, 29TPE37, 29TPE49.

ALTITUDINAL RANGE: from 440 to 550 m.

REFERENCES: Aguiar & Aguiar (1985) mapped from 29TPE06 and 29TPE07, Malkmus (2002) mapped from 29TPE06 and 29TPE07.

COMMENTS: Recorded by Aguiar & Aguiar (1985) from two 10x10 Km UTM squares partially occupied by the Park. Presence in the Park confirmed.

• *Libellula depressa* Linnaeus, 1758

MATERIAL EXAMINED: **S-33**: 07-07-2005 (1 ♂); **S-76**: 05-07-2005 (1 ♀);

UTM (10x10 KM): 29TPE17, 29TPE38.

ALTITUDINAL RANGE: from 460 to 930 m.

REFERENCES: Malkmus (2002) mapped from 29TPE17.

COMMENTS: Recorded by Malkmus (2002) from one 10x10 Km UTM square partially occupied by the Park. Presence in the Park confirmed.

• *Libellula quadrimaculata* Linnaeus, 1758

MATERIAL EXAMINED: **S-17**: 13-07-2005 (1 ♂); **S-25**: 12-06-2005 (1 ♂); **S-42**: 10-06-2005 (1 ♂ obs and 6 exuv.); **S-55**: 09-06-2005 (1 ♂ obs and 4 exuv.); **S-61**: 10-06-2005 (1 ♂); **S-65**: 10-06-2005 (1 ♂ obs); **S-69**: 10-06-2005 (1 ♂ obs); **S-74**: 12-06-2005 (1 ♂ obs).

UTM (10x10 KM): 29TPE16, 29TPE17, 29TPE26.

ALTITUDINAL RANGE: from 1430 to 1900 m.

REFERENCES: Malkmus (2002) mapped from 29TPE16, 29TPE17 and 29TPE26.

COMMENTS: Second record for the Park.

• *Orthetrum chrysostigma* (Burmeister, 1839)

MATERIAL EXAMINED: **S-16**: 04-08-2005 (1 ♂); **S-40**: 04-08-2005 (1 ♂ and 1 ♀).

UTM (10x10 KM): 29TPE26, 29TPE37.

ALTITUDINAL RANGE: from 520 to 600 m.

COMMENTS: First record for the Park.

• *Orthetrum coerulescens* (Fabricius, 1798)

MATERIAL EXAMINED: **S-04**: 07-07-2005 (1 ♂); **S-17**: 13-07-2005 (1 ♂); **S-25**: 11-07-2005 (1 ♂); **S-27**: 06-07-2005 (1 ♂); **S-32**: 14-07-2005 (1 ♂); **S-38**: 07-07-2005 (1 ♂); **S-50**: 11-07-2005 (1 ♂); **S-52**: 04-07-2005 (1 ♂ and 1 ♀); **S-54**: 12-07-2005 (1 ♂); **S-62**: 05-07-2005 (1 ♂); **S-75**: 05-07-2005 (1 ♂).

1980'S MATERIAL: **S-77**: 29-08-1982 (2 ♂♂), 16-08-1986 (1 ♂) and 29-08-1987 (1 ♂ and 1 ♀); **S-82**: 19-08-1986 (2 ♂♂).

UTM (10x10 KM): 29TPE06, 29TPE07, 29TPE16, 29TPE17, 29TPE27, 29TPE37, 29TPE48, 29TPE49.

ALTITUDINAL RANGE: from 270 to 1500 m.

COMMENTS: First record for the Park.

• *Sympetrum flaveolum* (Linnaeus, 1758)

MATERIAL EXAMINED: **S-60**: 13-07-2005 (1 ♂);

1980'S MATERIAL: **S-69**: 13-08-1987 (1 ♂); **S-78**: 12-08-1982 (3 ♂♂).

UTM (10x10 KM): 29TPE16.

ALTITUDINAL RANGE: from 1600 to 1900 m.

REFERENCES: Santos (1883a) from "Serra da Estrella, Aôut (Lagôa comprida 1527 m.)", Navás (1906, 1924) from "Serra da Estrella (Mattozo)", Comte Sart (1965) from "Sierra de la Estrella", Malkmus (2002) mapped from 29TPE38.

• *Sympetrum fonscolombii* (Selys, 1840)

MATERIAL EXAMINED: **S-05**: 14-07-2005 (1 ♂); **S-35**: 14-08-2003 (1 ♂ and 2 ♀♀); **S-43**: 13-08-2003 (2 ♂♂ and 1 ♀).

1980'S MATERIAL: **S-69**: 13-08-1988 (1 ♂).

UTM (10x10 KM): 29TPE26, 29TPE37, 29TPE38.

ALTITUDINAL RANGE: from 840 to 1900 m.

REFERENCES: Santos (1883a) from “Serra da Estrela, Aôut (Lagôa redonda 1490 m.; Lagôa comprida 1530 m.; Costa da Baleia)”.

COMMENTS: Second record for the Park.

• *Sympetrum sanguineum* (Müller, 1764)

MATERIAL EXAMINED: S-35: 14-08-2003 (1 ♂).

1980'S MATERIAL: S-69: 17-08-1984 (1 ♂); S-77: 16-08-1984 (1 ♂), and 18-08-1984 (1 ♂).

UTM (10x10 KM): 29TPE06, 29TPE16, 29TPE37.

ALTITUDINAL RANGE: from 270 to 1900 m.

REFERENCES: Malkmus (2002) mapped from 29TPE17 and 29TPE49.

COMMENTS: Recorded by Malkmus (2002) from one 10x10 Km UTM square partially occupied by the Park. Presence in the Park confirmed.

## Discussion

The analysis of the bibliographical data available for the Odonata of PNSE has hitherto resulted in a list of 15 references (McLachlan, 1880; Santos 1883a; Navás, 1906, 1907, 1924; Seabra, 1939a,b; Compte Sart, 1965; Aguiar & Aguiar 1985; Pfau, 1985; Aguiar, 1989; Graça *et al.*, 1989; Brändle & Rödel, 1994; Jödicke, 1996; Malkmus, 2002), in which 24 species were recorded from the Park's area. However, it is worth mentioning that most of the references are either citations of previous bibliographic references or only records of a single species from the Park and that only seven of them include first records for the area. Of these, Santos (1883a) is the most important, with 11 first citations.

The literature survey conducted and the new data presented place Serra da Estrela Natural Park at the top of the Portuguese Parks in terms of Odonata species richness, with 34 species recorded. This is closely followed by Vale do Guadiana Natural Park, with 32 species recorded so far, while most other Parks have 15 or fewer species recorded. The eleven species recorded for the first time from the Park correspond to one third of the catalogued fauna, representing a significant improvement in the faunistic knowledge of the area. Among the novelties, the finding of the Afrotropical *O. chrysostigma* in the Park is the most surprising one, confirming its presence north of the Tagus river, which had already been mapped by Malkmus (2002). However, its presence cannot be considered abnormal but due to the locally dry climate, in an area with Mediterranean influence.

Although the data presented derives from a survey lasting more than one year, the comparatively lower sampling effort applied during part of the summer as well as during autumn prevents the inference of the phenologic patterns of the species in the Park.

The only historical record of *A. juncea* in Portugal (Santos 1883a), was confirmed by Brändle & Rödel (1994), the reference to its presence in Serra da Estrela by Navás (1906), Compte Sart (1965) and Malkmus (2002) being based on the first. However, the data presented by Brändle & Rödel (1994) requires a clarification, since during the printing process the figure captions were exchanged between figures 2 and 3 (Martin Brändle, *in litt.*). The collection site for this species, described as an artificial lake near Sabugueiro standing between 1500 and 1700 m asl, therefore shown in figure 3, can as a result be recognized as Covão do Curral (29TPE1570). During this study it was possible to detect breeding areas (via exuviae) and to collect

an erratic female distant from any suitable breeding area. These observations represent two new 10x10 km UTM squares for the species, of particular interest because they confirm the reproduction in the area. Covão do Curral was not surveyed as the clarification was only obtained after fieldwork was concluded. Additionally we were able to check the identity of the only voucher specimen at MZCP, labelled “Lisboa”, which was reported as *A. juncea* in the unpublished catalogue of Williams (1990). This turned out to be a misidentified female of *A. cyanea*.

As with *A. juncea*, the distribution of *S. flaveolum* in Portugal is restricted to Serra da Estrela from where it was first recorded by Santos (1883a). Records of the species from this area by Navás (1906, 1924) and Compte Sart (1965) were based on Santos (1883a), nevertheless there is another work with data for this species (Malkmus 2002) but the map presented is unreliable as the data it bases on (Williams 1990 and Mendes, *in litt.*) is incorrect. The records from the surroundings of Lisbon are based on misidentified specimens of *S. fonscolombii* from ICT, and the data for Coimbra is based on two lost specimens from MZCP that pertain to a set of dubious specimens labelled “Coimbra” (see Ferreira *et al.* 2006). In the second case the unreliability is reinforced by the general preference of this species for high altitudes in the Iberian Peninsula (Ocharan & Torralba Burrial, 2004) whereas Coimbra lies below 200 m asl. Furthermore the species was mapped for the study area (29TPE38) as a post-1985 record but this must be considered erroneous since there are no recent published records of the species and the author did not collect the species (Malkmus, pers. comm.). Hence, the data presented here confirms the presence of the species in the Park, but it must be emphasized that all available reliable Portuguese records pertain to the 10x10 km UTM square 29TPE16. Therefore, further research is needed to check if this is an odd biased collecting artefact or if it really corresponds to the species distribution in the Park and in the country.

Regarding the legally protected species (species included in the Fauna-Flora-Habitat directive of the European Union) we were able to detect in the Park populations of *Oxygastra curtisii* (Dale, 1834), confirming its presence and increasing its known distribution, and also of *Coenagrion mercuriale* (Charpentier, 1840), which is reported for the first time from the Park in this study. However their conservation status in the area is unknown and more research is needed to fill this gap. Two further protected species were recorded from the Park in the past: *Gomphus graslinii* Rambur, 1842, whose occurrence requires confirmation since there is only one ancient record (McLachlan, 1880) repeated in a few more recent works (*e. g.* Compte Sart, 1965; Dommanget, 1996), and *Ophiogomphus cecilia* (Fourcroy, 1785) whose Iberian records were excluded by Ferreira *et al.* (2006).

The presence of *Lestes virens* (Charpentier, 1825), which was recorded only by Santos (1883a), has not been confirmed during the present study, nevertheless its occurrence has been recorded subsequently on the Planalto Central in August of 2008 (A. Torralba, pers. comm.). The remaining unconfirmed species, *Sympetrum meridionale* (Selys, 1841), also recorded by Santos (1883a) can be considered likely to occur in the Park as it is widely distributed in the country.

## Conservation threats to the Odonata in Serra da Estrela Natural Park

Fire is an agent of alteration of landscape and can cause extensive changes in watershed, namely in the composition and turbidity of water, which may have severe impacts on the fauna. In recent years Portuguese landscapes have been transformed by a ruthless fire scenario to which Serra da Estrela Natural Park was not an exception, and between 2003 and 2005 more than 19,000 hectares, representing almost a fifth of the Park's area, were burnt up leaving behind a devastated landscape, particularly prone to soil erosion. During 2005 alone, more than 9,000 hectares were affected by fire including the Zêzere glacier valley as well as other areas sampled in this study. The impact of these events on the Park's Odonata fauna is unknown and should be ascertained and monitored starting in the near future.

A somewhat intriguing fact observed during fieldwork is that at the highest altitudes *L. quadrimaculata* was the only species found in almost every pond near the roads, while at some distance away from the roads (30-50 m) other species, namely *E. cyathigerum*, were present in otherwise very similar ponds. One possible explanation is the likely presence of a salinity gradient from the road margin through the meadow, which has already observable effects in the faunal distribution/composition. This hypothesis is supported by two known facts: 1) tons of salt are used every year to keep the roads free from snow and ice, and 2) *L. quadrimaculata* has a high tolerance to salt (Corbet, 1999). However the effect of salinity on the fauna was never studied in Serra da Estrela and phenomena such as species distribution shifts and/or species replacement at the local scale may have occurred in the past or may be occurring nowadays without being detected.

As with most of the rivers in the country, Serra da Estrela water courses are under an increasing threat of damming and/or changes in river and bank structure, leading to a decrease of suitable habitat for most of the species.

## The relevance of the Odonata of Serra da Estrela Natural Park in the Portuguese context

According to the literature survey already conducted on the Odonata of Continental Portugal, the data obtained in this study places Serra da Estrela Natural Park at the top of the Portuguese Protected Areas in terms of Odonata species richness. Although that is not surprising, particularly if we consider Serra da Estrela's landscape heterogeneity and ecosystem diversity, it is very likely that the species inventory will be further increased as research continues. However, it should be emphasized that the available knowledge on the majority of the remaining Portuguese protected areas is still extremely deficient, and that the differences between the areas will therefore be lessened when their faunas are properly studied.

At the species composition level, Serra da Estrela's fauna can also be considered very interesting, as it is the only confirmed area of occurrence of *A. juncea* and *S. flaveolum* in Portugal. Both of these species have their western range limit in the Iberian Peninsula, where they occur solely in the northern half with fragmented populations mainly restricted to high altitude areas (Ocharan & Torralba Burrial, 2004, Ocharan *et al.*, 2006a,b). Despite their distribution and apparent population fragmentation in

Iberia, levels of genetic diversity on both species remain unknown as in the great majority of Iberian dragonflies. These two species are probably the ones that will face the biggest conservation problems in Portugal if the current climate changes continue, as there is already evidence that populations go extinct more frequently at the Southern end of their range due to the increase in temperature (Speight, 1999). Nevertheless this is still a hypothetical scenario and a substantial increase of the available knowledge on the distribution as well as on the conservation status of the populations at local and at Iberian level is vital for the design of adequate conservation measures.

## Acknowledgements

The study of the invertebrate fauna of PNSE was funded by *Instituto da Conservação da Natureza* and by European Union's INTERREG III A. The authors wish to thank Serafim and Carlos Aguiar for the kind donation of the 1980's material, to Dr. Isabel Carreira and Dr. José Reis at the University of Coimbra for allowing the study of the Zoological Museum's collection and Dr. Luis Mendes (Lisbon) for allowing the study of the collection of Instituto de Investigação Científica Tropical - Centro de Zoologia. Thanks are also due to Martin Corley for his comments on the manuscript.

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## APPENDIX

Locality code	Locality name	UTM	Altitude	Municipality
S-01	Cabeça Alta stream banks (near Moinhos da Aldeola)	29TPE3591	890	Celorico da Beira
S-02	Linhares stream banks	29TPE2992	500	Celorico da Beira
S-03	Near Lageosa do Mondego	29TPE4098	450	Celorico da Beira
S-04	Pond at Quinta dos Corgãos	29TPE4298	440	Celorico da Beira
S-05	Pond near Linhares	29TPE3188	840	Celorico da Beira
S-06	Ponte do Vilhagre	29TPE3497	480	Celorico da Beira
S-07	Prados	29TPE3791	810	Celorico da Beira
S-08	Reservoir near Salgueirais	29TPE3391	940	Celorico da Beira
S-09	Alforfa stream banks	29TPE1961	1260	Covilhã
S-10	Cabeço dos Coucinhos	29TPE1858	990	Covilhã
S-11	Covão do Boi	29TPE1864	1870	Covilhã
S-12	East of Alforfa hydroelectric power station	29TPE1859	1010	Covilhã
S-13	Near Covão do Ferro hydroelectric power station	29TPE1962	1370	Covilhã
S-14	Ponte do Bufo	29TPE1256	720	Covilhã
S-15	Ponte Nova (near Cortes do Meio)	29TPE1955	540	Covilhã
S-16	Reservoir in Beijames stream	29TPE2868	600	Covilhã
S-17	Road to Unhais (near Covão do Ferro reservoir)	29TPE1963	1500	Covilhã
S-18	Unhais da Serra stream at Unhais da Serra	29TPE1757	660	Covilhã
S-19	Aldeias	29TPE1880	710	Gouveia
S-20	Aldeias stream at Assessada	29TPE1781	590	Gouveia
S-21	Aldeias stream at Moimenta da Serra	29TPE1582	530	Gouveia
S-22	Melo	29TPE2486	570	Gouveia
S-23	Near Nespereira	29TPE1786	480	Gouveia

Locality code	Locality name	UTM	Altitude	Municipality
S-24	Near Paços da Serra	29TPE1580	520	Gouveia
S-25	Near Vale do Rossim reservoir	29TPE1973	1430	Gouveia
S-26	Near Vinhó	29TPE1683	510	Gouveia
S-27	Paços da Serra	29TPE1579	550	Gouveia
S-28	Ponte do Soalheiro	29TPE1977	1160	Gouveia
S-29	Quinta da Fazenda	29TPE2787	610	Gouveia
S-30	Salgueiro stream banks	29TPE2175	1280	Gouveia
S-31	Caldeirão stream reservoir	29TPE4186	720	Guarda
S-32	Famalicão stream at Carapita	29TPE3676	550	Guarda
S-33	Near Meios	29TPE3983	930	Guarda
S-34	Near Moinho do Bufo	29TPE3885	710	Guarda
S-35	Quinta do Fragusto	29TPE3377	980	Guarda
S-36	Rio Mondego banks, near Quinta da Taberna	29TPE3482	830	Guarda
S-37	River Mondego banks (near the bridge between Videmonte and Trinta)	29TPE3785	740	Guarda
S-38	River Mondego banks (near the bridge between Vila Soeiro and Pêro Soares)	29TPE4089	590	Guarda
S-39	River Mondego banks at Quinta da Ponte	29TPE4292	480	Guarda
S-40	River Zêzere banks (near Valhelhas)	29TPE3673	520	Guarda
S-41	Albarcãs (River Zêzere banks)	29TPE2268	1080	Manteigas
S-42	Argenteira	29TPE2064	1550	Manteigas
S-43	Candeeira stream banks	29TPE2066	1400	Manteigas
S-44	Covão da Ponte	29TPE2678	960	Manteigas
S-45	Fonte Santa	29TPE2371	840	Manteigas
S-46	Near Fraga da Risca do Bezerra	29TPE2166	1300	Manteigas
S-47	Near Malhada Alta	29TPE2367	1450	Manteigas
S-48	Near Quinta Branca	29TPE3173	700	Manteigas
S-49	Near Vale da Adega	29TPE2470	1310	Manteigas
S-50	River Zêzere banks at Relva da Reboleira	29TPE3074	550	Manteigas
S-51	River Zêzere banks near Beijames stream	29TPE3372	520	Manteigas
S-52	S. Gabriel (Manteigas)	29TPE2573	650	Manteigas
S-53	Stream between Torre and Cântaro Magro	29TPE1864	1930	Manteigas
S-54	Casal do Rei	29TPE0663	390	Seia
S-55	Chancas	29TPE1766	1840	Seia
S-56	Covão das Quelhas reservoir	29TPE1664	1810	Seia
S-57	Covão do Forno	29TPE1569	1570	Seia
S-58	Lagoa Comprida (north side banks)	29TPE1569	1600	Seia
S-59	Near Arrifana	29TPE0976	420	Seia
S-60	Near Covão das Quelhas reservoir	29TPE1765	1850	Seia
S-61	Near Lagoa Comprida dam	29TPE1469	1560	Seia
S-62	Near Santiago	29TPE0774	420	Seia
S-63	Ponte de Cabaços	29TPE1875	1350	Seia
S-64	Portela do Arão	29TPE0966	990	Seia
S-65	Pragueira stream banks	29TPE1468	1590	Seia
S-66	River Alva at Sabugueiro	29TPE1573	1030	Seia
S-67	River Alva banks near Vila Cova à Coelheira camping park	29TPE0770	310	Seia
S-68	Safra	29TPE0655	700	Seia
S-69	Salgadeira	29TPE1765	1900	Seia
S-70	Senhora do Desterro	29TPE1072	810	Seia
S-71	Southwest of Sabugueiro	29TPE1472	1100	Seia
S-72	Stream connecting Covão das Quelhas and Serrano reservoirs	29TPE1665	1790	Seia
S-73	Valezim	29TPE0968	710	Seia
S-74	Vidual stream banks	29TPE1872	1450	Seia
S-75	Vila Cova à Coelheira hydroelectric power station	29TPE0870	330	Seia
S-76	Vodra	29TPE1176	460	Seia
S-77	Sandomil	29TPE0368	270	Seia
S-78	Near Lagoa Comprida dam	29TPE16	1600	Seia
S-79	Seia	29TPE17	-	Seia
S-80	Manteigas	29TPE27	-	Manteigas
S-81	Near Penhas Douradas	29TPE27	-	Manteigas
S-82	Valhelhas	29TPE37	-	Manteigas