

Report on Adriatic Montenegro 2007 project - Odonata

Miloš Jović

Natural History Museum in Belgrade, Njegoševa 51, 11000 Belgrade, Serbia
email: milos.jovic@nhmbeo.org.yu

Introduction

In 2007, a project named Adriatic Montenegro 2007 was initiated and realised under the protection of IDF. Stimulated by the suggestion of Vincent Kalkman from the European Invertebrate Survey, The Netherlands, distribution data for the Odonata of Adriatic Montenegro were collected and used to create distribution maps. These data and maps should then be used in the evaluation of conservation measures for individual odonate species as well as for the IUCN Red List of the Mediterranean countries (organized by the IUCN Centre for Mediterranean Cooperation) and the Project on an atlas of European dragonflies (a co-operation of all European countries organised by the European Invertebrate Survey, The Netherlands).

Field work

The field work was carried out in the wetlands of the Adriatic shore in Montenegro and in the vicinity of the Lake of Skadar (Skadarsko jezero). The activities were divided in two phases, in order to cover the largest part of the season. The first phase comprised the period of late spring of 2007 from May 26th until June 9th. This period marks the end of the wet part of the year, which in the region of South Adriatic lasts for about 8 months. The second phase lasted from the end of the summer of 2007, from 5th to 18th of September (the end of the dry part of the year). A total of 34 localities have been surveyed along the Adriatic shore and in the vicinity of the Lake of Skadar. These sites represented a range of different habitats. All sites, except the lake on Lovćen Mountain, are in the zone of significant influence of the



Mediterranean climate and are exposed to strong anthropogenic influence in the summer tourist season.

All localities are marked with the numbers representing the sequence of visiting (Fig. 1). They are roughly divided in two groups – the area of the Lake of Skadar and the Adriatic coast. The geographic coordinates correspond with WGS 84 datum.



Figure 1: Satellite image of the Montenegrin coast and Skadarsko jezero with the positions of investigated localities (the image was downloaded from the website <https://zulu.ssc.nasa.gov/mrsid>)

Results and Discussion

During 19 days that allowed field work (i.e. days with several hours with clear sky and without rainfall), 36 Odonata species were recorded (Table 1).

Table 1. List of recorded taxa. "Bolded" taxa are of particular interest (see text for details).

Taxon	May/June	September
<i>Calopteryx splendens balcanica</i> Fudakowski, 1930	*	
<i>Calopteryx virgo festiva</i> (Brulle, 1832)	*	
<i>Lestes parvidens</i> Artobolevskii, 1929	*	*
<i>Lestes sponsa</i> (Hansemann, 1823)	*	
<i>Lestes barbarus</i> (Fabricius, 1798)	*	
<i>Platycnemis pennipes nitidula</i> (Brulle, 1832)	*	
<i>Ischnura elegans</i> (Vander Linden, 1820)	*	*
<i>Erythromma lindeni</i> (Selys, 1840)	*	
<i>Coenagrion puella</i> (Linnaeus, 1758)	*	
<i>Coenagrion pulchellum</i> (Vander Linden, 1825)	*	
<i>Ceriagrion tenellum</i> (de Villers, 1789)	*	
<i>Aeshna mixta</i> Latreille, 1805		*
<i>Aeshna affinis</i> Vander Linden, 1820	*	
<i>Aeshna isosceles</i> (Müller, 1767)	*	
<i>Anax imperator</i> Leach, 1815	*	
<i>Brachytron pratense</i> (Müller, 1764)	*	
<i>Gomphus schneiderii</i> Selys, 1850	*	
<i>Onychogomphus forcipatus</i> (Linnaeus, 1758)	*	
<i>Lindenia tetraphylla</i> (Vander Linden, 1825)	*	
<i>Cordulegaster bidentata</i> Selys, 1843	*	
<i>Cordulia aenea</i> (Linnaeus, 1758)	*	
<i>Somatochlora meridionalis</i> Nielsen, 1935	*	
<i>Somatochlora flavomaculata</i> (Vander Linden, 1825)	*	
<i>Libellula depressa</i> Linnaeus, 1758	*	
<i>Libellula fulva</i> Müller, 1764	*	
<i>Libellula quadrimaculata</i> Linnaeus, 1758	*	
<i>Orthetrum cancelatum</i> (Linnaeus, 1758)	*	*
<i>Orthetrum albistylum</i> (Selys, 1848)	*	
<i>Orthetrum coerulescens</i> (Fabricius, 1798)	*	*
<i>Orthetrum brunneum</i> (Fonscolombe, 1837)	*	*
<i>Crocothemis erythraea</i> (Brulle, 1832)	*	*
<i>Sympetrum meridionale</i> (Selys, 1841)	*	*
<i>Sympetrum striolatum</i> (Charpentier, 1840)	*	*
<i>Sympetrum sanguineum</i> (Müller, 1764)	*	
<i>Sympetrum fonscolombii</i> (Selys, 1840)		*
<i>Selysiothemis nigra</i> (Vander Linden, 1825)	*	

I Area of the Lake of Skadar

Locality 1. Crnojevića Žabljak, 26 May 2007

(Coordinates: 42.31758 N, 19.15842 E)

The silent river, Šegrtnica, after joining with the rivulet Biševina and forming the river Karatuna, flows into the Lake of Skadar. In the village of Crnojevića Žabljak the river is rich with floating vegetation. Residents of the piscatorial settlement on the river bank have a very big influence on the quality of habitat (solid waste, damage of littoral vegetation). In the end of May, the vegetation along the river was dominated by individuals of *P. p. nitidula*.

- Recorded species:

Platycnemis pennipes nitidula

Ischnura elegans

Orthetrum spec. (*O. cancellatum* or *Orthetrum albistylum*) female laying eggs

Localities 2, 3. Dodoši, 27 May, 17 September 2007

Piscatorial hamlet on the bank of the River Karatuna. The river is relatively wide and silent in this place and it flows into the Lake of Skadar. Outside the hamlet are flood meadows and alleys which are dry in the late summer months as are the drainage canals. The water surface near the riverside is sporadically rich with floating vegetation. The riverside is overgrown with reed in undisturbed parts. This habitat is being seriously endangered by the development of tourism and hospitality. In the end of May, dominant species were *Calopteryx splendens balcanica* (zone along the very river and along the canals, Fig. 3), *Libellula fulva* and *Libellula quadrimaculata* (flood meadows). The latter species has been present in the really large numbers – females have been taking positions on the top of almost every single bush that was placed in some of the flood meadows. Especially interesting was the finding of several young individuals of *Gomphus schneiderii*. The lateral black stripes on the thorax are somewhat wider than the yellow field between them (especially marked at the front stripe, Fig. 2b), while the shape of the female vulval plates and the male anal appendages (Fig. 2a) in the general appearance match the description given by previous authors (Askew, 2004; Dijkstra & Lewington, 2006). The here confirmed presence of this species in



Montenegro extends its current known distribution towards north and west. Previously, it had been recorded only once, in 1911, in the vicinity of the village of Crnojevića Žabljak (Bartenev, 1912). In the late summer, the vicinity of the River Karatuna in Dodoši is dominated by *Sympetrum meridionale* and *Ischnura elegans*.

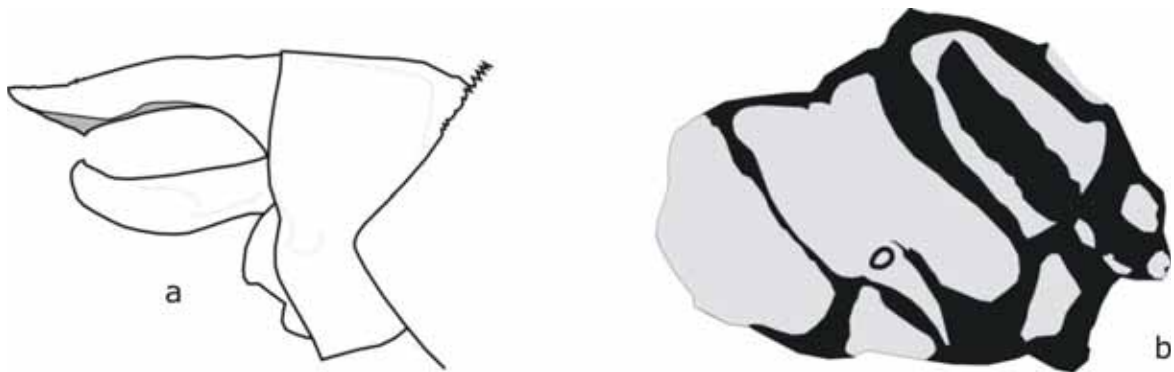


Figure 2: Lateral view of anal appendages (a) and thorax (b) of a male of *Gomphus schneiderii* Selys from Dodoši, Montenegro (specimen was collected on May 27th, 2007).

➤ 2 - The River Karatuna, 27 May, 17 September 2007 (Coordinates: 42.32867 N, 19.13414 E)

● Recorded species:

- Calopteryx splendens balcanica*
- Crocothemis erythraea*
- Libellula quadrimaculata*
- Orthetrum cancellatum*
- Ischnura elegans*
- Onychogomphus forcipatus*
- Libellula fulva*
- Gomphus schneiderii*
- Lestes sponsa*
- Orthetrum albistylum*
- Platycnemis pennipes nitidula*
- Sympetrum meridionale*
- Anax parthenope* (observed only)



- 3 - Karst rocks and macchia, 27 May, 17 September 2007
(Coordinates: 42.34558 N, 19.12628 E)

The village of Dodoši is placed in the slough below the ascending rocky sides of Buza and Velja Bobija hills. The vegetation of the rocky sides consists of a more or less disturbed macchia. Anisoptera were flying above bushes and especially above the asphalt road. *Orthetrum cancellatum* is dominant in the spring, *Aeshna mixta* dominates in the late summer.

● Recorded species:

Orthetrum cancellatum
Aeshna mixta
Sympetrum striolatum
Sympetrum meridionale

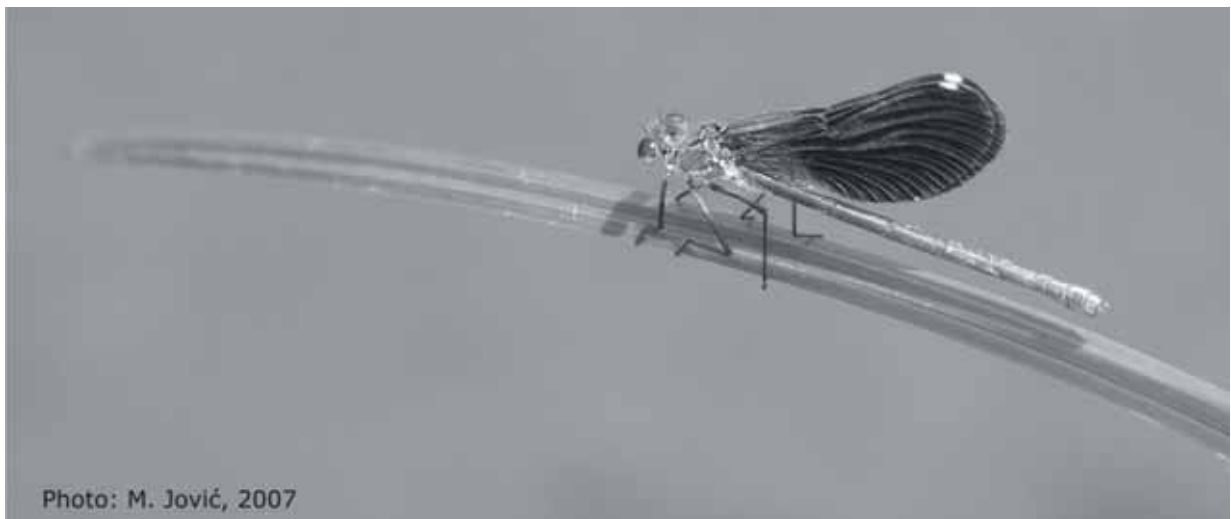


Figure 3a: *Calopteryx splendens balcanica* Fudakowski, a female perching on a leaf over irrigation canal in Donji Ceklin, the village of Dodoši, Montenegro.



Figure 3b: *Calopteryx splendens balcanica* Fudakowski, females, irrigation canal in Donji Ceklin, the village of Dodoši, Montenegro.



Localities 4, 10. The River Rijeka Crnojevića, 27 May, 30 May 2007

The river Rijeka Crnojevića is a relatively short river which flows into the Lake of Skadar on its west side. The upper course is fast and the river flows through a small canyon. After a hydroelectric power plant, the river flow is subsiding and the last part is silent and wide. Near the settlement of Rijeka Crnojevića, the landscape is disturbed because of the human influence. The water vegetation was very poor and almost no dragonflies were recorded. The part of the river flow that precedes its emptying into the lake is rich with floating vegetation, but completely inapproachable without using a boat.

➤ 4 - The Old Bridge, 27 May 2007 (Coordinates: 42.35461 N, 19.02708 E)

● Recorded species:

Ischnura elegans

➤ 10 - Canyon below the Obod Cave, 30 May 2007 (Coordinates: 42.35628 N, 19.01617 E)

Upstream from the settlement Rijeka Crnojevića, the river runs through a canyon of the same name. This canyon becomes more and more inapproachable towards Obod Cave. That is why the intensity of anthropogenic influence gradually decreases. The river is fast in this part and it flows between the rocks that lay in the riverbed (Fig. 4).

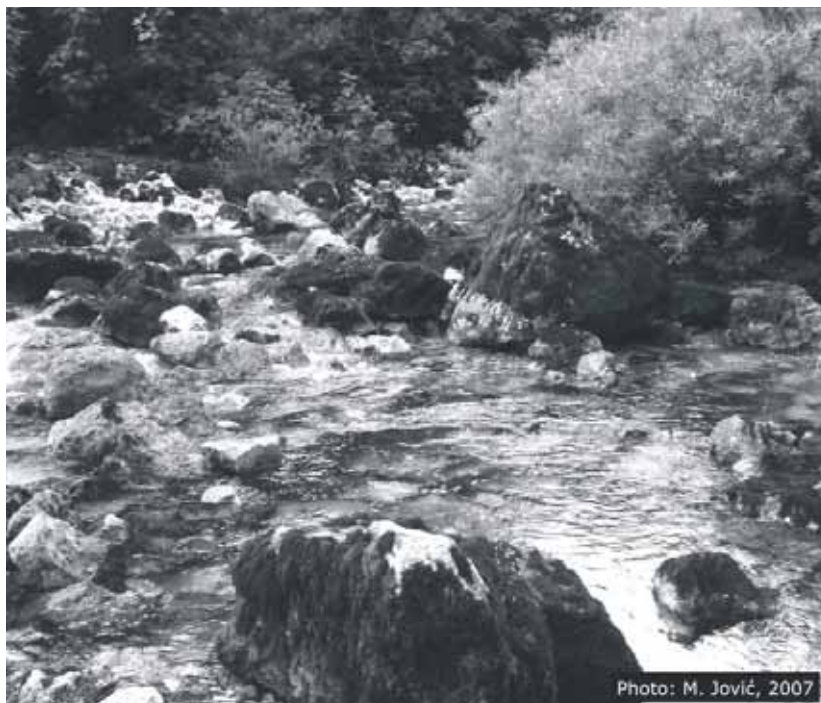


Figure 4: Rijeka Crnojevića, canyon, Montenegro.

● Recorded species:

Calopteryx virgo festiva

Crocothemis erythraea

Localities 5, 6. The village of Mataguži: Šipnica (or Sipnica), 29 May 2007

Šipnica (or Sipnica) is a part of the northern shore of the Lake of Skadar. Southwards from the village of Mataguži the landscape becomes wetter towards the flood zone of the lake. Dragonflies were observed in the zone of ponds that emanate near the stream (Fig. 5), and along the same stream, running through the region where the wet meadows and ponds are dominant. The bottom of the stream is mostly gritty.

➤ 5 - Ponds (Coordinates: 42.30181 N, 19.31514 E)

● Recorded species:

Calopteryx virgo festiva

Orthetrum brunneum

Ischnura elegans

➤ 6 – Stream Grabovnica (Coordinates: 42.29986 N, 19.31422 E)



● Recorded species:

Coenagrion pulchellum

Lestes sponsa

Ischnura elegans

Libellula fulva

Figure 5: Stream Grabovnica in Šipnica, Montenegro. This is habitat of rather strong populations of *Orthetrum brunneum* (Fonscolombe) and *Calopteryx virgo festiva* (Brulle).

Locality 7. The Lake of Skadar: Donja Plavnica, 29 May 2007, 18 Sept 2007

(Coordinates: 42.27439 N, 19.20017 E)

Donja Plavnica is placed on the northern shore of the Lake of Skadar. Seasonally wet meadows and groves constitute this place.

● Recorded species:

Calopteryx virgo festiva

Lestes sponsa

Sympetum meridionale

Coenagrion pulchellum

Ischnura elegans

Lestes parvidens

Localities 8, 9, 19, 20, 21, 22. Crmničko polje field, near the village of Gluhi Do, 30 May 2007, 02 June 2007

Crmničko polje is a NE-SW stretched field on the south-western shore of the Lake of Skadar from the village of Gluhi Do to the settlement of Virpazar on the shore. Several canals flow through the field. In the beginning of June there has been noted a large number of individuals of *C. virgo*, *S. meridionalis* and *S. flavomaculata*, while the complete absence of Odonata has been noted in September (on 17 September 2007).

➤ Location 8 (the same as 22) - Canal in Crmničko polje, 30 May 2007, 02 June 2007 (Coordinates: 42.2135 N, 19.05244 E)

The canal starts from the spring Velje oko, near a farm in the Crmničko polje field. In the spring, this canal was copious, while in the end of the summer of 2007 it was completely dry (Fig. 6). There was no floating vegetation but, especially in the lower part of the flow, was rich in submerge and emerged vegetation. In the outflow of the canal, I have found a quite strong population of *C. virgo festiva*. This is one of the few places where I have found *L. depressa*.

● Recorded species:

Calopteryx virgo festiva

Ischnura elegans

Libellula depressa





Figure 6: Crmničko polje, near the Velje oko spring. In September there were neither water nor dragonflies (photo: M. Jović, 2007).

Location 9 (the same as location 21) – Meadow Grkovina, 30 May 2007, 02 June 2007) (Coordinates: 42.21156 N, 19.05561 E)

The meadow is placed close to the canal mentioned above (site 8 above). It is used for mowing. Despite the rain, the tree canopy provided shelter and a number of individuals of *C. virgo festiva* and a single specimen of *O. brunneum* were found. During the second visit in sunny weather) a large number of young *S. meridionalis* were seen flying in swarm above the meadow.

● Recorded species:

Calopteryx virgo festiva

Orthetrum brunneum

Somatochlora meridionalis

➤ 19 – Railway, 02 June 2007 (Coordinates: 42.20808 N, 19.07589 E)

The railway passes through the field Crmničko polje. Individuals of *S. meridionalis* have been cruising above the rocky slopes of the railway bank.



- Recorded species:

Calopteryx virgo festiva
Somatochlora meridionalis

➤ 20 – Road, 02 June 2007 (Coordinates: 42.20311 N, 19.06619 E)

The road that is going from the railway to the farm to the beginning of the canal where I have done the observations (site 22), leads through a mixture of bushes and trees that separates agricultural fields. Mixed swarm of young males and females were flying above the road; dominant species were *S. meridionalis*, *S. flavomaculata* and *A. affinis*. Among them, some of the older individuals of *L. fulva*, could have also been noticed.

- Recorded species:

Aeshna affinis
Somatochlora meridionalis
Libellula fulva
Somatochlora flavomaculata

Localities 18, 40. Virpazar, 02 June 2007, 17 September 2007

Virpazar is a picturesque hamlet on the bank of the Lake of Skadar (Fig. 7). Through the village runs the river that is flowing into the lake. The riverside is overgrown with reed, and along the stream are belts of thick floating vegetation. Changes in the lake level cause seasonally flooding, so in the moist part of the year, swamp reaches the houses on the edge of Virpazar.

➤ 18 - Village road, 02 June 2007 (Coordinates: 42.23033 N, 19.08667 E)

- Recorded species:

Orthetrum cancellatum

➤ 40 - Beside the bridge over Crmnica River, 17 September 2007
(Coordinates: 42.2448 N, 19.0915 E)

- Recorded species:

Ischnura elegans





Figure 7: Virpazar, a village on the shore of the Lake of Skadar.

Locality 11. The Lake of Skadar: Water lilies, 31 May 2007

(Coordinates: 42.26886 N, 19.21908 E)

The hydrology of the large Lake of Skadar is relatively well known. Its surface significantly varies during the season and generates many swampy habitats. A boat is inevitable but even a boat may be hindered by the dense floating vegetation. In this "kingdom" of water lilies I observed tremendous numbers of *I. elegans*, a lot of them teneral. *C. erythraea* males had also been flying above the water surface, while the Aeshnidae had stayed out of my reach.

- Recorded species:

Ischnura elegans

Crocothemis erythraea

Localities 12, 13. The Lake of Skadar: The River Gostiljska Rijeka, 31 May 2007

The river Gostiljska Rijeka is one of the northern confluent of the Lake of Skadar. We went by boat into the river from the lake. The river bank is plentifully overgrown with reedy vegetation and it is impossible to emerge to the land in the proximate vicinity of the lake (Fig. 8). As we were moving upstream, we found a part of the bank that was reclaimed and behind which were placed agricultural areas. There were meadows between the bank and the agriculturally useful areas.

➤ 12 – Watercourse (on boat) (Coordinates: 42.27922 N, 19.24367 E)

- Recorded species:

Calopteryx splendens balcanica

Anax imperator (only observed)



➤ 13 - Meadows (Coordinates: 42.28333 N, 19.24386 E)

● Recorded species:

*Sympetrum sanguineum**Crocothemis erythraea**Aeshna affinis**Lestes sponsa**Calopteryx virgo festiva**Orthetrum cancellatum**Ischnura elegans**Coenagrion pulchellum*

Figure 8: Gostiljska Rijeka river, Montenegro.

Photo: M. Jović, 2007

Locality 15. Šas: Svač, 01 June, 13 September 2007 (Coordinates: 41.99581 N, 19.30925 E)

The locality Svač is placed in the degraded macchia (probably it could be considered as garigue) in the vicinity of The Lake of Šas. Above the valley which foundation is made of rock and red earth, rises the hill on which are located the remains of the medieval Town of Svač. I have collected and observed dragonflies beside the road, in a small settlement. Here and there, in June, *L. tetraphylla* females could be found resting on the rocky roads. The males of *A. affinis* were patrolling high above the road, while the still immature individuals of *L. fulva* were hiding in the bushes. Here, in September, I have found only the specimens of *S. meridionale*.

● Recorded species:

*Aeshna affinis**Calopteryx virgo**Libellula fulva**Aeshna isosceles**Lindenia tetraphylla**Sympetrum meridionale*

Localities 16, 17. The Lake of Šas, 01 June, 13 September 2007

The Lake of Šas is a relatively small lake laced between the Lake of Skadar and the saline Ulcinj and the Adriatic Sea on the other side, situated in the vicinity of the river Bojana. There are craggy edges of the lake slough around it. The edges of the lake are overgrown with reed, while the canals flowing into the lake are covered by floating vegetation. In close vicinity, there are meadows divided by hedges. They are used for mowing and as pasture for sheep. The shore is parcelled, too. The parcels are detached with barbwire and it can be assumed that the real exploitation is still to come. In September, the water level was significantly lower than in June, a large part of the reed belt was completely dry and partially burnt, and the diversity of Odonata species was also significantly decreased compared to June.

➤ 16 – Meadows, 01 June, 13 September 2007 (Coordinates: 41.98031 N, 19.33794 E)

The dominant species in June was *A. isosceles*. Males were flying about 2 metres above the meadows. There were a lot of *L. fulva*, while numerous individuals of *P. pennipes nitidula* have been hiding in the hedge. Not far from the shore of the Lake of Šas, a teneral female of *Selysiothemis nigra* has been collected, which confirms reproduction of this species in Montenegro. *S. nigra* had been noted just once before in 1990 by R. Seidenbusch, south from Ulcinj, near the border with Albania (Jović *et al.*, 2008).

● Recorded species:

Platycnemis pennipes nitidula

Crocothemis erythraea

Erythroma lindeni

Libellula fulva

Orthetrum cancellatum

Aeshna isosceles

Sympetrum meridionale

Lestes parvidens

Selysiothemis nigra



➤ 17 – Shore, 01 June 2007, 13 September 2007 (Coordinates: 41.97908 N, 19.33531 E)

● Recorded species:

Sympetrum sanguineum

Sympetrum striolatum

Sympetrum meridionale

Aeshna isosceles

Libellula quadrimaculata

Ischnura elegans

Orthetrum coerulescens

Orthetrum brunneum

Orthetrum cancellatum

Crocothemis erythraea

II The Adriatic Coast

Locality 14. The Saline of Ulcinj, 01 June 2007 (Coordinates: 41.93206 N, 19.29767 E)

The saline of Ulcinj is a large complex of ponds and canals which are being used for production of sea salt. Between the pools for salt sedimentation, there are small banks overgrown with high grass and belts of reed. Halophyte plants grow on the bottom of the empty pools. Very few Odonata have been observed, including some unidentified aeshnids in flight.

● Recorded species:

Crocothemis erythraea

Ischnura elegans

Localities 23, 24, 25, 36, 37. Ulcinj: Štoj, 02 June, 13 September 2007

Štoj, east of the seaside town of Ulcinj, is one of the few places of the Montenegrin shore, where the natural ecosystem of a sand beach has been preserved. Nearby is the west limb of The Bojana's deltoid mouth to the



Adriatic Sea. Beside the vegetation characteristic for sand beaches, there can be found groves and ponds. Large ponds created by the (illegal) exploitation of sand and for collecting water in the holes represent habitats that are promising a fauna of dragonflies much more rich than the one I have found. This area is under heavy tourist use in September. Species found there are among the most abundant at the Montenegrin shore.

➤ 23 – Bushes, brackish swamp in the background of the beach near Bojana river, 02 June 2007 (Coordinates: 41.87353 N, 19.35439 E)

● Recorded species:

Sympetrum meridionale

Libellula fulva

Platycnemis pennipes nitidula

Sympetrum sanguineum

Orthetrum brunneum

Orthetrum albistylum

Orthetrum cancellatum

Orthetrum coerulescens

Aeshna isosceles



Figure 9: Long beach, near Ulcinj, Montenegro. Canal runs into the sea.



➤ 24 – Meadows, brackish swamp in the background of the beach near Bojana river, 02 June 2007 (Coordinates: 41.87425 N, 19.34742 E)

● Recorded species:

Lestes parvidens
Coenagrion pulchellum
Brachytron pratense
Sympetrum sanguineum
Orthetrum cancellatum
Crocothemis erythraea

➤ 25 - The Long Beach (Fig. 9), 02 June 2007 (Coordinates: 41.89403 N, 19.29531 E)

● Recorded species:

Crocothemis erythraea
Orthetrum cancellatum

➤ 36 - Štoj: Holes in the sand, 13 September 2007 (Coordinates: 41.8861 N, 19.3283 E)

● Recorded species:

Ischnura elegans
Sympetrum meridionale

➤ 37 - The Mouth of Bojana into the Adriatic Sea: Hinderland of the beach, 13 September 2007 (Coordinates: 41.869 N, 19.3361 E)

This locality, part of the Long Beach, has little surface water (at least in September) and mainly consists of sand covered with littoral sandy beach vegetation.

● Recorded species:

Sympetrum fonscolombii



Localities 26, 29. The village of Reževići, 02 June, 05 June, 06 June 2007

The village of Reževići is placed on a hill above the Adriatic shore. Dominant vegetation in this area is macchia, but groups of trees can also be found sporadically.

➤ 26 – above the main road, 02 June 2007 (Coordinates: 42.21583 N, 18.93425 E)

In the late afternoon hours I have found a group of young individuals of *S. flavomaculata* that have been circulating above the glade that had been made by clearing of vegetation.

● Recorded species:

Somatochlora flavomaculata

➤ 29 - Drobni Pijesak, 05 and 06 June 2007 (Coordinates: 42.23458 N, 18.907 E)

Drobni pijesak, a village and beach by the sea shore with the shore steeply rising above the beach. A fast stream with rocky and gritty bottom runs through the macchia. The stream can be approached at only few spots and there I found *C. bidentata* relatively frequently. On a nearby asphalt road a group of individuals of *S. flavomaculata* was observed flying on a height of about 3 meters. No dragonflies were found on 17 September 2007.

● Recorded species:

Cordulegaster bidentata

Calopteryx virgo festiva

Somatochlora flavomaculata

Lestes barbarus

Localities 27, 28. River Sutorina, 3 June, 07 June, 06 September 2007

An extraordinary place. Whilst appearing rather disturbed and polluted (Fig. 10) the stream harbours a very diverse and interesting odonate fauna.





Figure 10: Rivulet Sutorina, few dozen meters before the beach where it empties into the sea, near Igalo, Montenegro. This is very important habitat for many species, including *Ceriatrigon tenellum* (de Villers) and *Cordulia aenea* (Linnaeus).

Platycnemis pennipes nitidula (Fig. 11). A population was discovered in the westernmost part of the seacoast in Montenegro, near the border with Croatia. This record extends the known distribution range of this subspecies further to the west and likely occurs also in the SE parts of the Croatian seashore.

Cordulia aenea. The finding of this species near Igalo is very interesting because it was previously known only from higher altitudes in Montenegro. A dense belt of reed on the river banks just before the river reaches the sea is habitat for numerous dragonflies and damselflies. In addition to *C. aenea* *A. isosceles* and *A. imperator* males were seen patrolling. Males of *A. parthenope* were flying over the water in periods when those of *A. imperator* were absent. A very numerous population of *L. fulva* was found and individuals were observed mating on the leaves of shore vegetation. In this lower part of the Sutorina's stream the only species of the genus *Libellula* present was *L. fulva*. Upstream close by, near the Sveti Nikola Monastery, this small



river has a completely different appearance – gritty bottom, with banks in the shades of trees. Here the only recorded libellulid species was *Libellula depressa*. These two species seemed completely separated on a relatively small distance between habitats that are connected by water course. The fact that in Montenegro, *L. fulva* was more abundant than *L. depressa* is the opposite to the situation in Serbia where *L. fulva* is very hard to find. The presence of one species seems to exclude that of the other (ANDJUS, 1985). On the mouth of the Sutorina *Platycnemis pennipes nitidula* was very numerous in June. Teneral individuals disturbed by my presence rose in clouds. It seems that in September, it has been completely substituted with *Ischnura elegans*, which then was very numerous.

Ceriagrion tenellum – I found a small population of this species on the mouth of the Sutorina into the sea, in Igalo. A small number of males have been hiding in high grass on the river bank. *C. tenellum* is the most recently discovered species of the Montenegrin fauna. During the years of 2006 and 2007, this species has also been found only on several locations in Montenegro (Gligorović & Pešić, 2007).



Figure 11: *Platycnemis pennipes nitidula* (Brulle) tandem ovipositing. Rivulet Sutorina, just before emptying in The Adriatic Sea, near Igalo, Montenegro.

➤ 27 - Sveti Nikola (St. Nicholas) Monastery, 03 June 2007
(Coordinates: 42.476 N, 18.47564 E)

● Recorded species:

Orthetrum brunneum
Onychogomphus forcipatus
Orthetrum coerulescens
Platycnemis pennipes nitidula
Calopteryx virgo festiva
Libellula depressa

➤ 28 - Igalo, 03 June, 07 June, 06 September 2007 (Coordinates: 42.45489 N, 18.49886 E)

● Recorded species:

Sympetrum meridionale
Libellula fulva
Cordulia aenea
Orthetrum coerulescens
Orthetrum brunneum
Ceriagrion tenellum
Ischnura elegans
Anax imperator
Lestes parvidens
Aeshna isosceles
Crocothemis erythraea
Lestes barbarus
Platycnemis pennipes nitidula
Coenagrion puella
Anax parthenope (only observed)

Localities 30, 31. Buljarica, 05 June, 06 June 2007

➤ 30 – Hinterland of the beach, irrigation canals, 05 June 2007
(Coordinates: 42.19244 N, 18.98019 E)

This locality near the village of Buljarica represents an ex-swamp which had been going through the bay of the Adriatic Sea. This part of the bay is



rugged with drainage canals and used for mowing and as a pasture. Around the canals grows reedy moor vegetation but the whole ecosystem is under great human influence. During the summer months the amount of water significantly decreases and the canals become dry. During my early summer visit I collected teneral specimens of *O. coerulescens* suggesting this site being used for reproduction. A repeated visit on 07 September was not fruitful – there were no Odonata.

- Recorded species:

Calopteryx virgo festiva

Orthetrum coerulescens

Coenagrion pulchellum

➤ 31 – Beach, 06 June 2007 (Coordinates: 42.19247 N, 18.96728 E)

The Buljarica beach is a car and caravan campsite. In close vicinity there are remains of a swamp which regenerates every spring and dries up in summer. The swamp reaches the sea at several spots separated by a few meters of gritty or sandy beach (Fig. 12). This place is under destructive human influence, especially during summer tourist season. In early summer, above the



Figure 12: Buljarica beach, Montenegro



pond vegetation, *S. flavomaculata* had been flying and copulating and was abundant. Individuals of *A. isosceles* had been flying above the beach and the sea water. During the late summer visit (on 07 September 2007) no dragonflies were found on loc. 31.

- Recorded species:

Somatochlora flavomaculata

Aeshna isosceles

Crocothemis erythraea

Coenagrion puchellum

Orthetrum coerulsecens

Aeshna affinis (only observed)

Locality 35. The Cove of Jaz: Mrčevo polje, 09 September 2007

(Coordinates: 42.2866 N, 18.8014 E)

Similar to the bay of Buljarica, the cove of Jaz had also been a swampy area in the past. Its resumption is the Mrčevo polje field through which flows the River Jaška reka. the large marsh area is impossible to approach. The anthropogenic influence has been increasing within the last few years because of the tourist camp but also because of the intense building of tourist facilities in the surroundings of the beach. The newest stroke for this ecosystem had been preparations for building the stage for The Rolling Stones' concert and it seems that the pop star Madonna will perform there, too.

- Recorded species:

Ischnura elegans

Orthetrum brunneum (only observed)

Locality 38. The village of Rafailovići: meadow below the main road, 12, 15 September 2007 (Coordinates: 42.2826 N, 18.8776 E)

The meadow where I have been collecting dragonflies is in close vicinity of the tourist centre Budva with the obvious intense anthropogenic influence. A larger group of females of *A. mixta* had been flying at dusk, very fast, at a height of about 3 meters. Now and then, some of the individuals had been separating and flying along the concrete road that had been edged with a



rocky wall (so characteristic for Mediterranean) and with thick bushy vegetation.

- Recorded species:

Sympetrum striolatum

Aeshna mixta

Locality 39. The village of Bečići, meadow below the main road, 12 September 2007 (Coordinates: 41.2816 N, 18.8728 E)

In the past, this meadow had been connected with the one in Rafailovići (locality 38) but today they are separated by a hotel and a parking lot. In this meadow there are some holes with water reserves and groups of hydrophilic plants. At this place, I've found a healthy population of *O. brunneum*. I have been observing a male of *O. brunneum* probably precluding a female of this species from laying eggs. He had been neutralising her efforts by flying under her and making her to fly higher. If she had landed few meters from that spot, he would have landed right besides her, waiting for her to ascend again. That behavior had been repeated and so was hardly coincidence. The position of their bodies had been also very interesting. The male would always land so the sidelines of their bodies could be parallel, but in opposite directions. He had been following vividly her every move and ascending right after her.

Beside the whole surrounding being a subject of tourist delights this meadow is being used as a pasture, too.

- Recorded species:

Orthetrum brunneum

Aeshna mixta (only observed)

Sympetrum sp. (only observed)



Acknowledgments

I would like to thank the next colleagues and friends, without whom the realization of this project would be impossible: Mr. Miroslav Jovanović (NHM Belgrade), Mr. Vincent Kalkman (EIS) who stimulated the original idea of Adriatic Montenegro 2007 project, Mr. and Mrs. Gordan Karaman (Montenegrin Academy of Sciences and Arts & NHMMN Podgorica), Mr. Marko Karaman (NHMMN Podgorica), Mrs. Suzana Malidžan (NHMMN Podgorica), Mrs. Ljiljana Protić (NHM Belgrade), Mr. Martin Schorr (IDF), Mr. Aleksandar Stojanović (NHM Belgrade), Miss Dajana Todorović (Institute for Biological researches, Belgrade), Mrs. Olga Vasić (NHM Belgrade), Mrs. Nela Vešović (National Park Skadarsko Jezero, Podgorica) and Mr. Ondrej Vizi (NHMMN Podgorica).

The realisation of the project Adriatic Montenegro 2007 was supported by natural history museums in Belgrade (NHM Belgrade) and Podgorica (NHMMN Podgorica), just like the National Park "Skadarsko jezero". A part of the expenses was covered by personal resources of the author.

References

- Andjus, Lj., 1985. Biogeographical features of the Odonata fauna and distribution of species in some biocenoses in SR Serbia. M. Sc. Thesis (manusc.), Faculty of Biology, University in Belgrade, 109 pp.
- Askew, R.R., 2004. The Dragonflies of Europe (Revised Edition). Harley Books, Colchester.
- Bartenev, A.N., 1912. Notice sur les odonates du Montenegro. *Revue Russe Ent.* 12(1): 76-80. – [in Russian with French summary]
- Dijkstra, K-D.B. & Lewington, R., 2006. Fieldguide to the Dragonflies of Britain and Europe. British wildlife publishing, Dorset.
- Gligorović, B. & Pešić, V., 2007. Contribution to the knowledge of the dragonflies (Odonata) from lake Skadar's drainage basin (Montenegro). *Acta entomologica serbica*, 12(2): 11-16.
- Jović, M., Bedjanič, M., Andjus, Lj. & Santovac, S., 2008. Review of the Odonata fauna of Montenegro. *Opuscula zoologica fluminensia*, 224: 1-27.

