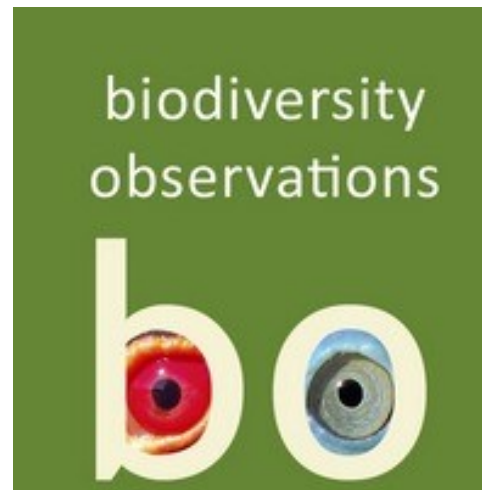


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Odonata

Dragonflies and Damselflies of the Lower Olifants River Valley: Citrusdal to the sea

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Abstract

This paper contains a list of the 38 species of dragonflies and damselflies recorded to date on the section of the Olifants River between Citrusdal and the sea at Papendorp. It is designed to be used as a guide for residents and visitors. To help with the identification of species, links to the species texts in the online Atlas of the Dragonflies and Damselflies of South Africa, Lesotho and Eswatini are provided. These contain comprehensive species information and annotated photographs. We also set out priorities for further observations.

Introduction

The Olifants River valley occupies a special place in the study of dragonflies in South Africa. A unique set of rock paintings depicting these insects was discovered in the northern Cederberg, not far from Clanwilliam (Box 1). Here, we present a species list of dragonflies and damselflies recorded in the lower valley of the Olifants River and

surrounding area (Box 2 contains basic information about this group of insects).

The Olifants River, c. 265 km in length, has its source in the mountains near Ceres. It flows mainly northwards until Klaver, where it turns to the west and reaches the Atlantic Ocean at Papendorp (Figure 1). The estuary is open to the sea and is tidal. Saltwater intrudes as far up the river as the low-level bridge immediately west of Lutzville. This paper focuses on the lower section of the river, the c. 160 km from Citrusdal to the sea. The altitude at Citrusdal is 160 m above sea level; on average the gradient is 1 m per km, so the river flow is mostly slow but steady.

Box 1: Unique rock paintings of dragonflies in the Cederberg

The Olifants River valley occupies a special place in the study of dragonflies in South Africa. A unique set of rock paintings depicting these insects was discovered in the northern Cederberg, not far from Clanwilliam (Mguni 2013). In these paintings, the San artists captured not only the morphology but also the life cycles of dragonflies. It is difficult to know the meaning intended by the original artists, but especially in San paintings, character depictions serve a purpose, either conveying information or reminding viewers of significant concepts and mythologies (Mguni 2013). Thus, rock art may also be interpreted as an act of respect; a way of telling the subject that it is worthy of deep consideration, time, and remembrance. These remarkable Cederberg portraits of dragonflies show a belief that the subject had something of value to communicate, and a willingness on the part of the artist to share its message. Regardless of the “true” significance of the dragonfly for the San, it seems clear that these colourful creatures were carriers of meaning. As you begin to get to know the dragonflies and damselflies around you, take time, like the San, to watch and listen for what teachings they may have to offer. Who knows--maybe your attention will inspire artwork of your own!

Sharon Stanton and Karis Daniel



Figure 1: The N7, the national road from Cape Town to Namibia is along the west bank of the Olifants River from Citrusdal to Klawer. This map shows the main towns and villages mentioned in the text in red, and the key water features in blue

Box 2: Introduction to dragonflies and damselflies

Dragonflies and damselflies (collectively known as the Odonata) have inhabited the planet's wetlands for approximately 300 million years and are one of the most ancient forms of animal life to persist into the 21st century (Tarboton & Tarboton 2019). By contrast, moths and butterflies (Lepidoptera) have been present for about 100 million years. The Odonata have outlived the dinosaurs, which emerged around 250 million years ago and went extinct about 66 million years ago.

There are approximately 6,000 species of dragonflies and damselflies globally (far fewer than the number of moths and butterflies, which total 170,000 species). The number of dragonfly and damselfly species in Africa south of the Sahara Desert is around 850, and 164 of these have been recorded in South Africa, Lesotho and Eswatini (Tarboton & Tarboton 2019).

The presence (or absence) of species of Odonata in wetlands is frequently used as an indicator of environmental health and water quality (Bush et al. 2013). All species breed in fresh water and are dependent on water for the development of their nymphal (pre-adult) stages. In addition, the adults of most species are dependent on freshwater wetlands, where they lay their eggs and play a key role in the food web.

The Bulshoek Dam, 26 km south of Clanwilliam, was built across the river in 1923 (Figures 1 and 2, Box 3). To make the supply of irrigation water more reliable, especially in late summer, the Clanwilliam Dam was constructed in 1935 and enlarged between 1962 and 1966 by raising the height of the wall by 6 m. The construction of the dams and the irrigation scheme altered the river's ecology, thereby also influencing the biodiversity of the area and the abundance of dragonflies and damselflies.

The list of dragonflies and damselflies presented here is a provisional list. It is incomplete in two ways: first, there are species which may occur here and which have not yet been recorded, and second, there are many gaps in the distribution maps for known species.

This paper is therefore also an invitation to add records to the OdonataMAP section of the Virtual Museum to help expand our understanding (Box 4). By increasing the number of species records, we will be able to compare the dragonfly and damselfly communities in the irrigated area north of Trawal, where agricultural impacts are the most severe, with communities to the south, where there are sections of the river remain relatively intact. We can also use these data to understand the flight periods of adults of different species within the region. Though this can broadly be described as "summer," careful monitoring requires more precise information.

Current records of Odonata species

By June 2022, 38 species had been recorded within the lower Olifants River valley and surrounding area: 24 dragonflies and 14 damselflies (Table 1, Figure 1). This represents about half of the total species found in the Western Cape Province and includes several endemic species and some near threatened species. This list is based on the records for nine [quarter degree grid cells](#) which cover the river from Papendorp to Citrusdal (Figure 3). By the middle of 2022, a total of 323 records of dragonflies and damselflies had been submitted to the OdonataMAP section of the Virtual Museum for this area (Navarro & Underhill in press). There is more information about the Virtual Museum in Box 4. This list is primarily intended as a resource for visitors to towns, villages and resorts along the Olifants River, to helping bring awareness of the dragonflies and damselflies which can be

Box 3: 2023 marks the centenary of the first major irrigation scheme in South Africa

The year 2023 is the one hundredth anniversary of the construction of the Bulshoek Dam (Figure 2) and an intricate network of canals to convey water to the valley. This enormous engineering feat precipitated the start of the transformation of the lower Olifants River Valley, from Trawal to the estuary. Both the dam and the canals were crucial enablers for the makeover of c. 8,500 ha of arid countryside into intensively irrigated cropland producing fruit, vegetables and cereals. These changes were accompanied by a large increase in the human population. The downside of this development was a loss of natural habitats which were replaced by a mosaic of agricultural fields and homesteads. This shift would have had an enormous negative impact on the biodiversity of the area, affecting the abundance of many species and changing the species composition. Some of the original species almost certainly no longer occur in the area; species adapted to the new habitats created by the transformation have arrived. A few of these have developed a reputation as agricultural pests, but the overwhelming majority of species, old and new, add quality to our lives, and need our understanding and protection. We can achieve this understanding through getting to know the species around us. We can work to protect them by documenting where they occur.

This species list for the dragonflies and damselflies is designed to help residents and visitors to get to identify the species in this region. It is the first of several publications planned by the Biodiversity and Development Institute to mark the centenary of the Bulshoek Dam and the irrigation scheme.

observed in the area. Instead of a description and photograph for each recorded species, Table 1 provides a link to the species text in the online Atlas of the Dragonflies and Damselflies in South Africa, Lesotho and Eswatini (Tippett *et al.* in press). These texts contain detailed photographs of each species with arrows pointing to the key identification features (Figure 4). The information in the atlas is updated periodically. The links in Table 1 will remain unchanged, but the content is continually improved as additional information becomes available.

Dragonflies and damselflies require warm muscles before they can fly and therefore start becoming active during the day once the daily temperature reaches approximately 18°C. In the Western Cape, most records of dragonflies and damselflies are made outside of the cold winter months. For the study area, 95% of the 323 records were made between September and mid-April. The earliest records were made in August. Generally, species are most abundant between November and March. Small numbers of the hardiest species persist into the first weeks of winter, but the Nomad *Sympetrum fonscolombii* and Swamp Bluet *Africallagma glaucum* can be found throughout the year. Of one thing we are certain: the list of species in Table 1 is incomplete and we need your help to expand it. There are also gaps in known distributions which can be filled.

For example, the damselfly Tropical Bluetail *Ischnura senegalensis* has been recorded in six of the eight grid cells between Citrusdal and Lutzville, but is missing from grid cells 4 and 8 (Table 1). The Palmiet Sprite *Pseudagrion furcigerum*, Stream Hawker *Pinheyschna subpupillata*, Friendly Hawker *Zosteraeschna minuscula*, Eastern Blacktail *Nesciothemis farinosa*, Highland Skimmer *Orthetrum machadoi*, Yellow-veined Widow *Palpopleura jucunda*, Violet Dropwing *Trithemis annulata* and Blue Cascader *Zygonyx natalensis* have been recorded in only one of the nine grid cells (Table 1) and are likely to occur in some of the others. We need your help to fill these gaps. There are species which could potentially be added to the list: [Pantala](#), [Cape Thorntail](#), [Vagrant Emperor](#), [Two-striped Skimmer](#), [Russet Dropwing](#), [Gilded Presba](#), [Keyhole Glider](#), [Goldtail](#) and [Sapphire Bluet](#).

Box 4: OdonataMAP and the Virtual Museum

Real museums contain specimens of dead animals. The Virtual Museum contains photographs of live animals (although photographs of dead animals, for example roadkills, are also valuable). The unique attraction of the Virtual Museum is that you do not need to be able to identify the species in the photograph. All the Virtual Museum needs is the place, the date and an image. Members of the expert identification panel do their best to identify the species in each photograph.

The information in the Virtual Museum, derived from your photographs, is used in multiple ways. The simplest is to plot all the places where the photographs for a species were taken, and slowly build up a distribution map. For dragonflies and damselflies, knowing the flight periods are important because they are predicted to vary in response to climate change, becoming shorter or longer, or shifting earlier or later.

The Virtual Museum has many sections for different groups of species. OdonataMAP is the section for the dragonflies and damselflies. The instructions for uploading photographs are [here](#). Each record can include up to three photographs, taken from different angles. This aids the expert panel in making identifications. It is also a good idea to include a picture showing the habitat in which the species was observed. Anyone can participate; the photographs only need to be good enough for the experts to make an identification.

The data in the Virtual Museum are summarized into [quarter degree grid cells](#) (Figure 3). However the database contains the exact positions of each record; these are valuable for detailed analyses of distribution patterns. Since it started in 2010 up to August 2022, the OdonataMAP database has grown to 129,000 photographic records. The project gathers records from the whole of Africa (Underhill *et al.* 2016). It is one of the largest databases of its type in the world. The software that drives the Virtual Museum was developed in Cape Town by Rene Navarro, Biodiversity and Development Institute.



Figure 2: Bulshoek Dam was constructed in 1923 (Box 3). Although the flow of the river below the dam has been dramatically altered, the watercourse and banks are little changed. Thus this section of the Olifants River from the dam downstream to Trawal might be particularly interesting to explore for dragonflies and damselflies. They will be almost absent from the sections where Eucalyptus trees overshadow the river. The year 2023 marks the 100th anniversary of the construction of the dam. There is no public access to this section of the river, and permission from landowners is essential.

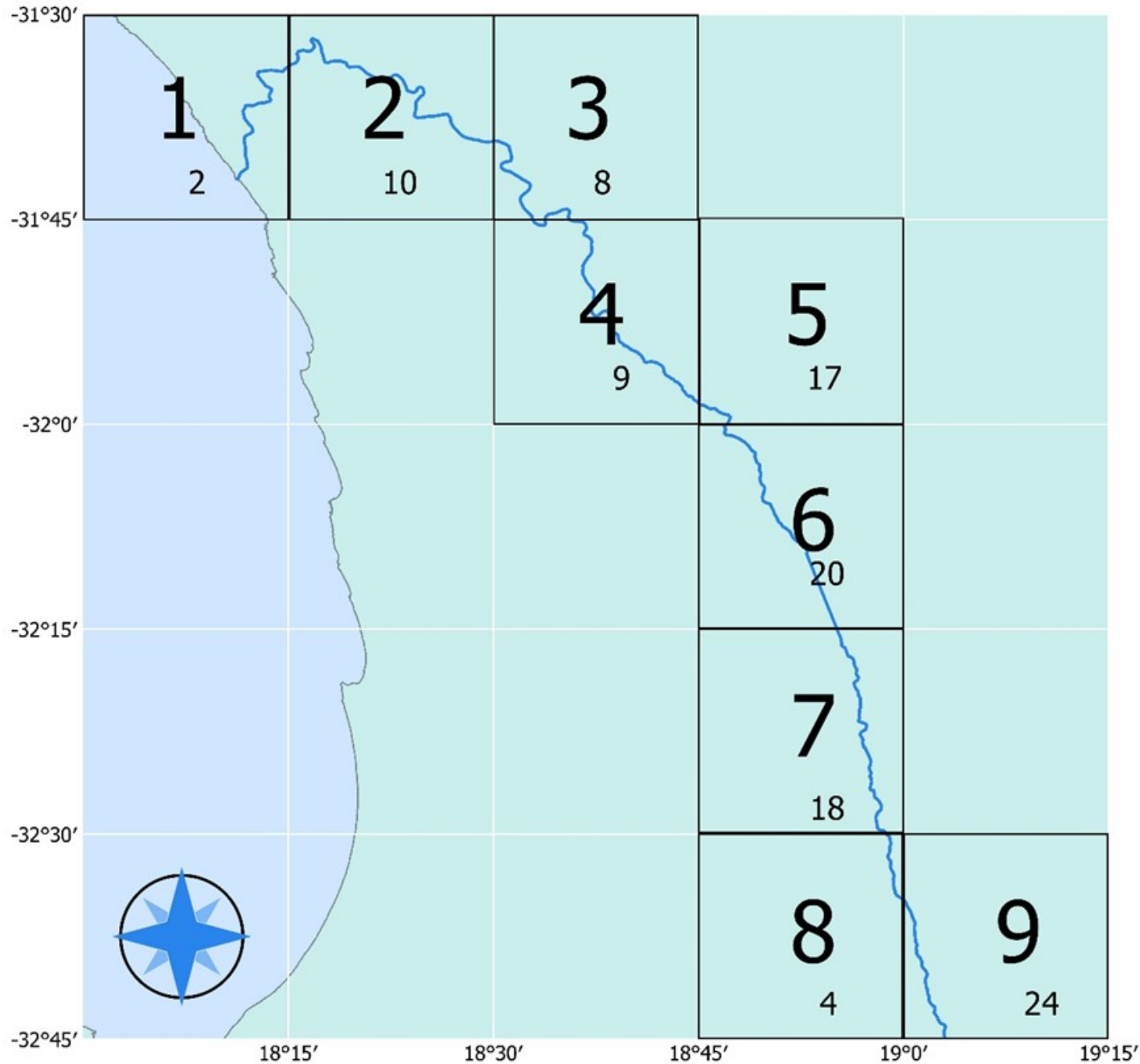


Figure 3: The [quarter degree grid cells](#) through which the Olifants River runs are numbered from 1 to 9. These numbers are used in Table 1. At the bottom of the grid cells, the small number indicates the number of species recorded in the grid cell in Table 1. Each grid cell has an official code and name: 1) 3118CA Pappendorp, 2) 3118CB Lutzville, 3) 3118DA Vanrhynsdorp, 4) 3118DC Klawer, 5) 3118DD Bulshoek, 6) 3218BB Clanwilliam, 7) 3218BD Oliewenboskraal, 8) 3218DB Eendekuil, 9) 3218CA Citrusdal. We use these codes in the Virtual Museum (Box 4). To find an up-to-date species list for the grid cell 3218BB Clanwilliam (and a map which shows the roads and the boundaries), go to https://vmus.adu.org.za/vm_locus_map.php?vm=OdonataMAP&locus=3218BB. To do the same for any of the other grid cell, change the final six letters and numbers to the code for the grid cell you need.

Good spots to look for dragonflies

All freshwater wetland habitats in the Lower Olifants River valley are likely to support dragonflies and damselflies. When searching for dragonflies and damselflies remember to not only look for them at waterbodies but also in the surrounding vegetation. Many dragonflies, especially young males and females, can be found several kilometers away from the water. The best places to stop and search for them are discussed below.

There are only a few places where it is possible to gain access to the Olifants River itself. The best of these is the low level bridge (Algeria Bridge) 2 km from the N7 along the road that leads to Algeria Campsite (Figures 5 and 6). Twelve species have been submitted to OdonataMAP from the Algeria Bridge (Figure 7). The gravel road between Clanwilliam and Klawer follows the eastern bank of the river and there are access points along the edge of the Bulshoek Dam. The low level bridge in Trawal is also a good access point. In addition, there are good views down into the river from the bridge on the R363 as you leave Klawer (on the road between Klawer and Vredendal), but you will need a long lens to take photographs. Finally, there is a low level bridge in Lutzville. All along the river, sections with patches of the reed Palmiet *Prionium serratum* are likely to be rewarding. Places where the river is shaded from the sun have the fewest dragonflies and damselflies. This is especially true of the sections where the river flows through avenues of trees, mostly eucalypts.

Many of the tributaries to the Olifants River only flow in winter and early spring, though some continue flowing into early summer depending on the amount of winter rainfall received. From about September until these rivers and streams stop flowing, these tributaries are good places to stop and search for dragonflies and damselflies. For example, bridges over the tributaries along the gravel road which runs to the east of the river from Citrusdal via Clanwilliam to Klawer may provide suitable habitat for dragonfly and damselfly species. The tributaries flow mostly from the mountain chain to the east of the river, which includes the Cederberg.

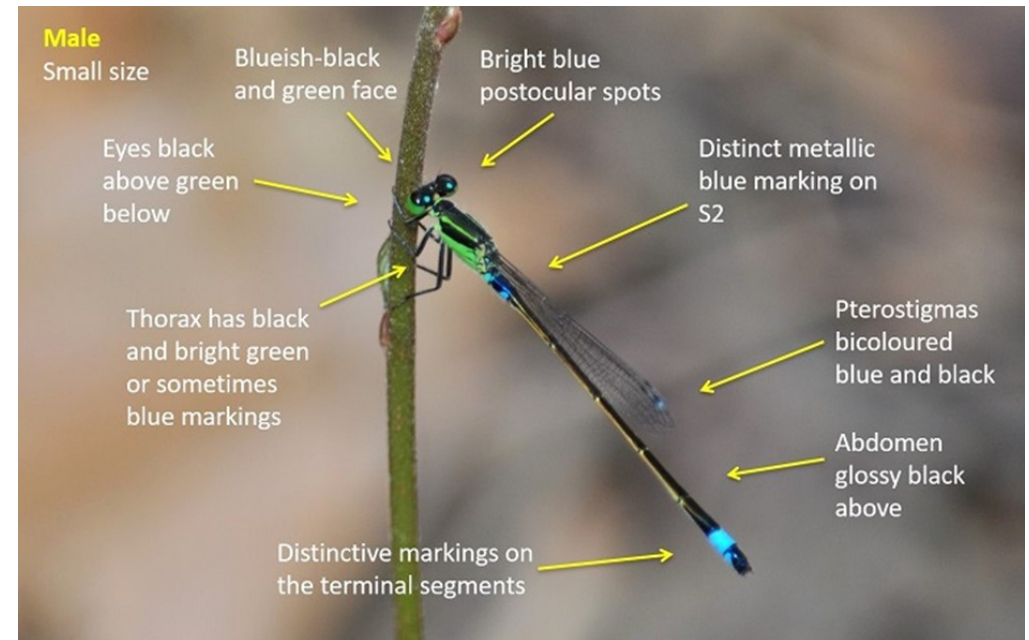


Figure 4: Sample of an identification photo from the online atlas (Tippett et al. in prep.). This is a male Tropical Bluetail *Ischnura senegalensis*, the most frequently recorded damselfly in the Lower Olifants River Valley. The atlas is designed so that lines point to the key identification features for the species. This enables observers to identify species without learning the details of dragonfly taxonomy. For example, pterostigmas are the brightly coloured rectangles near the end of each wing, but you do not need to learn this, because there is an arrow that points to this feature. The link to the species text is <https://thebdi.org/2020/05/12/tropical-bluetail-ischnura-senegalensis/>

Do also look for dragonflies and damselflies at farm dams and circular reservoirs (especially if they leak water) (Figures 8 and 9). Some of these are readily visible from the roads (Figure 8) and some are in the towns and villages (Figures 9 and 10).

Most of the Olifants River and its tributaries lie on private property. To gain access to the river in these areas, you will need permission from the landowners. We aim to distribute this paper to as many

landowners in the Olifants River Valley as possible, hopefully easing the task of requesting access to the river.

Probably the most important section to get access is immediately north of the Bulshoek Dam towards Trawal (Figure 2). These properties mostly contain vacation homes, so locating owners and gaining access may be a challenge. This part of the river is least transformed by agriculture, though some stretches are heavily shaded by eucalypts. This is the section of the river where we expect to find species that are not already listed.

Priorities for ongoing data collection

Dragonflies and damselflies can be graded into a continuum from species that only occur in pristine habitats to those that are tolerant of habitat change. From a biodiversity research perspective, it is likely that the dragonflies and damselflies in transformed habitat are mostly



Figure 5: The Algeria bridge. This low level bridge is roughly halfway between Citrusdal and Clanwilliam, 2 km from the N7 along the road that leads to Algeria Campsite in the Cederberg (Figure 1). Bridges like this provide good opportunities for seeing dragonflies and damselflies.

the resilient species which are tolerant of change. We need lots of species records from the grid cells from Trawal to the estuary (Figures 1 and 3) to confirm this. In reality, we are in need of data from throughout the lower Olifants River, from sections where the watercourse is nearly pristine, to sections which are completely transformed.

The OdonataMAP database (Box 4) will serve as the future source of records for updating our provisional species list. We encourage both residents and visitors to take photographs of the dragonflies and damselflies they observe and to upload their photographs into the Virtual Museum, where they are recorded in the database for posterity.



Figure 6: The view of the Olifants River downstream from the Algeria Bridge. Although the river is perennial, the amount of water varies seasonally.

Species records are required from the time the first individuals are in flight in late spring, throughout the summer months when the dragonflies and damselflies are most abundant, to the end of the season for

most of them in autumn. These records provide us with information on the change of abundance of each species over the calendar year. This is termed the seasonality of occurrence.



Figure 7: A selection of four of the 12 species seen at the Algeria Bridge that crosses the Olifants River between Citrusdal and Clanwilliam. Top left: [OdonataMAP 59407](#), Les Underhill. Bottom left: [OdonataMAP 83377](#), Faansie Peacock. Top right: [OdonataMAP 63620](#), Maritza van Rensburg. Bottom right: [OdonataMAP 79335](#), Corrie du Toit.



Figure 8: Circular reservoirs, like this one, should be checked for dragonflies and damselflies. This one is north of Bulshoek Dam.



Figure 9: This circular reservoir is in the northeastern corner of the grounds of the Dutch Reformed Church in Vanrhynsdorp. It is a good place to see Orange-winged Dropwing (Figure 10), and occasionally Nomads are seen here too. The males of these two dragonfly species are red, and this is a good place to see them close up, and learn to identify them.

Figure 10: Orange-winged Dropwing at the circular reservoir, Dutch Reformed Church, Vanrhynsdorp. This is a good spot to learn to identify this species, because you can get close to them, and see them almost at eye-level. This is record [120824 in OdonataMAP](#).



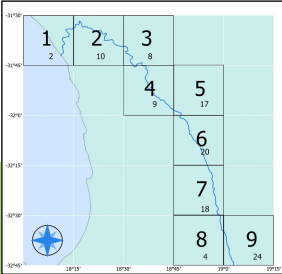
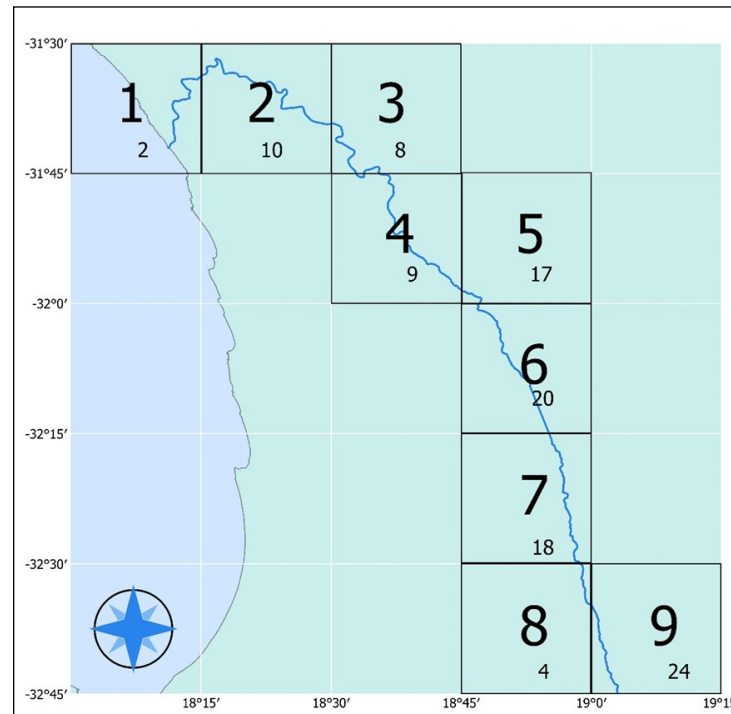


Table 1: Odonata of the Lower Olifants River valley. The common names provide links to the species texts in the online Atlas of the Dragonflies and Damselflies of South Africa, Lesotho and Eswatini (Tippett et al. in prep.). Columns 1 to 9 refer to the quarter degree grid cells in Figure 3. OdonataMAP is the Virtual Museum database for photographic records of dragonflies and damselflies.

Scientific Name	Common Name	Afrikaans Name	Preferred Habitat	3118C	3118C	3118D	3118D	3118D	3218B	3218B	3218D	3219C	Total
				A	B	A	C	D	B	D	B	A	
				1	2	3	4	5	6	7	8	9	
<i>Chlorolestes conspicuus</i>	Conspicuous Mala-	Reusemalagiet	Streams & rivers						4				4
<i>Ecchlorolestes peringueyi</i>	Rock Malachite	Rotsmalagiet	Streams & rivers with extensive rock exposures						4				4
<i>Platycypha fitsimensi</i>	Boulder Jewel	Klipjuweeltjie	Streams & rivers						2				2
<i>Elatoneura frenulata</i>	Sooty Threadtail	Roetswardraadstertjie	Streams & rivers						1	1		5	7
<i>Elatoneura glauca</i>	Common Threadtail	Gewone Draadstertjie	Streams and rivers with rank vegetation		1		1	1					3
<i>Africallagma glaucum</i>	Swamp Bluet	Vleibloutjie	Most wetland types		2			1	2			4	9
<i>Azuragrion nigridorsum</i>	Sailing Bluet	Swartstertbloutjie	Still water habitats like ponds, dams and marshes				2						2
<i>Ceriagrion glabrum</i>	Common Citril	Gewone Aljander	Still water habitats like ponds, dams and marshes					1	2			3	6
<i>Ischnura senegalensis</i>	Tropical Bluetail	Hemelstertjie	Most wetland types		3	5		5	3	2		3	21
<i>Pseudagrion citricola</i>	Yellow-faced Sprite	Jaloerse Gesie	Streams & rivers		2		3			1		2	8
<i>Pseudagrion draconis</i>	Mountain Sprite	Berggesie	Streams & rivers					1		2		2	5
<i>Pseudagrion furcigerum</i>	Palmiet Sprite	Palmietgesie	Streams & rivers						1				1
<i>Pseudagrion kersteni</i>	Powder-faced Sprite	Poeiergesiggie	Streams & rivers				1			1		3	5
<i>Pseudagrion masaicum</i>	Masai Sprite	Masaigesie	Still water habitats like ponds, dams and marshes		2		1	1	1	1		1	7
<i>Anax imperator</i>	Blue Emperor	Bloukeiser	Most wetland types			3		4		2			9

				3118C A	3118C B	3118D A	3118D C	3118D D	3218B B	3218B D	3218D B	3219C A	
Scientific Name	Common Name	Afrikaans Name	Preferred Habitat	1	2	3	4	5	6	7	8	9	Total
<i>Anax speratus</i>	Orange Emperor	Oranjekeiser	Streams & rivers									2	2
<i>Pinheyschna subpu- pillata</i>	Stream Hawker	Spruitjieverter	Streams & rivers									1	1
<i>Zosteraeschna minus- cula</i>	Friendly Hawker	Vrolike Venter	Still water habitats like ponds, dams and slow moving river stretches.									1	1
<i>Ceratogomphus pic- tus</i>	Common Thorntail	Gewone Doringstert	Bare margins of dams, rivers & streams					1	1				2
<i>Paragomphus cogna- tus</i>	Rock Hooktail	Kliphakiestert	Streams & rivers					1				1	2
<i>Paragomphus genei</i>	Common Hooktail	Gewone Hakiestert	Most waterbodies with sandy margins			2				5		2	9
<i>Crocothemis ery- thraea</i>	Broad Scarlet	Breë Bloisie	Most wetland types		1	1		4	3		1	3	13
<i>Crocothemis sanguin- olenta</i>	Little Scarlet	Kleinbloisie	Streams & rivers						1	2		7	10
<i>Diplacodes lefebvrui</i>	Black Percher	Swartsittertjie	Still water habitats with emergent plants									1	1
<i>Nesciothemis farinosa</i>	Eastern Blacktail	Swartstertskepper	Most wetland types with sedge & grass fringes							1			1
<i>Orthetrum julia capicola</i>	Cape Skimmer	Kaapse Skepper	Most wetland types					1	2	6	2	11	22
<i>Orthetrum machadoi</i>	Highland Skimmer	Hooglandskepper	Grassy fringes of marshes & rivers					1					1
<i>Orthetrum trinacria</i>	Long Skimmer	Gestrekte Skepper	Most wetland types		2	1		3	2	2		2	12
<i>Palpopleura jucunda</i>	Yellow-veined Widow	Geelaarweetjie	Grassy fringes of marshes, ponds & rivers						1				1
<i>Sympetrum fonsco- lombii</i>	Red-veined Darter or Nomad	Swerwertjie	Most wetland types	1	4	3	3	5		3		3	22
<i>Tramea limbata</i>	Ferruginous Glider	Enkelbandswewer	still water habitats but mostly away from water					1			1	2	4

				3118C A	3118C B	3118D A	3118D C	3118D D	3218B B	3218B D	3218D B	3219C A	
Scientific Name	Common Name	Afrikaans Name	Preferred Habitat	1	2	3	4	5	6	7	8	9	Total
<i>Trithemis annulata</i>	Violet Dropwing	Purpervalvlerkie	Vegetated margins of		1								1
<i>Trithemis arteriosa</i>	Red-veined Dropwing	Rooierfie	Most wetland types	1	1	1	4	7	12	22	1	12	61
<i>Trithemis dorsalis</i>	Highland Dropwing	Hooglandvalvlerkie	Streams & rivers				2		4	1		5	12
<i>Trithemis furva</i>	Navy Dropwing	Blouvalvlerkie	Rivers and streams					2	7	12		6	27
<i>Trithemis kirbyi</i>	Orange-winged Dropwing	Oranjevlervlerkie	Most wetland types			5	2	2	5	2			16
<i>Trithemis stictica</i>	Jaunty Dropwing	VrolikeValvlerkie	Rivers & Streams; Still					1	3			4	8
<i>Zygonyx natalensis</i>	Blue Cascader	Blouklatertjie	Rivers and streams with rapids							1			1



Acknowledgements

This species list exists because hundreds of citizen scientists have contributed photographic records to OdonataMAP. The dragonfly atlas was developed with funding provided by the JRS Biodiversity Foundation through the Freshwater Research Centre in Cape Town. The software that runs the Virtual Museum was developed and is maintained by Rene Navarro. Karis Daniel and Sharon Stanton commented on the text, and John Wilkinson made suggestions for improvements. Carynn Underhill made the maps and Jenny Underhill edited the text. Megan Loftie-Eaton did the final layout and editing.

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Biodiversity Observations

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