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Dragonflies and damselflies of the Nuwejaars Wetlands Special Management Area, Agulhas Plain, South Africa: 2018–2024

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Abstract

The Nuwejaars River and its associated wetlands lie in the Heuningnes Catchment, situated within the Overberg region in the province of the Western Cape, South Africa. Large areas of invasive alien vegetation have been cleared from the floodplain of the river. Over the period 2018 to 2024, 452 records of 25 species of Odonata (dragonflies and damselflies) were made in the Nuwejaars Wetlands Special Management Area. Although the results are not confirmed by quantitative data, it is clear that the abundance of odonatids has increased since the removal of the infestations of alien invasive vegetation from the floodplain. The most unexpected species was Spesbona (*Spesbona angusta*).

Introduction

The Odonata (the dragonflies and damselflies) of South Africa have been made accessible to everyone through the development of English and Afrikaans common names for the 164 species of South Africa, and the creation of an excellent field guide (Tarboton & Tarboton 2019). This has enabled citizen scientists to make a massive contribution to our knowledge of the distribution of this important family of insects (Barnard et al. 2017).

In the Western Cape, one of four major gaps in knowledge of the distribution of the Odonata was the Overberg region; this was listed by Underhill et al. (2018) as one of the priority areas for further data collection in the OdonataMAP section of the Virtual Museum (Underhill et al. 2018, Underhill & Navarro 2023). The Agulhas Plain, the section of the Overberg south of the Bredasdorp mountains, consists essentially of eight quarter degree grid cells south of 34.5°S. The OdonataMAP database showed that, at the end of 2017, the total number of records for these eight grid cells was 86 of 21 species. None were from grid cell 3419DB, which includes the Nuwejaars Wetlands. By the end of 2019, this total had grown to 427 records of 26 species; however, 382 of these records were for grid cell 3419CB Gansbaai. Four were from the target grid cell 3419DB and were geolocated within our focus area.

Here, we document the Odonata of the Nuwejaars Wetlands, which are in grid cell 3419DB (Figure 1) over the period 2021 to 2024. Prior to and during this period, extensive alien vegetation removal had been done. This paper aims to demonstrate the impact of the recovery of the wetland on dragonflies and damselflies.

Study area

The Nuwejaars River Nature Reserve protects the Nuwejaars Wetlands Special Management Area, at the southernmost tip of Africa, which is part of an internationally recognized biodiversity hotspot consisting of the south-western coastal lowlands fynbos ecosystems of the Cape Floristic Region. It's home to the complex Nuwejaars wetland system, which lies in the Heuningnes Catchment and covers an area of approximately 1 442 km^2 It is one of the most important wetland systems in South Africa in terms of vegetation diversity, it boasts a variety of seasonal and permanent wetlands.

The sources of the tributaries which form the river have altitudes between 400 m and 650 m above sea level, but most of the catchment lies below the 60 m contour. The floodplain of the Nuwejaars River is the southernmost in Africa, and has a maximum width of 0.8 km (Figure 1). The river flows into Soetendalsvlei, the second largest freshwater lake in South Africa; the Heuningnes River flows from the lake to the Indian Ocean, and the estuary is a Ramsar Wetland of International Importance.

landowners and the Elim Community have collaborated to form the Nuwejaars Wetlands Special Management Area (NWSMA). This Special Management Area (SMA) is a 'first of its kind' innovative approach to land management that combines commercial agriculture with conservation. Through the Nuwejaars Wetlands Landowners Association (NWLOA) landowners have secured a long-term commitment to the Constitution and Conservation Development Framework by registering restrictive conditions against their title deeds. The primary objectives of the NWSMA are to promote sustainable farming and to conserve the wetlands in the area and the biodiversity it supports. The NWSMA has an area of 47,000 ha of which half is natural vegetation and half is active agricultural lands and stretches along the Nuwejaars River and its tributaries from the town of Elim eastwards almost as far as Bredasdorp.

The region has a large proportion of land invaded by alien vegetation, which represents a major threat to the biodiversity of the Nuwejaars.

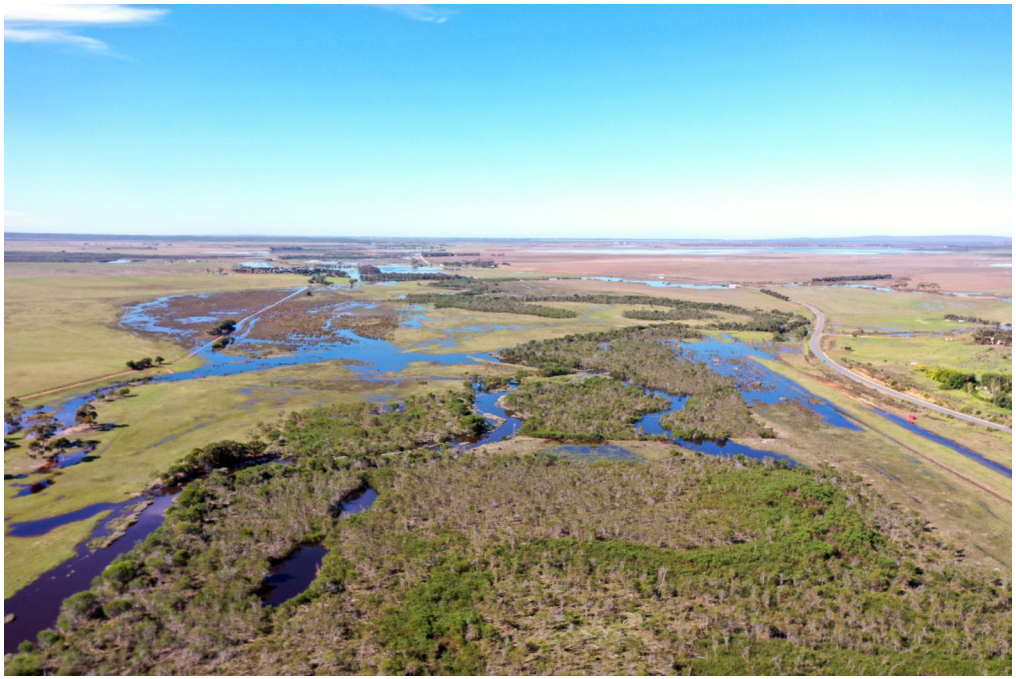


Figure 1: Section of the floodplain of the Nuwejaars River, looking east. The photograph was taken on 18 May 2021, prior to the removal of the dense infestation of aliens in the foreground. The Black Oystercatcher wine-tasting centre is immediately to the right of the photograph, with the Black Oystercatcher airstrip on the edge of the photo.

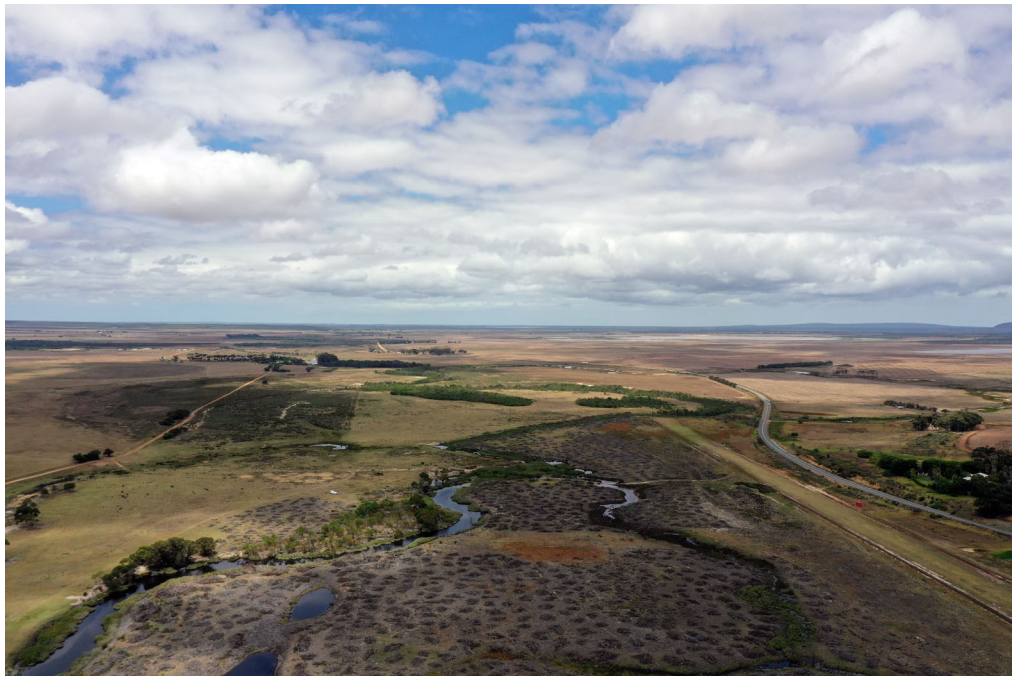


Figure 2: Same section of floodplain of the Nuwejaars River, with the alien vegetation cut and stacked for burning. Photograph taken 17 February 2022.

This vegetation was actively planted in the past to facilitate land stabilization (particularly on shifting dune systems), but it has encroached over large areas, transforming the habitat and causing water loss in the wetland systems, in addition fires occur more frequently leading to a reduction of certain fynbos elements (Marnewick et al. 2015).

In 2018, more than half of the natural areas within the NWSMA boundaries had more than 10% of their cover consisting of alien invasive plants. Alien clearing actively started in 2013 through funding from the then Department of the Environment facilitated by the Agulhas Biodiversity Initiative. Once this ended, the NWSMA was responsible for finding the funding to carry out alien clearing across the area. In 2018 a WWF-SA funded project accelerated the alien clearing efforts. This enabled the NWSMA management team to focus on clearing the aliens along the Nuwejaars River, its floodplain and associated wetlands. The objective was to extend the available wetland habitat for the benefit of the biodiversity which is dependent on it for resources and breeding. In the three-year period 2018–2021, a total of 400 ha of prime wetland habitat was restored (Figures 1 and 2). This momentum was maintained by the NWSMA management team. Between 2021 and 2024, more than 6,900 ha of important habitat categories, many of them threatened, have been cleared of mature woody terrestrial invasives: Wetlands and Riparian Areas, Elim Ferricrete, Overberg Sandstone, Agulhas Sand Fynbos, Agulhas Limestone and Central Ruens Shale Renosterveld.

Methods

This study is based on the database within the OdonataMAP section of the Virtual Museum (Underhill & Navarro 2023). We extracted the records of dragonflies and damselflies which were made in the catchment of the Nuwejaars River in quarter degree grid cell 3419DB. As part of this, dedicated fieldwork was undertaken by CduT on 8 and 14 January 2021, and on 12 and 13 February 2024. The section of the Nuwejaars River between Elim and the bridge over the river on the R43 was covered as systematically as time and access allowed. During the February 2024 fieldwork, more records were identified to species than were submitted to the Virtual Museum, but all records were included in this analysis. Multiple visits to a few sections of the wetland were made in October, November and December 2024.

Dragonflies and damselflies were photographed and uploaded to OdonataMAP. They were usually provisionally identified by the observers, with identifications confirmed or made by an expert panel. Agreement between at least two members of the expert panel was required to confirm a record's identification.

Results

The first records of Odonata in the Nuwejaars Wetlands were made in November 2019, when two records of Red-veined Dropwing (Figure 3) were submitted to OdonataMAP; and by the start of the Covid 19 lockdown in March 2020, the total had grown to seven records of three species, with Tropical Bluetail and Cape Skimmer added (Table 1, which also provides scientific names). In November 2020, four records were added, and the total number of species was six (Table 1). One of the species added was Jaunty Dropwing (Figure 4).

Figure 3: The Red-veined Dropwing was the first odonatid to be recorded at the Nuwejaars Wetland SMA, on 3 March 2019. It is the species with the most records (Table 1).

Table 1: Records of (Odonata) dragonflies and damselflies from the Nuwejaars Wetlands Special Management area, 2019–2024. The English common names are linked to the species texts in the Online Atlas of Dragonflies and Damselflies of South Africa. The values for the Dragonfly Biotic Index (DBI) are from Samways & Simaika (2016).

English name	Afrikaans name	Scientific name	DBI	Mar 2019	Mar 2020	Nov 2020	Jan 2021	Jan 2022	Nov 2022	Feb 2024	Oct-Dec 2024	Total
Sooty Threadtail	Roetswart-draadstertjie	*Elattoneura frenulata*	5				5					5
Common Threadtail	Gewone Draadstertjie	*Elattoneura glauca*	1								1	1
Spesbona	Spesbona	*Spesbona angusta*	9								1	1
Swamp Bluet	Vleibloutjie	*Africallagma glaucum*	1				3	1	2		5	11
White-masked Wisp	Witmaskersoetjie	*Agriocnemis falcifera*	4								1	1
Sailing Bluet	Swartstertbloutjie	*Azuragrion nigridorsum*	3								1	1
Common Citril	Gewone Aljander	*Ceriagrion glabrum*	0				7	1	1	14	36	59
Tropical Bluetail	Hemelstertjie	*Ischnura senegalensis*	0		2		11	1		26	21	61
Mountain Sprite	Berggesie	*Pseudagrion draconis*	4				4	4		5	5	18
Powder-faced Sprite	Poeiergesiggie	*Pseudagrion kersteni*	1					1			1	2
Masai Sprite	Masaigesie	*Pseudagrion massaicum*	1				1	2				3
Blue Emperor	Bloukeiser	*Anax imperator*	1			1	2			8	6	17
Friendly Hawker	Vrolike Venter	*Zosteraeschna minuscula*	5							1	1	2
Common Thorntail	Gewone Doringstert	*Ceratogomphus pictus*	2				2	2		2	5	11
Broad Scarlet	Breë Blosie	*Crocothemis erythraea*	0			1	5	2		26	15	49
Two-striped Skimmer	Strepieskepper	*Orthetrum caffrum*	3				3		1	4	4	12
Cape Skimmer	Kaapse Skepper	*Orthetrum capicola*	3		1		3	2		25	19	50
Highland Skimmer	Hoogland-skepper	*Orthetrum machadoi*	3								7	7
Long Skimmer	Gestrekte Skepper	*Orthetrum trinacria*	1				3			6	7	16
Yellow-veined Widow	Geelaarweetjie	*Palpopleura jucunda*	2							7	0	7
Red-veined Darter	Swerwertjie	*Sympetrum fonscolombii*	0				2				3	5
Ferruginous Glider	Enkelbandswewer	*Tramea limbata*	0							3		3
Red-veined Dropwing	Rooinerfie	*Trithemis arteriosa*	0	2	2	1	9	3		36	27	80
Highland Dropwing	Hooglandvalvlerkie	*Trithemis dorsalis*	0							1		1
Jaunty Dropwing	Vrolike Valvlerkie	*Trithemis stictica*	1			1	6			12	8	27
Number of records				2	5	4	66	19	4	179	173	452
Number of species				1	3	4	15	10	3	15	20	25

After thorough fieldwork on 8 and 14 January 2021, CduT uploaded 66 records of 15 species to OdonataMAP; she obtained records of the four previously observed species (Table 1). Three of the eight new species recorded during this period were Mountain Sprite (Figure 5), Common Thorntail (Figure 6) and Sooty Threadtail (Figure 7). She revisited the area briefly in 2022 on 4 January (19 records of 10 species, adding Powder-faced Sprite to the list of species) and on 29 November 2021 (four records of three species) (Table 1).

On 12 and 13 February 2024, the most intensive survey to date, resulted in 179 photographic records with 15 species identified; not all records were submitted to OdonataMAP, but all are included in Table 1. Three species were added to the list: Friendly Hawker, Yellow-veined Widow (Figures 8 and 9) and Ferruginous Glider (Table 1).

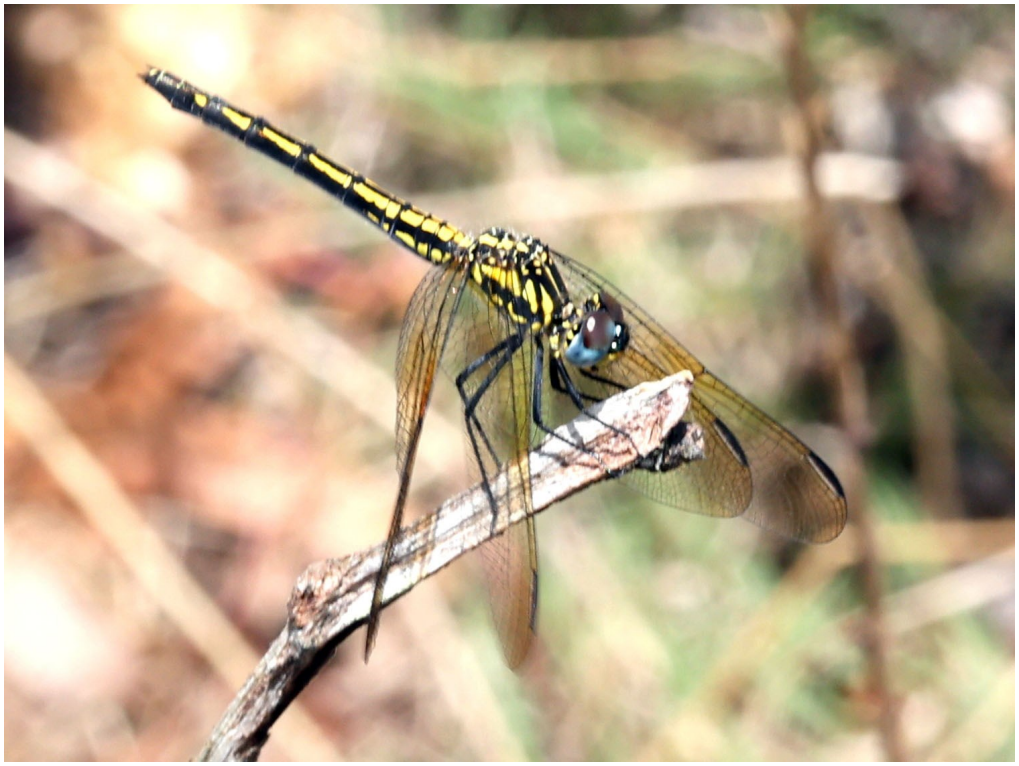


Figure 4: Jaunty Dropwing, first recorded at the Nuwejaars Wetland SMA on 28 November 2020.

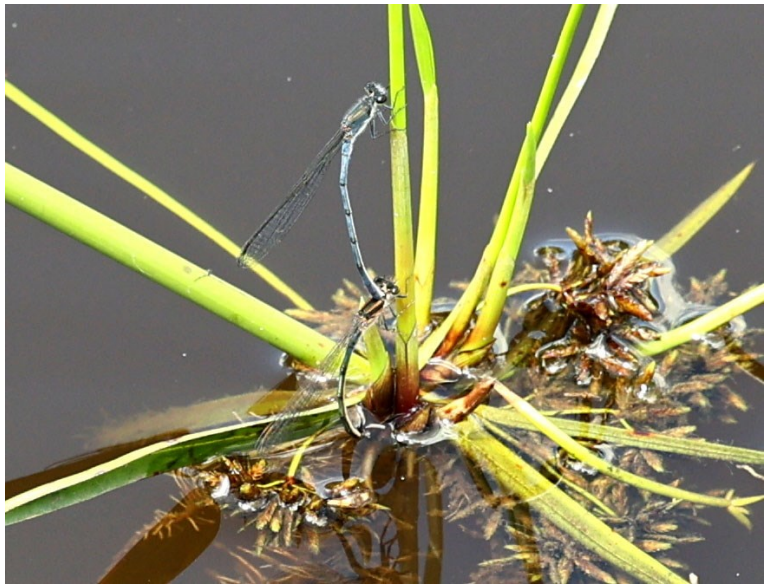


Figure 5: Mountain Sprite, first recorded at the Nuwejaars Wetland SMA on 7 January 2021.

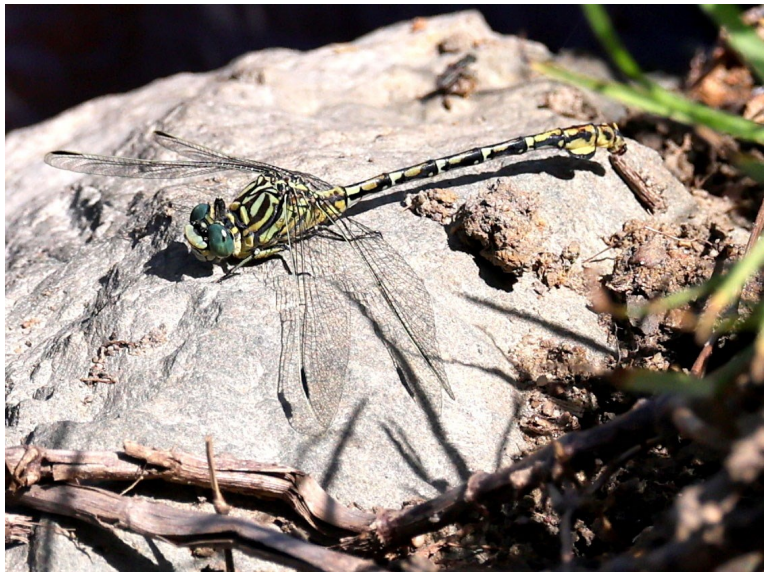


Figure 6: Common Thorntail, first recorded at the Nuwejaars Wetland SMA on 7 January 2021.

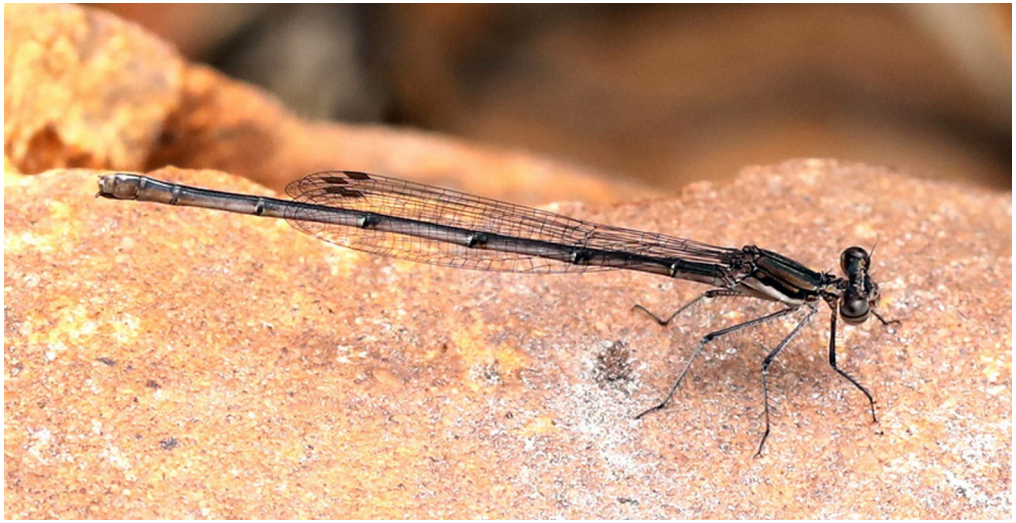


Figure 7: Sooty Threadtail, first recorded recorded at the Nuwejaars Wetland SMA on 8 January 2021.

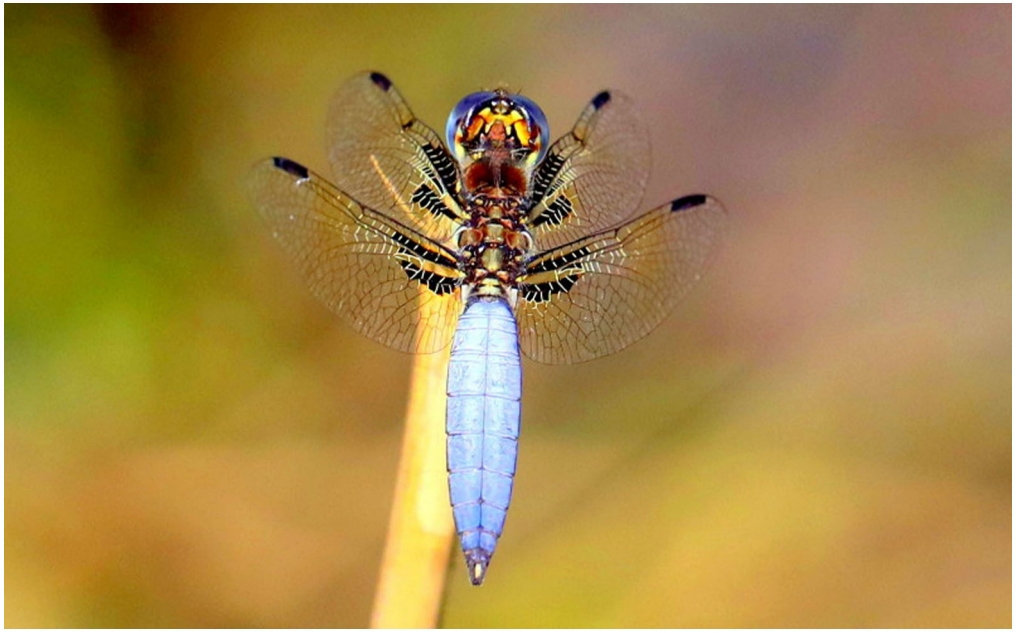


Figure 8: Male Yellow-veined Widow, first recorded at the Nuwejaars Wetland SMA on 12 February 2024.

Figure 9: Female Yellow-veined Widow, first recorded at the Nuwejaars Wetland SMA on 12 February 2024.

The seven Yellow-veined Widows were sitting at the tips of long grasses, their favourite perching spot.

In the last three months of 2024, several short bursts of fieldwork took place, focused mainly on the Moddervlei region of the floodplain. 173 records of 20 species were recorded, of which five were new species to the list: Sailing Bluet, Spesbona (Figure 10), Common Threadtail (Figure 11), White-masked Wisp and Highland Skimmer were the additional species (Table 1). Spesbona, which has an IUCN threat status of Critically Endangered, was recorded on 9 October 2024 on the farm Hazevlakte in a roadside ditch alongside a farm road (Figure 12). This point lies 500 m to the east of the restored floodplain; the area surrounding the record of the Spesbona was degraded habitat where, at some stage long ago in the past, the floodplain was lost by digging a channel to concentrate the flow of the river (Figure 13).

In the last three months of 2024, several short bursts of fieldwork took place, focused mainly on the Moddervlei region of the floodplain. 173 records of 20 species were recorded, of which five were new species

Figure 10: Spesbona, first recorded at the Nuwejaars Wetland SMA on 10 October 2024.

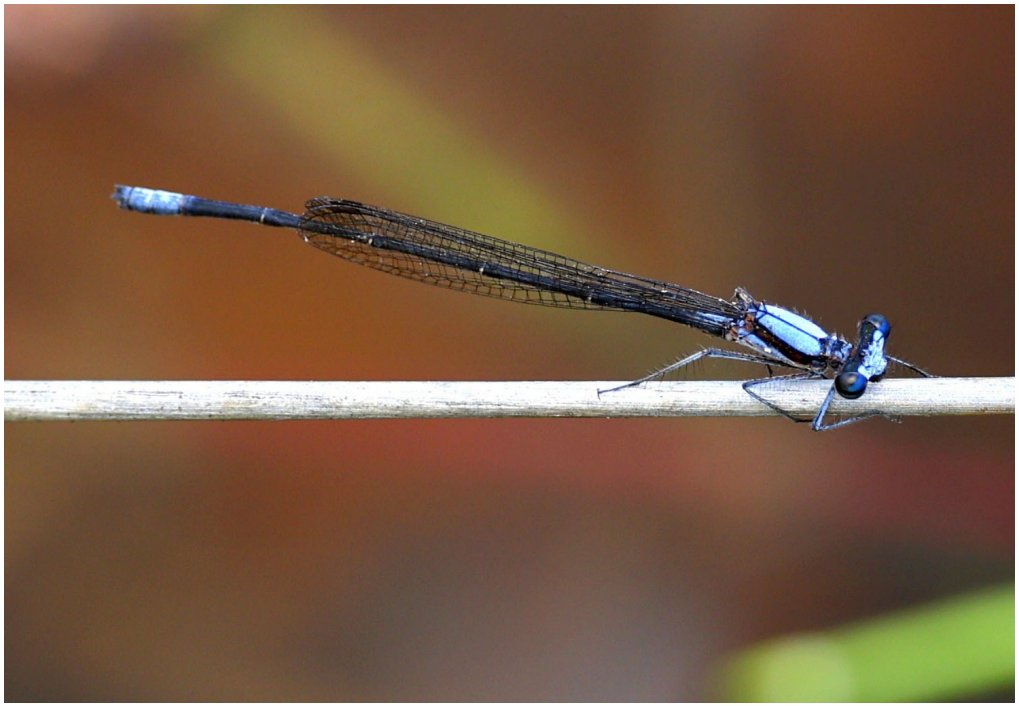
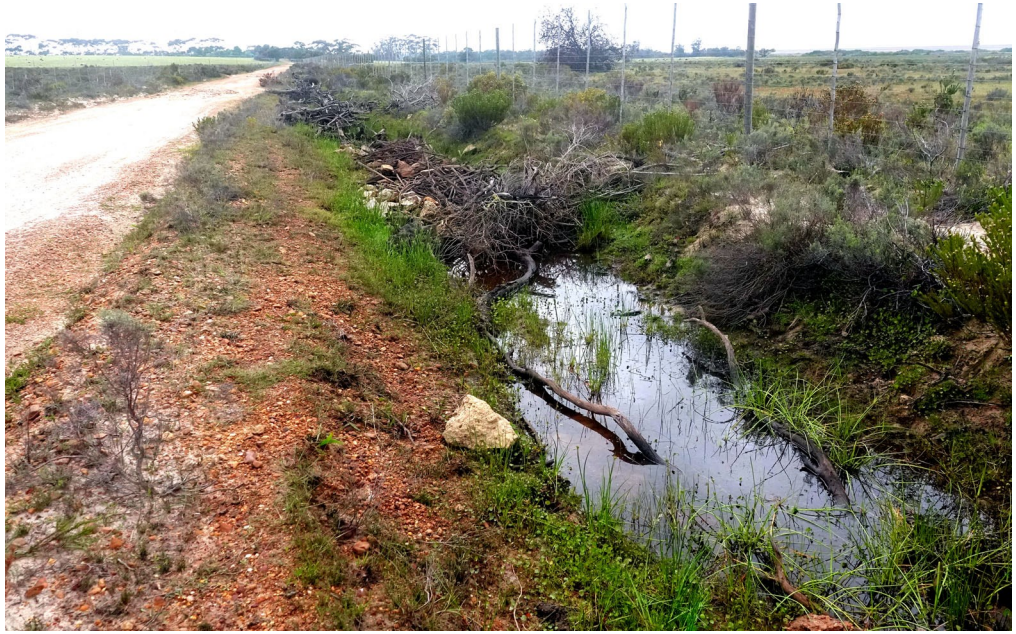


Figure 11: Common Threadtail, first recorded at the Nuwejaars Wetland SMA on 28 November 2024.



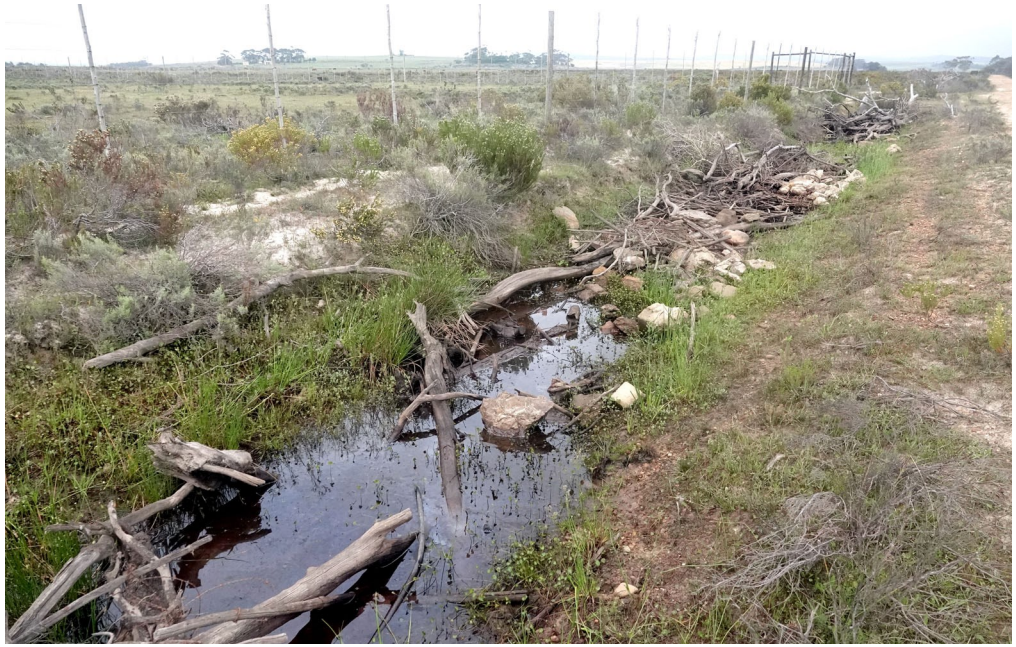


Figure 12: The locality, at the Nuwejaars Wetland SMA, at which the Spesbona was found.

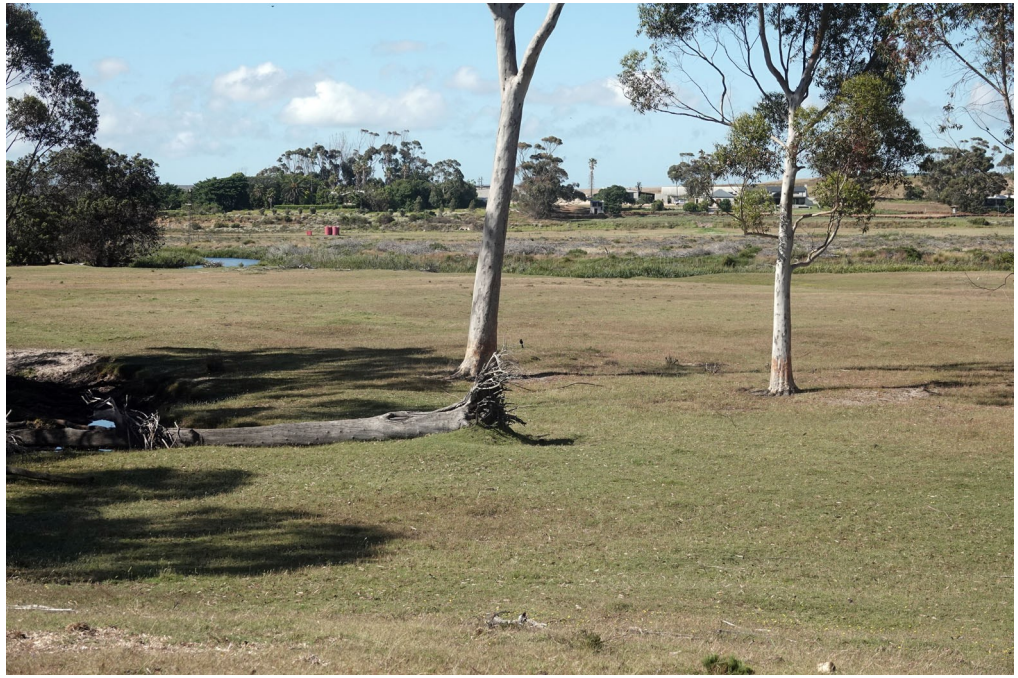


Figure 13: Degraded habitat in the Nuwejaars Wetland SMA near the localikty at which the Spesbona was found. This section of floodplain was degraded decades ago due to lowering the water table by digging a channel for the Nuwejaars River.

to the list: Sailing Bluet: Common Threadtail, Spesbona, White-masked Wisp and Highland Skimmer were the additional species (Table 1). Spesbona, which has an IUCN threat status of Critically Endangered, was recorded on 9 October 2024 on the farm Hazevlakte in a roadside ditch alongside a farm road (Figures 9–12). This point lies 500 m to the east of the restored floodplain; the area surrounding the record of the Spesbona was degraded habitat where, at some stage in the past, the floodplain was lost by digging a channel to concentrate the flow of the river (Figure 13).

CduT undertook the two intensive surveys in January 2021 and February 2024. In 2021, she found that the density of Odonata was low, and individuals needed to be searched for. In the three-year interval to 2024 she noted large increases in the abundance and density of all the common species.

By 2024, we observed that the floodplain of the Nuwejaars River was largely free of aliens. The most valuable section was from the farm Zoetendal downstream to east of Moddervlei at a point at 36.6257°S, 19.8254°E. In this section the floodplain was up to 800 m wide. It consisted of a mosaic of crystal-clear water and lush vegetation. The mosaic consisted of streams of slow-flowing water; patches of open water partly covered with water lily leaves; marshes with short restios; ponds of still water fringed by overhanging vegetation; open water with stony or sandy beaches; open flowing streams bordered by thick palmiet growth, etc. Downstream of this point, towards Hazevlakte and the bridge over the R43, the floodplain was degraded sometime in the past by digging a channel, so that the river effectively flowed in a single canal. The banks of river course were lined in parts with strips of reeds and palmiet, and elsewhere they were open, adjacent to dry farmland. This area contained few odonatids.

Discussion

The major shortcoming of this study is the reality that, on each visit to the wetland, we tended to focus on obtaining a complete species list; we did no actual counts, and can therefore provide no quantitative insights into changes in relative abundance (Bried et al. 2020). There is a need for a standard approach to the monitoring of dragonflies and damselflies like that achieved for butterflies (van Swaay et al. 2015).

However, the qualitative impression between 2021 and 2024 was of a large increase in the abundance of Odonata. This suggests that the condition of the habitat improved over this three-year period.

The Dragonfly Biotic Index (DBI) aims to provide a measure of the quality of freshwater ecosystem health; each species is allocated an integer value between 0 and 9. The maximum value indicates that the species is extremely sensitive to habitat disturbance, has a restricted distribution, and is classified in the highest conservation threat categories (Samways & Simaika 2016).

One of the species recorded in the Nuwejaars Wetlands has a DBI of 9; this is Spesbona (Table 1). This record extends the range of this Critically Endangered species by 100 km into an area where it would not have been predicted to occur. All earlier records lay along the

Cape Fold Mountains, the Langeberg range and its extensions to the east (Sedgefield) and west (Ceres). However, adjacent mountains to the Nuwejaars River are part of a long chain of mountains that are linked onto one of the core biodiversity areas of the Cape Fold Mountains, the Kogelberg, and stretch eastwards beyond Bredasdorp to the Potberg.

There is a need for a proper Odonata survey in the upper reaches of the Nuwejaars River, west of Elim, in the five largest tributatories, Uintjieskuil, Pietersieliekloof, Boskloof, Jan Swartskraal and the Koue Rivers, as far as their sources in the mountains. Strictly speaking, this area lies west of the Special Management Area, but it is a mountainous area with flowing streams in spring and early summer, and therefore likely to support a rich variety of dragonflies and damselflies. A tentative list of 20 potential species contains many which need high quality habitats, as measured by the DBI (Table 2). Some parts of this area have dense infestations of invasive alien trees, and a dragonfly survey could help provide a motivation for funds to clear it, in the same way as waterbirds did for the floodplain east of Elim.

Acknowledgements

Besides the co-authors, records of dragonflies and damselflies for the Nuwejaars Wetlands Special Management Area were submitted by Eugene Hahndiek, Heather D'Alton, Hafeez Sonday, Helen Pickering, Shandre Heuvel, Heather and Andrew Hodgson, Keir Lynch and others. Ryan Tippett compiled Table 2. Photographs: Nuwejaars Wetlands SMA and coauthors.

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Table 2: Additional 20 species of dragonflies and damselflies that, on the basis of distribution maps, can potentially be anticipated to occur within the Nuwejaars River catchment, including the upper reaches of the tributaries. The species considered unlikely are marked with a question mark in the column headed Un. The highest point along the watershed of the catchment has an altitude of 562 m, in the Bredasdorp Mountains. The English common names are linked to the species texts in the Online Atlas of Dragonflies and Damselflies of South Africa. The values for the Dragonfly Biotic Index (DBIA) are from Samways & Simaika (2016).

English name	Afrikaans name	Scientific name	Un	DBI
Slate Sprite	Leiblougesie	*Pseudagrion salisburyense*	?	1
Yellow-faced Sprite	Jaloerse Gesie	*Pseudagrion citricola*	?	3
Palmiet Sprite	Palmietgesie	*Pseudagrion furcigerum*		7
Swamp Bluet	Vleibloutjie	*Africallagma glaucum*		1
Mauve Bluet	Persbloutjie	*Proischnura polychromatica*		9
Orange Emperor	Oranjekeiser	*Anax speratus*		2
Stream Hawker	Spruitjieventer	*Pinheyschna subpupillata*		4
Evening Hawker	Nagventer	*Anaciaeschna triangulifera*		4
Common Hooktail	Gewone Hakiestert	*Paragomphus genei*		3
Yellow Presba	Geel Swalker	*Syncordulia gracilis*	?	6
Darting Cruiser	Pyltjieswalker	*Phyllomacromia picta*		2
Epaulet Skimmer	Epouletskepper	*Orthetrum chrysostigma*		2
Eastern Blacktail	Swartstertskepper	*Nesciothemis farinosa*		1
Black Percher	Swartsittertjie	*Diplacodes lefebvrii*		3
Little Scarlet	Kleinblosie	*Crocothemis sanguinolenta*		3
Orange-veined Dropwing	Oranjevlerk-valvlerkie	*Trithemis kirbyi*		0
Russet Dropwing	Rosbruinvalvlerkie	*Trithemis pluvialis*		2
Navy Dropwing	Blouvalvlerkie	*Trithemis furva*		0
Blue Cascader	Blouklatertjie	*Zygonyx natalensis*	?	2
Pantala, Wandering Glider	Narbroekie	*Pantala flavescens*		0