

The distribution of *Oritoniscus flavus* (Budde-lund, 1906) in VC83 Midlothian (Isopoda: Oniscidea: Trichoniscidae)

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INTRODUCTION

The woodlouse *Oritoniscus flavus* (Budde-Lund, 1906) is rare in Britain (though widespread in southern Ireland, as described in Gregory, 2009), having first been recorded in 1994 in a location in south Wales (Morgan, 1994). In September 2010, the species was also, surprisingly, found by the River North Esk at Melville Castle in Midlothian (VC83), Scotland, making this the northernmost occurrence of *O. flavus* in the world by some 200km (Sivell & Gregory, 2015). Fieldwork in 2011 recorded the species at two further sites along the North Esk and River Esk (as it is named after the confluence of the North and South Esk rivers), at Dalkeith Country Park and near Whitecraig, with additional records gathered at Dalkeith CP during the BMIG annual fieldtrip in April 2015 (*ibid.*). The bedrock in the region belongs to the Clackmannan Group, a mixture of sandstone, mudstone, siltstone and limestone with Coal Measures overlying parts of it (see <https://mapapps.bgs.ac.uk/geologyofbritain/home.html>), meaning that the area is relatively base rich, though local conditions can produce more acidic habitats. The presence of *O. flavus* here has been hypothesised to stem from accidental introduction, perhaps via long-standing plant nurseries in the area.

On 30.vii.2017, I had my first encounter with this species, a single individual found under a fallen wall stone at Inveresk, about 150m east of the River Esk, also in Midlothian. My initial assumption that it was a small, dark *Philoscia muscorum* (Scopoli, 1763) proved incorrect on closer examination, which revealed it to be *O. flavus*. This was about 0.5km downstream from the nearest previous record. This find raised the question of the distribution of *O. flavus* along the Esk river systems, and targeted fieldwork (mostly in 2018 and 2019) was carried out by the author in order to determine the limits of the species' geographical distribution in the area. Fieldwork consisted of searching suitable habitat (usually woodland) within a short distance of the river system. The dark colour and characteristic behaviour of *O. flavus* (in the author's experience scattering rapidly like small ball-bearings in all directions on disturbance) mean that it is a conspicuous species where it is present. However, the speed at which the species scatters makes collection of samples and photography difficult, though occasional individuals may act indecisively or even freeze, at least for a few seconds, and in frosty conditions it is more sluggish (Figs. 1-2). It is typically found, often in good numbers, in leaf litter and under deadwood, sawn logs, stones and other debris, and it is usually quickly evident if it is present at a location. The species was found in mixed woodland, usually within a short distance of the river, and although it evidently prefers somewhat damp conditions, it can also be found in relatively dry microhabitats and appears to be less common in wet and waterlogged places. *O. flavus* was rarely found under birch or conifers, suggesting that it disprefers acidic microhabitats. The results of this fieldwork are summarised in Table 1.

Distribution of *Oritoniscus flavus* along the Esk river system

O. flavus was found to be common, indeed abundant, along both banks of the North Esk at Dalkeith CP (especially between NT333677 and NT332680) and along the east bank of the River Esk at Inveresk between NT346709 and NT347717. Several individuals have also been found about 250m west of the river (though near a tributary burn) under the railway bridge at Monktonhall (NT342711). Further

Table 1: Fieldwork along the Esk river system.

Date	Location	Grid Ref	Notes
30.vii.17	Inveresk	NT345712	Single individual seen under a fallen wall stone 150m from the river.
17.ix.17	Dalkeith CP	NT332680 to NT332677	<i>O. flavus</i> abundant under cut wood and in leaf litter on the west bank of the North Esk.
17.ix.17	Dalkeith CP	NT333678	<i>O. flavus</i> common under stones on the east bank of the North Esk.
25.iii.18	Inveresk	NT345713	About a dozen under sawn logs near the river.
25.iii.18	Roslin Glen	NT273628 to NT275629	No <i>O. flavus</i> found.
11.xi.18	Bilston Wood near Polton	NT287648	Up to 20 individuals found under an old pallet and fence posts in dry woodland above the river.
11.xi.18	The Maiden Castle	NT285644	One individual found under deadwood by the river.
03.i.19	Roslin Glen	NT266620 to NT268626	No <i>O. flavus</i> found.
03.ii.19	Monktonhall	NT342711	Several seen under bricks below the railway bridge, 250m west of the river.
03.ii.19	Inveresk	NT346709 to NT347717	<i>O. flavus</i> abundant under deadwood, sawn logs and stone along the course of the river, uncharacteristically sluggish because of the hard frost. See Figures 1 and 2.
23.iii.19	Inveresk	NT346708	Several collected for Joerg Spelda's isopod DNA barcoding project.
27.vii.19	Lady Lothian's Plantation (South Esk)	NT327650 to NT328655	No <i>O. flavus</i> found, even though other woodland species were plentiful.
17.viii.19	Lord Ancrum's Wood (South Esk)	NT331657 to NT336666	No <i>O. flavus</i> found, even though other woodland species were plentiful.
31.viii.19	Mouth of the Esk, west bank	NT344730	No <i>O. flavus</i> found in open parkland with few trees, so habitat not really suitable.
31.viii.19	Young amenity woodland at the west end of Levenhall Links Leisure Park	NT346735	No <i>O. flavus</i> found in young dry woodland.
31.viii.19	Station Road, Musselburgh	NT338721	Two individuals found under deadwood.
31.viii.19	Musselburgh	NT338716	Three <i>O. flavus</i> under a log.
12.x.19	Bilston Wood	NT281646	Two individuals found under loose stones on a lime-mortared wall (with <i>Porcellio spinicornis</i>) about 400m from the river, 150m from the small Bilston Burn tributary.
12.x.19	Between the Maiden Castle and Hawthornden Castle	NT284642	Several individuals under deadwood by the river.
12.x.19	Between the Maiden Castle and Hawthornden Castle	NT285639	Several individuals under deadwood by the river.
12.x.19	Opposite Hawthornden Castle	NT285636	Over 20 found under campfire stones in the high, dry forest on the west bank of the North Esk.
09.xi.19	Dalkeith CP	NT339676 to NT339691	None found along this stretch of the South Esk, much of it dominated by mature oak woodland.
09.xi.19	Dalkeith CP	NT339691 to NT333684	No <i>O. flavus</i> detected along the east bank of the final stretches of the North Esk, an area dominated by mature oak woodland.
09.xi.19	Dalkeith CP	NT333683	Several <i>O. flavus</i> immediately apparent in mixed woodland on the east bank of the North Esk.
17.xi.19	Roslin Glen to Hawthornden Castle	NT273628 to NT284636	No <i>O. flavus</i> found along the west bank of the river or in the dry woodland above it.

fieldwork sought to determine the upstream and downstream limits of the species. A visit to Bilston Woods, near Polton, on 11.xi.2018 revealed the species to be present in good numbers under an old pallet and fence posts in the high, dry woodland above the North Esk at NT287648, whilst a single individual was found even further upstream at The Maiden Castle (NT285644). This was about 4km upstream from the previous Melville Castle records. Additional exploration of this area on 12.x.2019 revealed *O. flavus* to be present further upstream again, with the species recorded on the west bank of the North Esk at NT284642 and NT285639, and opposite Hawthornden Castle at NT285636. This last record, 5km upstream from Melville Castle, consisted of over 20 individuals found under the stones of an old campfire in dry woodland high above the river, which at this point passes through a deep canyon.

A further two individuals were found next to Bilston Wood under loose stones on a lime-mortared wall (with *Porcellio spinicornis* Say, 1818) at NT281646, about 400m from the river (though only about 150m from the small Bilston Burn tributary), giving an indication of how far the species can spread away from running water.

The Musselburgh area was visited on 31.viii.2019 in order to determine the downstream limits of the species. No sign of *O. flavus* was detected in the open parkland on the west bank of the River Esk near its mouth (NT344730) nor in the young amenity woodland at the west end of Levenhall Links Leisure Park (NT346735). Between the mouth of the river and the A6095, there is no obvious suitable habitat for the species, with the riverbanks, which consist of grass lawn and aisles of single trees with no rank vegetation, substantial leaf litter or fallen wood, surrounded by buildings. South of the A6095 bridge, there is a stretch of accessible woodland on the east bank of the river. Searches revealed three *O. flavus* individuals under a sawn log at NT339716, and two individuals under deadwood at NT338722, these latter being the furthest downstream occurrences of the species so far recorded. It thus appears that *O. flavus* is found down the River Esk towards the sea as far as the habitat remains suitable.

No evidence has yet been found of *O. flavus* along the North Esk upstream of Hawthornden Castle. Repeated searches in 2018 and 2019 at Roslin Glen (NT2762) failed to find any evidence of the species. On 17.xi.2019, the west bank of the North Esk between Roslin Glen carpark (NT273628) and Hawthornden was surveyed, with no sign of the species detected. Thus the record of *O. flavus* opposite Hawthornden Castle (NT285636) on 12.x.2019 remains the known upstream limit of the species. The North Esk passes through a deep canyon between Hawthornden and Roslin, which may have discouraged spread upstream. But given that the species appears to be common in higher, dry woodland well away from the river in locations further downstream, there is no reason why this should be a particular impediment to further extension of its range in the direction of Roslin as this canyon is surrounded by similar woodland. It seems likely that the species has just not yet spread any further upstream.

Three visits to the South Esk have also failed to produce any evidence of *O. flavus*, suggesting that the species has not (yet) spread up the southern branch of the river. Surveys were conducted on 27.vii.2019 between NT327650 and NT328655 (Lady Lothian's Plantation), on 17.viii.2019 between NT331657 and NT336666 (Lord Ancrum's Wood), and on 09.xi.2019 between NT339676 and NT339691 (Dalkeith CP). This last stretch reaches to the confluence of the North and South Esk, an area dominated by mature open oak woodland (both *Quercus robur* L. and *Q. petraea* (Matt.) Liebl.). It is notable that no *O. flavus* were detected along the east bank of the initial stretch of the North Esk either, from NT339691 to NT333684, an area which is similarly dominated by oak, even though the species was found immediately upstream at NT333683 in mixed woodland (as well as further downstream along the River Esk). Might it be possible that *O. flavus* disprefers woodland of this type, and that this has so far stopped it spreading up the South Esk? Why this might be so is uncertain, as this woodland is no drier/damper or darker/lighter than other woodlands the species was found in. The acidity of oak wood may perhaps be a factor, given that *O. flavus* also appears to be absent under conifers and birch.



Figure 1: *Oritoniscus flavus* at Inveresk, 03.ii.2019 (image © Warren Maguire).



Figure 2: A group of *Oritoniscus flavus* with *Collembola* at Inveresk, uncharacteristically sluggish due to a hard frost, 03.ii.2019 (image © Warren Maguire).

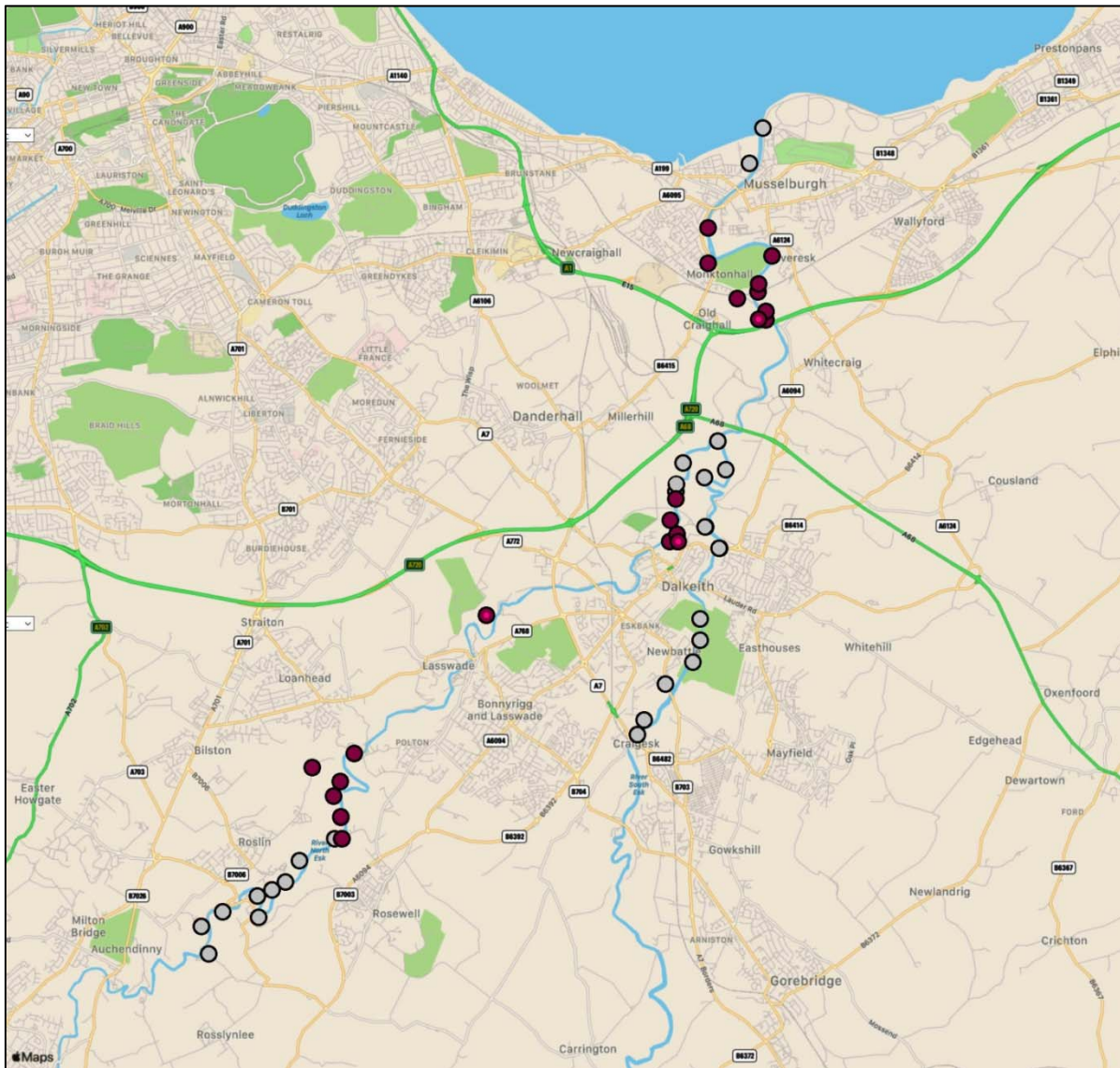


Figure 3: The distribution of *Oritoniscus flavus* in Midlothian (VC83).

- *O. flavus* recorded 2017-2019;
- Indicates the three original 2010-2011 sites reported in Sivell & Gregory (2015);
- Site surveyed, but *O. flavus* not recorded.

Map compiled using <https://gridreferencefinder.com>, which uses Apple Maps.

Conclusions

The recorded distribution of *O. flavus* along the River (North) Esk is shown in Fig. 3. The species is found along a 14km stretch of territory, covering at least 16 monads over three hectads, between about 120m asl and 10m asl. The most inland record, at Hawthornden, is 10.25km from the coast at Joppa. Melville Castle lies at the centre of this area, so the hypothesis put forward in Sivell & Gregory (2015) that the population derives from accidental introduction via plant nurseries in this location is still consistent with the distribution of the species. However, the range has proved to be wider than that indicated by Sivell & Gregory's fieldwork, perhaps as a result of geographical expansion if not an artefact of wider survey coverage (but Sivell & Gregory 2015: p47 note that fieldwork between 2011 and 2013 failed to find evidence of the species at Polton or Musselburgh). Whether the species spreads further up the North Esk to Roslin or up the South Esk to Lord Ancrum's Wood and beyond remains to

be seen. The species has not (yet) been recorded along other watercourses in the Lothians, and given its conspicuous nature this would suggest that it is not present elsewhere in the region. Nevertheless, further survey work along the River Almond, the Union Canal, the Water of Leith, the Braid Burn (including Duddingston Loch and Bawsinch Nature Reserve), and Brunstane/Niddrie Burn is required to confirm this.

Acknowledgements

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References

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