TARGETED SURVEY AND HABITAT ASSESSMENT FOR THE BEAULIEU DUNG BEETLE (*Liothorax niger*) AT SELECTED WETLAND SITES IN THE NEW FOREST.

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Survey commissioned by: Surrey Wildlife Trust Ecology Services on behalf of Forestry England

EXECUTIVE SUMMARY

A targeted search and habitat assessment for the Nationally Rare Beaulieu Dung Beetle *Liothorax niger* was undertaken in early July 2022 at eight wetland sites in the New Forest, South Hampshire (Vice County 11) selected by Natural England. In addition to these sites Standing Hat was also visited due to proximity and habitat suitability.

The project brief was as follows:

- Description of methods.
- Description of habitat suitability, vegetation cover and structure within each survey site.
- Record of where each species was present and absent during the field survey.
- The location and extent of each identified site and/or meta-population mapped and presented in ARC GIS shapefile and pdf maps at the 1:10000 scale.
- Identify other suitable habitat nearby.
- Notes on competing species if present.
- Estimation of size of each meta-population.
- Assessment of the current status of the population of each species within the New Forest.
- A discussion of the threats and risks to the populations of each species around the New Forest is to be provided in the write-up.

The selected sites were visited on the 4th & 12th July 2022 by two experienced invertebrate ecologists, Scotty Dodd MSc MCIEEM MRES and Dr. Jonty Denton Bsc (Hons) FRES FLS CEcol MCIEEM. Dr Denton is also the County Recorder for Coleoptera (beetles) for Hampshire (VC11 & VC12).

The Beaulieu Dung Beetle *Liothorax niger* was not recorded at any of the sites visited. 2022 was unusually dry and by the time of survey most wetland features had entirely dried out.

It is recommended that the sites are re-visited in April and May 2023, when the features are highly likely to be wet and accumulated debris and litter more likely post winter flooding etc.

This report should be cited as: Dodd, S.G. & Denton, J.S. (2022). *Targeted Survey and Habitat Assessment for the Beaulieu Dung Beetle (**Liothorax niger**) at Selected Wetland Sites in the New Forest*. Forestry England Beaulieu Dung Beetle Project (New Forest) Report. Project No. 4060-2.

Contents

INTRODUCTION

BACKGROUND

A targeted search and habitat assessment for the Nationally Rare Beaulieu Dung Beetle *Liothorax niger* at eight wetland sites in the New Forest, South Hampshire (Vice County 11), was commissioned by Forestry England via Surrey Wildlife Trust Ecology Services. Maps and contract were received and reviewed on the 1st June 2022. The surveyors had no availability until early July.

The Beaulieu Dung Beetle *Liothorax niger* (Illiger, 1798) [synonyms: *Aphodius niger* (Panzer, 1797)], (Coleoptera: Scarabaeidae: Aphodiinae), is globally a very widespread Palaearctic species occurring throughout Europe (except for the north of Fennoscandia and southern areas of the Iberian and Balkan Peninsulas). It is present on most of the Mediterranean islands, but not in North Africa, and extends east through Asia Minor and Russia to the far east of Asia and China. In northern Europe, where it is considered to be very localised and rare, there has been a perceived decline through the 20thC with few modern records, e.g. in Poland. In the UK it is locally common across South Hampshire (VC11), especially in the New Forest which is considered to be a historical stronghold for the species, although there are accepted historic records from Dorset (VC9). The species was also recently found in Berkshire (VC22) in 2010 (Mann & Garvey, 2014) and it seems plausible that there is the potential for further records from central southern England.

Within the New Forest Balmer Lawn, near Brockenhurst, was considered to be the historic stronghold, or at least the location that collectors descended upon to obtain a specimen. However, Mann & Garvey (2014) in their review of records for the New Forest considered the species to be widespread across the area, with confirmed post-2000 data for six hectads.

In Britain the species was regarded as Endangered (Red Data Book 1) by Shirt (1987) [Note: As *Aphodius (Nialus) niger*] who gave the locality of Brockenhurst area of New Forest and the banks of a pond at Brockenhurst in 1909, but also cites historic records from Balmer Lawn by A.M. Massee in 1931 and 1938. The subsequent review by Hyman & Parsons (1992) retains the RDB1 (Endangered) status applied by Shirt (1987), adding "*currently known from only one pond in the New Forest*". Lane & Mann (2016) in their IUCN review of the group consider the species to be of Least Concern (LC) in the broader Global context, but apply a revised status of Nationally Rare (NR) in the British context, reflecting the more widespread distribution within and without the New Forest shown by Mann & Garvey (2014).

In terms of species ecology, Shirt (1987) makes the most simplistic observation that the species is to be found in mud at the sides of ponds frequented by cattle and horses. Hyman & Parsons (1992) add pond and ditch margins, feeding on decaying matter in damp soils and mud at the sides of ponds that have been frequented by cattle and horses. They also cite records from grass tussocks under or adjacent to dung on wet mud and under sods on the bed of the pond when it had dried out.

Mann & Garvey (2014) describe *Liothorax niger* as not an obligate dung-associated species, rather it is a stenotopic, saprophagous species found almost exclusively in open areas around temporary or permanent pools and ditch margins. However, they do note that the species does

likely benefit from the humus-rich soils contributed to by dunging and might therefore be adversely impacted by the use of endectocides applied to livestock. They describe the habitats as in soil, under flood debris, in leaf litter and under algal mats near water. In terms of phenology the species has been recorded from January to November, with most records between April and June (with the exception of a data bias from July 1999 when the New Forest Life Project occurred).

PROJECT AIMS

The project brief was as follows:

- Description of methods.
- Description of habitat suitability, vegetation cover and structure within each survey site.
- Record of where each species was present and absent during the field survey.
- The location and extent of each identified site and/or meta-population mapped and presented in ARC GIS shapefile and pdf maps at the 1:10000 scale.
- Identify other suitable habitat nearby.
- Notes on competing species if present.
- Estimation of size of each meta-population.
- Assessment of the current status of the population of each species within the New Forest.
- A discussion of the threats and risks to the populations of each species around the New Forest is to be provided in the write-up.

SAMPLING COMPARTMENTS

4th July 2022

- Long Pond – SU 1993 0216
- Vinney Ridge – SU 2606 0578
- Dame's Slough – SU 2537 0483
- Markway Inclosure – SU 2449 0227
- Mogshade Hill – SU 2374 0973

12th July 2022

- Balmer Lawn – SU 3060 0350
- Butts Lawn – SU 3006 0298
- Whitemoor Pond – SU 2778 0245
- *Standing Hat – SU 3133 0365

* Additional site selected by the surveyor's as still partially wet and close to the requested survey site of Balmer Lawn.

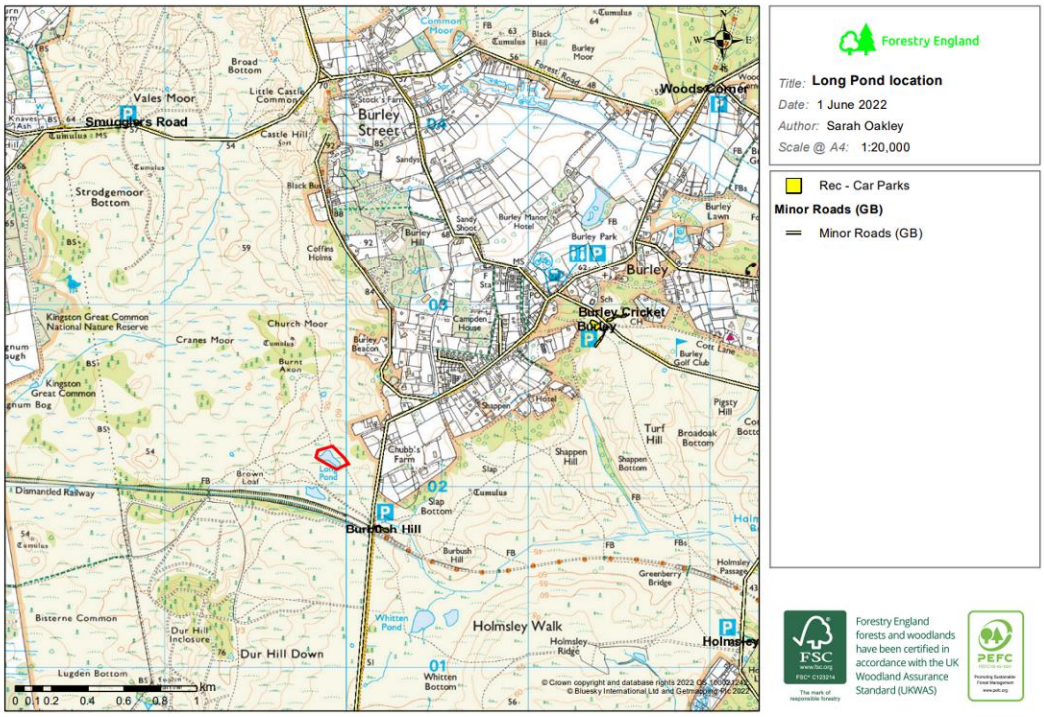

Figure 1. New Forest sampling compartments for Beaulieu Dung Beetle in 2022 – Long Pond, Burley.

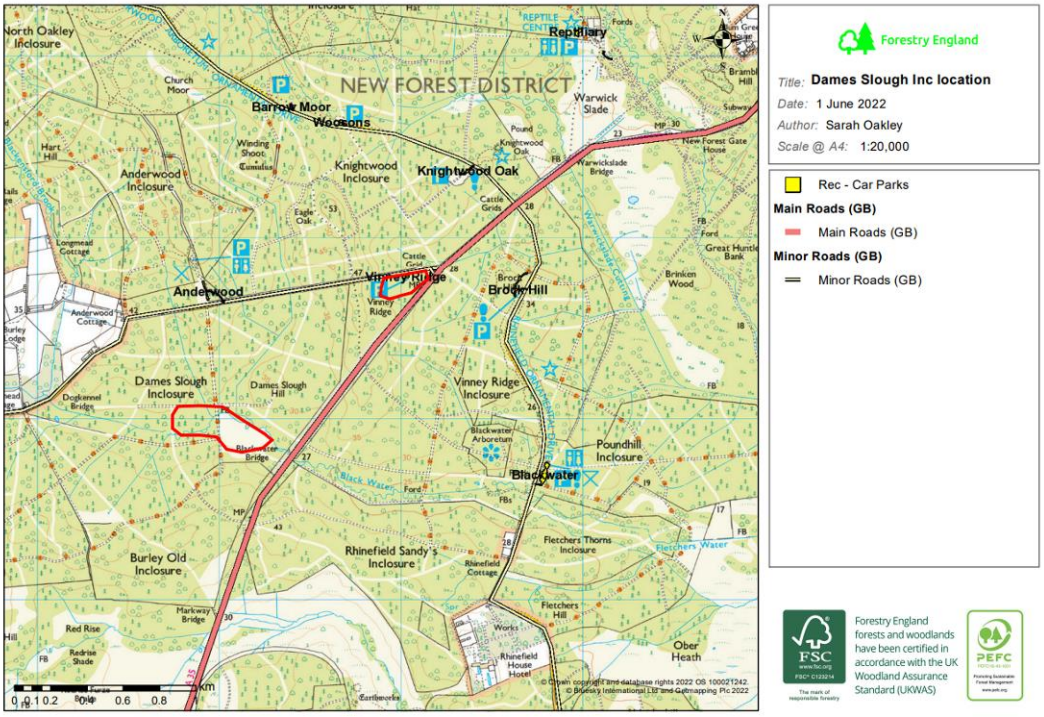

Figure 2. New Forest sampling compartments for Beaulieu Dung Beetle in 2022 – Vinney Ridge & Dames Slough

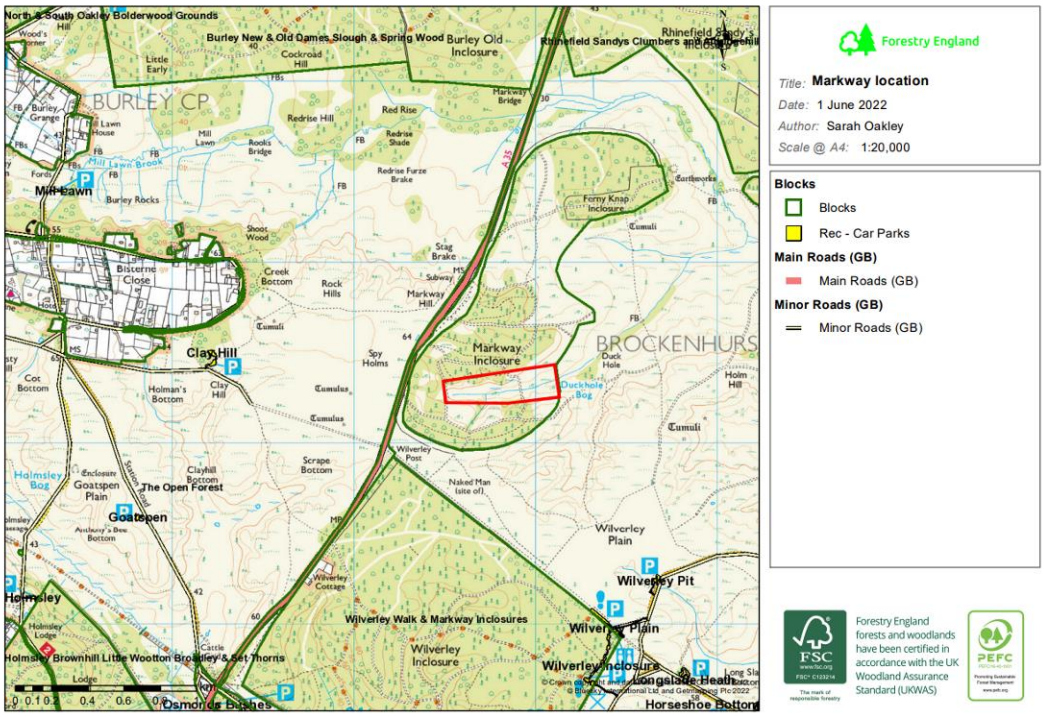

Figure 3. New Forest sampling compartments for Beaulieu Dung Beetle in 2022 – Markway Inclosure, Duckhole Bog.

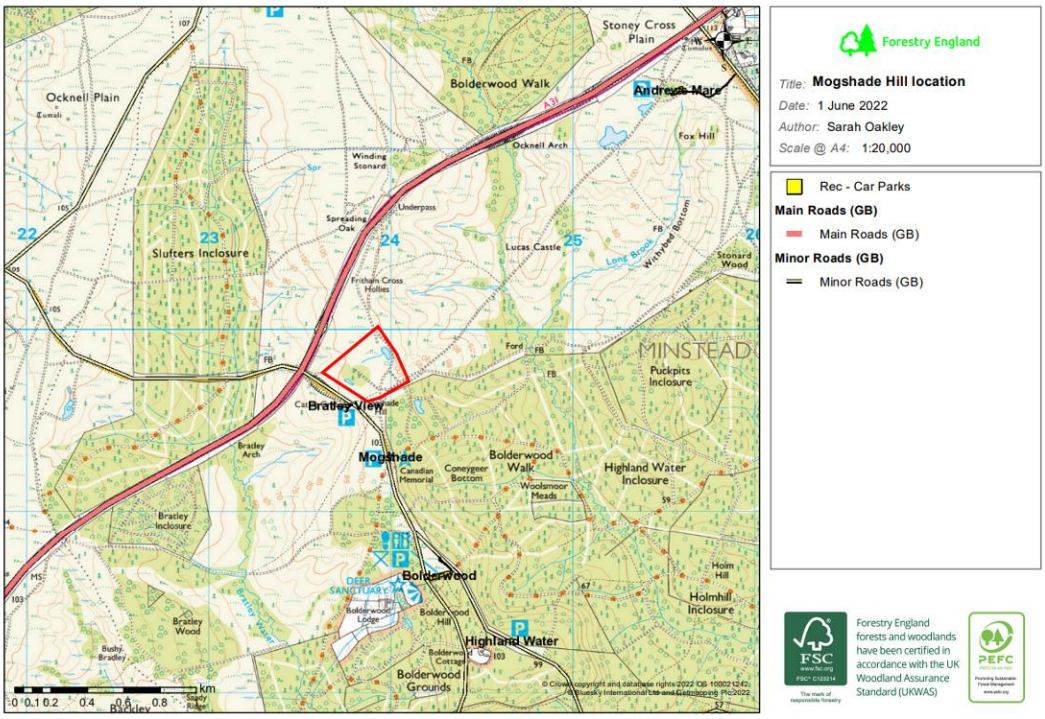

Figure 4. New Forest sampling compartments for Beaulieu Dung Beetle in 2022 – Mogshade Hill.

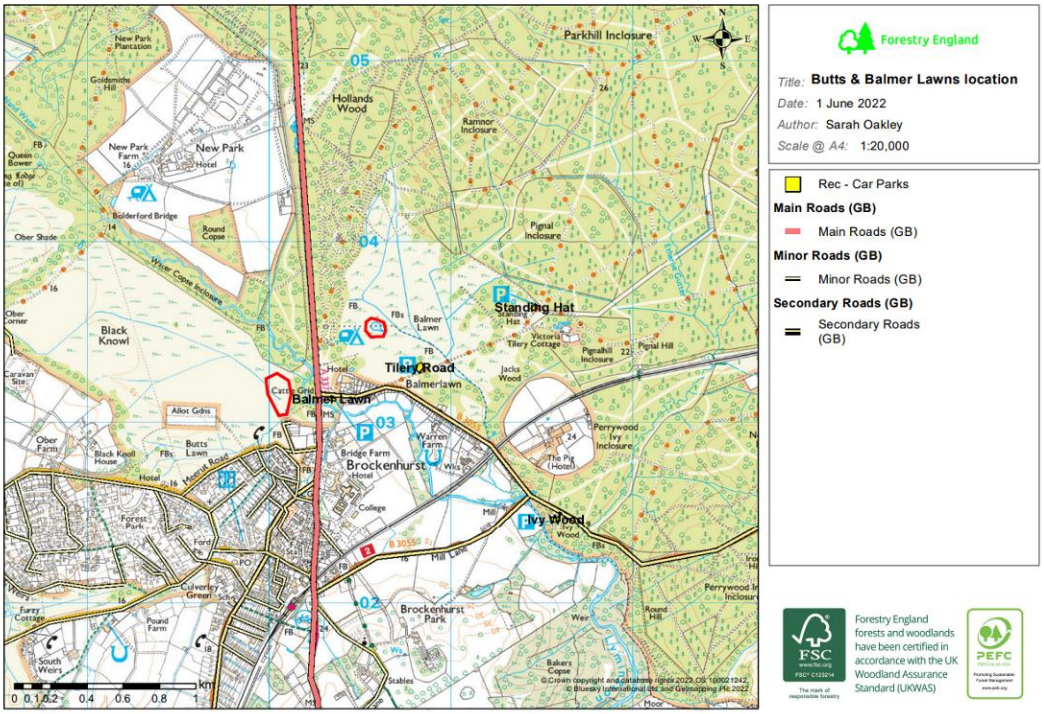

Figure 5. New Forest sampling compartments for Beaulieu Dung Beetle in 2022 – Balmer Lawn & Butts Lawn, also showing Standing Hat to the east.

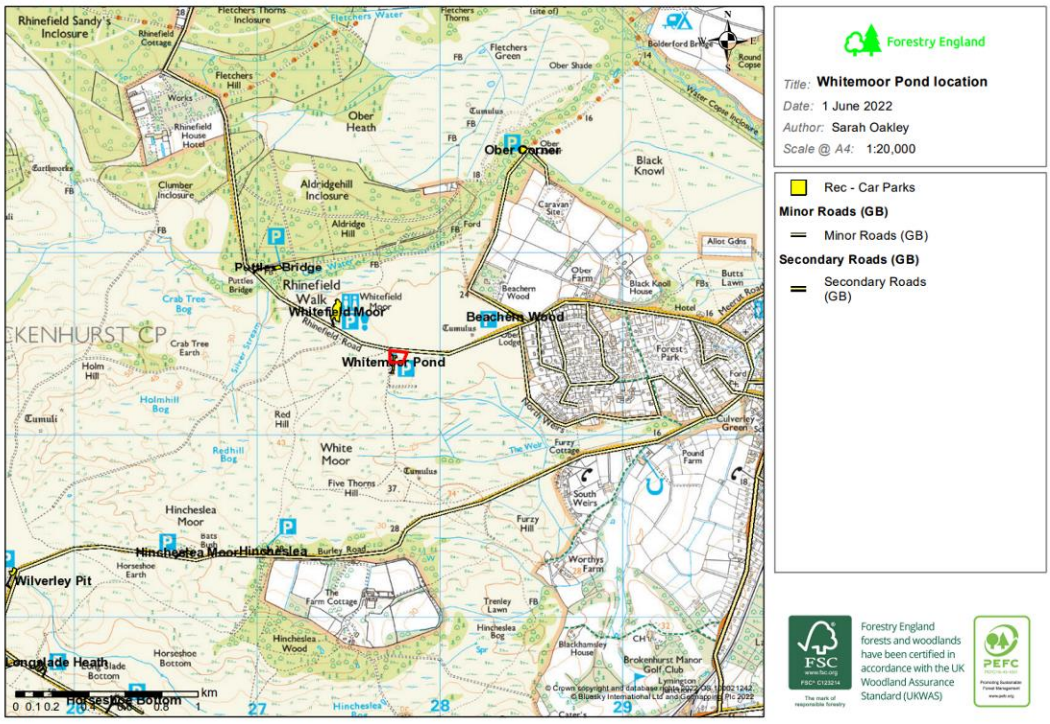

Figure 6. New Forest sampling compartments for Beaulieu Dung Beetle in 2022 – Whitemoor Pond.

METHODOLOGY

SAMPLING WITHIN THE COMPARTMENTS

The following search methods were implemented:

- Suction sampling of pond / ditch edges (second visit only to mitigate for dry conditions).
- Hand searching in and under dung using nitrile gloves.
- Hand searching in and under litter and debris.
- Bank splashing where water present.
- Floating out dung where water present.
- Puddling moss and litter where water present.

SITE VISITS

The selected sites were visited on the 4th & 12th July 2022 by two experienced invertebrate ecologists, Scotty Dodd MSc MCIEEM MRES and Dr. Jonty Denton Bsc (Hons) FRES FLS CEcol MCIEEM.

CONSTRAINTS

Due to the late commissioning of the work in June the surveyor's had no availability until July. By July most of the selected sites had completely dried out.

RESULTS

Long Pond

No *Liothorax niger* found but habitat optimal with pond still holding water and evidence of regular access by ponies and cattle.

The north shore is predominantly bare mud with signs of dunging and poaching. The south shore is less poached and largely vegetated, predominantly with Marsh St. John's-wort *Hypericum elodes*, Lesser Spearwort *Ranunculus flammula*, Shoreweed *Littorella uniflora* and invasive New Zealand Pigmyweed *Crassulla helmsii*. Note that where Shoreweed dominates it tends to outcompete the invasive *Crassula*. Other plants noted include Pillwort *Pilularia globulifera*, Water-purslane *Lythrum portula*, Water-plantain *Alisma plantago-aquatica*, Lesser Water-plantain *Baldellia ranunculoides*, White Water-lily *Nymphaea alba*, Bog Pimpernel *Anagallis tenella* and Common Spike-rush *Eleocharis palustris*. The surrounding habitat is typical wet / humid heath transitioning to drier Ling *Calluna* vulargis dominated heath.

Methods: Bank splashing, floating out, puddling, direct searching of dung.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Coleoptera	Dryopidae	*Dryops luridus*	A water beetle	
Coleoptera	Dytiscidae	*Agabus bipustulatus*	A water beetle	

Order	Family	Taxon	Vernacular	National Status
Coleoptera	Hydrophilidae	*Cercyon melanocephalus*	A dung associated beetle	
Coleoptera	Hydrophilidae	*Cercyon pygmaeus*	A dung associated beetle	
Coleoptera	Scarabaeidae	*Agrilinus constans*	A dung beetle	
Coleoptera	Scarabaeidae	*Teuchestes fossor*	A dung beetle	
Coleoptera	Staphylinidae	*Aleochara lanuginosa*	A dung associated rove beetle	
Coleoptera	Staphylinidae	*Paederus caligatus*	A rove beetle	[RDB3]
Diptera	Syrphidae	*Scaeva pyrastri*	a hoverfly	
Lepidoptera	Lycaenidae	*Plebejus argus*	Silver-studded Blue	[Nb] / S41
Odonata	Aeshnidae	*Anax imperator*	Emperor Dragonfly	

Photograph 1. Long Pond north shore with bare mud and trampled dung.

Photograph 2. Long Pond south shore, vegetated with signs of occasional poaching and dunging.

Vinney Ridge

No *Liothorax niger* found. Suitable habitat is limited to a *Sphagnum* flush in a humid to wet heath area along a woodland edge, including a flush running parallel and adjacent to the road. At the time of survey the flush was very dry with little fresh dung present. Botanically the area was typical wet / humid heath comprising Purple Moor-grass *Molinia caerulea*. Cross-leaved Heath *Erica tetralix* and Ling *Calluna vulgaris*. The flush itself comprised *Sphagnum* sp., Bog Pimpernel *Anagallis tenella* and Tormentil *Potentilla erecta*.

Methods: Puddling, direct searching of dung.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Coleoptera	Scarabaeidae	*Onthophagus similis*	A dung beetle	

Photograph 3. Humid heathland at Vinney Ridge.

Photograph 4. *Sphagnum* flush and wet heath at Vinney Ridge.

Dame's Slough (Blackwater Bridge)

No *Liothorax niger* found. Dame's Slough is a stream edge with semi-shaded marshy ground transitioning into wet woodland. The woodland flush and stream edges supported Water Mint *Mentha aquatica*, Gipsywort *Lycopus europaeus*, Marsh Bedstraw *Galium palustre*, Self-heal *Prunella vulgaris*, Lesser Spearwort *Ranunculus flammula* Yellow Pimpernel *Lysimachia nemorum*, Trailing St. John's-wort *Hypericum humifusum* and a small number of Lesser Water-plantain *Baldellia ranunculoides*. Graminoids were present but were not identified to species. Signs of livestock passing through were minimal with very little poaching or fresh dunging. The woodland flush was largely dry.

Methods: Bank splashing, floating out, puddling, direct searching of dung.

Other invertebrates / vertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Coleoptera	Carabidae	*Bembidion dentellum*	A ground beetle	
Coleoptera	Carabidae	*Paranchus albipes*	A ground beetle	
Coleoptera	Dryopidae	*Dryops luridus*	A water beetle	
Coleoptera	Dytiscidae	*Dytiscus semisulcatus*	A water beetle	
Heteroptera	Veliidae	*Velia caprai*	Water-cricket	
Hymenoptera	Formicidae	*Myrmica ruginodis*	an ant	
Isopoda	Porcellionidae	*Porcellio scaber*	Common Rough Woodlouse	
Odonata	Calopterygidae	*Calopteryx virgo*	Beautiful Demoiselle	
Odonata	Coenagriidae	*Pyrrhosoma nymphula*	Large Red Damselfly	
Odonata	Cordulegasteridae	*Cordulegaster boltonii*	Golden-ringed Dragonfly	Local
Orthoptera	Tetrigidae	*Tetrix subulata*	Slender Ground Hopper	Local
Petromyzontiformes	Petromyzontidae	*Lampetra fluviatilis*	River Lamprey	Priority Species under the UK Post-2010 Biodiversity Framework

Photograph 5. Stream edge and woodland flush at Dame's Slough, Blackwater Bridge.

Markway Inclosure (Duckhole Bog)

No *Liothorax niger* found but habitat optimal with ponds still holding water and evidence of regular access by ponies and cattle.

The two ponds present had areas of bare mud with signs of dunging and poaching. Surrounding vegetation was predominantly Marsh St. John's-wort *Hypericum elodes,* Bog Pondweed *Potamogeton polygonifolius*, Soft Rush *Juncus effusus,* Tormentil *Potentilla erecta,* Round-leaved Sundew *Drosera rotundifolia*, *Sphagnum* sp., Bog Myrtle *Myrica gale*, Bog Asphodel *Narthecium ossifragum*, Cross-leaved Heath *Erica tetralix* and a cotton-grass *Eriophorum* sp.

Methods: Bank splashing, floating out, puddling, direct searching of dung.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Coleoptera	Chrysomelidae	*Donacia versicolorea*	A reed beetle	Local
Coleoptera	Dryopidae	*Dryops striatellus*	A water beetle	NS
Coleoptera	Dytiscidae	*Dytiscus semisulcatus*	A water beetle	
Coleoptera	Hydrophilidae	*Cercyon pygmaeus*	A dung associated beetle	
Coleoptera	Scarabaeidae	*Rhodaphodius foetens*	A dung beetle	
Coleoptera	Scarabaeidae	*Teuchestes fossor*	A dung beetle	
Coleoptera	Staphylinidae	*Aleochara lanuginosa*	A dung associated rove beetle	
Coleoptera	Staphylinidae	*Oxytelus laqueatus*	A dung associated rove beetle	
Hymenoptera	Formicidae	*Formica picea*	Black Bog Ant	[RDB1] / S41

Photograph 6. Duckhole Bog and ponds at Markway Inclosure.

Photograph 7. Pond at Duckhole Bog, Markway Inclosure with poached edges and ponies present.

Mogshade Hill

No *Liothorax niger* found and pond completely dry, small amounts of relatively fresh dung present. The dry pond is situated in an area of typical dry heathland. The pond bottom supported locally frequent patches of Shoreweed *Littorella uniflora*.

Methods: Direct searching of dung.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Coleoptera	Histeridae	*Margarinotus ventralis*	A dung associated beetle	
Coleoptera	Scarabaeidae	*Acrossus rufipes*	A dung beetle	
Coleoptera	Staphylinidae	*Philonthus cruentatus*	A rove beetle	

Photograph 8. Dry pond at Mogshade Hill.

Balmer Lawn

No *Liothorax niger* found and pond almost completely dry. The ditch-line was also dry. The area is heavily poached by livestock. Suction sampling did not find the target species. However, two weevils of particular note were among the by-catch.

Plants noted include Lesser Spearwort *Ranunculus flammula*, Hampshire-purslane *Ludwigia palustris*, Marsh St. John's-wort *Hypericum elodes*, Pillwort *Pilularia globulifera*, Petty Whin *Genista anglica* and New Zealand Pigmyweed *Crassula helmsii*.

Methods: Direct searching of dung, puddling, suction sampling.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Araneae	Linyphiidae	*Erigone atra*	A money spider	
Coleoptera	Chrysomelidae	*Cryptocephalus fulvus*	A pot beetle	
Coleoptera	Coccinellidae	*Coccinella undecimpunctata*	11-spot Ladybird	
Coleoptera	Curculionidae	*Bagous brevis*	Lesser Spearwort Weevil	[RDB1]
Coleoptera	Curculionidae	*Pelenomus olssoni*	Purslane Weevil	[RDB3]
Coleoptera	Staphylinidae	*Aleochara lanuginosa*	A dung associated rove beetle	
Coleoptera	Staphylinidae	*Paederus caligatus*	A rove beetle	[RDB3]
Heteroptera	Lygaeidae	*Nysius huttoni*	A ground bug	
Heteroptera	Nabidae	*Nabis ferus*	A predatory bug	

Photograph 9. The pond at Balmer Lawn in July with less than 1m^2 of water left. Note extensive livestock trampling.

Photograph 10. The dry ditch at Balmer Lawn.

Standing Hat

No *Liothorax niger* found but habitat is optimal. The pond was drying but still holding water centrally with a layer of *Sphagnum* spp. moss, Bogbean *Menyanthes trifoliata*, Bog Pondweed *Potamogeton polygonifolius*, Bog Pimpernel *Anagallis tenella* and a central stand of willow *Salix* scrub. Whilst floating out moss and litter a rare and globally Near Threatened Medicinal Leech *Hirudo medicinalis* attached itself to the surveyor's arm. The pond supported an exceptional assemblage of rare and notable invertebrates.

Methods: Bank splashing, floating out, puddling, direct searching of dung.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Arhynchobdellida	Hirunididae	*Hirudo medicinalis*	Medicinal Leech	NT (global) / W&CA
Araneae	Lycosidae	*Pirata piraticus*		

Order	Family	Taxon	Vernacular	National Status
Araneae	Lycosidae	*Pirata piscatorius*		NS
Araneae	Pisauridae	*Dolomedes fimbriatus*	Raft Spider	NS
Coleoptera	Carabidae	*Acupalpus dubius*		
Coleoptera	Carabidae	*Chlaenius nigricornis*		Local
Coleoptera	Carabidae	*Tachyura walkeriana*		NR; NT
Coleoptera	Dryopidae	*Dryops striatellus*		NS
Coleoptera	Dytiscidae	*Agabus bipustulatus*		
Coleoptera	Dytiscidae	*Dytiscus semisulcatus*		
Coleoptera	Dytiscidae	*Ilybius quadriguttatus*		
Coleoptera	Hydrophilidae	*Anacaena limbata*		
Coleoptera	Hydrophilidae	*Anacaena lutescens*		
Coleoptera	Hydrophilidae	*Cymbiodyta marginella*		
Coleoptera	Hydrophilidae	*Helochares punctatus*		Local
Coleoptera	Hydrophilidae	*Hydrobius fuscipes sens. lat.*		
Coleoptera	Scarabaeidae	*Otophorus haemorrhoidalis*		
Coleoptera	Scirtidae	*Scirtes hemisphaericus*		
Coleoptera	Staphylinidae	*Acylophorus glaberrimus*		[RDB1]
Coleoptera	Staphylinidae	*Paederus caligatus*		[RDB3]
Coleoptera	Staphylinidae	*Stenus flavipes*		
Coleoptera	Staphylinidae	*Stenus fornicatus*		[Nb]
Coleoptera	Staphylinidae	*Tetartopeus terminatus*		
Diptera	Syrphidae	*Helophilus pendulus*	a hoverfly	
Diptera	Syrphidae	*Platycheirus rosarum*	a hoverfly	
Heteroptera	Hebridae	*Hebrus pusillus*		NS
Heteroptera	Hebridae	*Hebrus ruficeps*		Local
Heteroptera	Lygaeidae	*Pachybrachius luridus*		[RDB3]
Heteroptera	Nepidae	*Nepa cinerea*		
Hymenoptera	Formicidae	*Myrmica scabrinodis*	an ant	
Odonata	Coenagriidae	*Ceriagrion tenellum*	Small Red Damselfly	Local
Orthoptera	Gryllidae	*Nemobius sylvestris*	Wood Cricket	NS

Photograph 11. Pond at standing Hat.

Photograph 12. Central *Salix* carr scrub at Standing Hat.

Butts Lawn

No *Liothorax niger* found but some potential habitat present. The stony bottomed stream supported exposed sediment and a small area of marshy grassland with frequent Lesser Spearwort *Rannunculus flammula*. Mid-stream was a large raft of Water-crowfoot *Ranunculus* subgenus *Batrachium*. A poached ford with small amounts of relatively fresh dung was noted.

Methods: Bank splashing, floating out, puddling, direct searching of dung, suction sampling.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Coleoptera	Staphylinidae	*Paederus caligatus*	A rove beetle	[RDB3]
Diptera	Dolichopodidae	*Poecilobothrus nobilitatus*	A fly	
Heteroptera	Veliidae	*Velia caprai*	Water-cricket	
Odonata	Calopterygidae	*Calopteryx virgo*	Beautiful Demoiselle	
Odonata	Cordulegasteridae	*Cordulegaster boltonii*	Golden-ringed Dragonfly	Local

Photograph 13. Stream at Butts Lawn.

Whitemoor Pond

No *Liothorax niger* found, habitat has some potential but is quite shaded by overhanging trees and shrubs. The pond was rapidly drying but appears to be regularly used by livestock despite being adjacent to a road and car park. A reasonable amount of dung was trampled into the muddy drawdown zone. No marginal or emergent vegetation was present.

Methods: Bank splashing, floating out, puddling, direct searching of dung.

Other invertebrates noted:

Order	Family	Taxon	Vernacular	National Status
Diptera	Dolichopodidae	*Poecilobothrus nobilitatus*	A fly	
Heteroptera	Corixidae	*Hesperocorixa sahlbergi*	An aquatic bug	

Photograph 14. Poached muddy edges of receding pond with scattered dung.

ECOLOGICAL ASSESSMENT

Despite our best efforts the target species, the Beaulieu Dung Beetle *Liothorax niger*, could not be located at any of the sample sites surveyed. All sites surveyed would have at least some potential to support the species in optimal conditions, with several sites such as Balmer Lawn (a known site), Long Pond, Standing Hat and Duckhole Bog having very high potential. The exceptionally dry conditions and lack of associated wetland litter and debris all point towards early season targeted searches being the most optimal. Mann & Garvey (2014) suggest April to June as the most optimal survey window.

THREATS

Mann & Garvey (2014) speculate that the use of endectocides in livestock might be detrimental.

Hyman & Parsons (1992) list threats such as drainage of pools and ditches, infilling, excavating and pollution. They also mention restricting the access of livestock to ponds etc to be potentially damaging.

Extreme hot weather and drought events in successive years may also prove to be problematic in the future.

FURTHER WORK

It is recommended that the sites are re-visited in April and May 2023, when the features are highly likely to be wet and accumulated debris and litter more likely post winter flooding etc.

In addition to the selected sites Mann & Garvey (2014) list a number of other New Forest localities (including Balmer Lawn and Whitemoor Pond) that should be included in any futher survey work, they are listed below:

- Eyeworth Wood
- Longslade Bottom
- Millyford Car Park
- Rhinefield Ornamental Drive
- Sway
- Three Beech Ponds
- Windmill Hill Pond
- Yew Tree Heath

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Appendix 1. Status categories for rare and Notable species

Red Data Book Category 1 (RDB 1) – Endangered

Definition.
Taxa in danger of extinction *in Great Britain* and whose survival is unlikely if the causal factors continue operating.

Included are those taxa whose numbers have been reduced to a critical level or whose habitats have been so dramatically reduced that they are deemed to be in immediate danger of extinction. Also included are *some* taxa that are *possibly* extinct.

Criteria.
Species which are known *or believed to occur* as only a single population within one 10 km square of the National Grid.

Species which only occur in habitats known to be especially vulnerable.

Species which have shown a rapid or continuous decline over the last twenty years and are now *estimated* to exist in five or fewer 10 km squares.

Species which are *possibly* extinct *but have been recorded this century* and if rediscovered would need protection.

Red Data Book Category 2 (RDB 2) - Vulnerable

Definition.
Taxa *believed* likely to move into the endangered category in the near future if the causal factors continue operating.

Included are taxa of which most or all of the populations are decreasing because of *over-exploitation*, extensive destruction of habitat or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security is not yet assured; and taxa with populations that are still abundant but are under threat from serious adverse factors throughout their range.

Criteria.
Species declining throughout their range.

Species in vulnerable habitats.

Red Data Book Category 3 (RDB 3) – Rare

Definition.
Taxa with small populations *in Great Britain* that are not at present endangered or vulnerable, but are at risk.

These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range.

Criterion.
Species which are estimated to exist in only fifteen or fewer 10 km squares. *This criterion may be relaxed where populations are likely to exist in over fifteen 10 km squares but occupy small areas of especially vulnerable habitat*

Nationally Scarce Category A - Notable A (Na)

Definition.
Taxa which do not fall within **RDB** categories but which are none-the-less uncommon in Great Britain and are thought to occur in 30 or fewer 10 km squares of the National Grid or, for less well recorded groups, within seven or fewer vice-counties.

Nationally Scarce Category B - Notable B (Nb)

Definition.
Taxa which do not fall within **RDB** categories but which are none-the-less uncommon in Great Britain and are thought to occur in between 31 and 100 10 km squares of the National Grid or, for less well recorded groups, within eight and twenty vice-counties.

Nationally Scarce - Notable (N)

Definition.
Taxa which do not fall within **RDB** categories but which are none-the-less uncommon in Great Britain and are thought to occur in between 16 to 100 10 km squares of the National Grid. Species within this category are often too poorly known for their status to be more precisely estimated.

Summary of the IUCN categories and criteria.

- **REGIONALLY EXTINCT (RE)**
  A taxon is Extinct when there is no reasonable doubt that the last individual has died. In this review the last date for a record is set at fifty years before publication.
- **CRITICALLY ENDANGERED (CR)**
  A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered.
- **ENDANGERED (EN)**
  A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered.
- **VULNERABLE (VU)**
  A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable.
- **NEAR THREATENED (NT)**

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

- **LEAST CONCERN (LC)**

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

- **DATA DEFICIENT (DD)**

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

- **NOT EVALUATED (NE)**

A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

GB Rarity Status categories and criteria

- **Nationally Rare (NR)**

Native species which have not been recorded from more than 15 British hectads since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species which are probably extinct.

- **Nationally Scarce (NS)**

Native species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 British hectads since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads.

Other species status terminology.

- **Local**. Species that are restricted in distribution either geographically or by habitat. Also used for species that are widespread but infrequently encountered, e.g. encountered in no more than 300 10km squares of the national Ordnance Survey grid since 1970. Or those species listed as such, based upon modern geographical data, by ISIS (2010) and/or relevant recording schemes.
- **Widely Scattered.** Generally distributed but at low densities.
- **Southern.** Mainly or completely confined to southern England and/or its westerly or easterly regions – as indicated.
- **Common.** Generally widespread throughout the UK.
- **Unknown**. Usually indicates a lack of available data for difficult taxa but may also imply recent taxonomic confusion.