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ECOLOGICAL CONSULTANTS
Limited Liability Partnership

**Northumbrian Water
Reptile Survey Report
Volume 2: Central Area**

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1 Introduction

Baker Shepherd Gillespie was commissioned to conduct reptile surveys on a series of eight Northumbrian Water Ltd (NWL) sites throughout North-East England. All sites are within the North Pennines Area of Outstanding Natural Beauty and are in County Durham, apart from Derwent Reservoir which is located on the border between County Durham and Northumberland. The site locations covered by the surveys and their central grid references are listed in Table 1 below.

As landowner, operator and manager, NWL is committed to conserving and enhancing biodiversity in the region. As part of this continuing commitment NWL has produced its own Biodiversity Strategy, the purpose of which is to set out how it will meet biodiversity objectives that are relevant to its landholdings and activities.

It is intended that the results of the reptile surveys undertaken during 2008 will be used to guide conservation management at NWL sites to benefit reptiles. The results of these surveys complement those collected during similar surveys carried out in 2007.

1.1 Sites Surveyed

The eight Northumbrian Water sites that were surveyed for reptiles are all located in the Upper Derwent catchment (Derwent, Waskerley, Smiddy Shaw and Hisehope Reservoirs, Honey Hill Water Treatment Works and Presser Pumping Station) or Upper Weardale (Burnhope and Tunstall Reservoirs). The location of these sites is described in Table 1 below.

Table 1 – Sites Surveyed

Site Name	Central Grid Reference	Current Use	Location
Derwent Reservoir	NZ 015524	Reservoir	Upper Derwent Valley, eastern edge of the North Pennines, west of Consett.
Burnhope Reservoir	NY844388	Reservoir	Upper Weardale, central North Pennines, west of Ireshopeburn.
Tunstall Reservoir	NZ065412	Reservoir	Lower Weardale, eastern edge of North Pennines, north of Wolsingham.
Waskerley Reservoir	NZ022442	Reservoir	North Pennines, north-east of Stanhope.
Smiddy Shaw Reservoir	NZ043462	Reservoir	North Pennines, north-east of Waskerley Reservoir.
Hisehope Reservoir	NZ021464	Reservoir	North Pennines, north of Waskerley Reservoir.
Honey Hill	NZ051470	Water treatment Works	North Pennines, immediately to the north-east of Smiddy Shaw Reservoir.
Presser Pumping Station	NY961478	Pumping Station	North Pennines, south of Blanchland.

All of the reptile surveys focussed on land within the ownership and management of NWL. However, habitats adjacent to these sites were also assessed visually to provide some indication of the likelihood of reptiles being present. Setting the context of each site within the wider environment is considered to be important with respect to understanding the merits and potential benefits of enhancing sites for reptile species. For example, enhancement of a site with no or low numbers of reptiles is only likely to be beneficial if reptiles are present in adjacent habitats, from where they can move to colonise the enhanced site.

1.2 Aims of Study

The overall aim of the study was to identify those species of reptile that are currently using each of the Northumbrian Water sites surveyed. Although the survey methodology is not designed to provide a quantitative estimate of the reptile population, a crude estimate of population size has been made using the number of reptiles recorded within optimum habitat at each site.

At those sites where reptiles were not recorded the habitat has been evaluated to try to identify why this might be the case. Where appropriate, measures are described that are designed to enhance the site for reptiles.

At those sites where reptiles were recorded the habitats have been assessed to see if they can be enhanced to further benefit reptiles.

2 Reptile Ecology, Distribution and Status

There are six species of reptile that are native to Britain, but of these the sand lizard *Lacerta agilis* and smooth snake *Coronella austriaca* have a distribution that is restricted predominantly to the south of England. Neither of these species are native to the study area and consequently have not been considered further within this report.

Four native species of reptile have a geographical distribution that includes the north-east of England and the area where the study sites are located. These species are:

- adder *Vipera berus*
- grass snake *Natrix natrix*
- common lizard *Lacerta vivipara*
- slow worm *Anguis fragilis*

All reptiles are ectothermic (that is they are reliant on an external heat source to enable activity) and for this reason they are generally inactive between October and March (Froglife, 1999). Even during the period when they are most active, i.e. April to September, reptiles may only be detected effectively during suitable weather conditions. Their reliance on an external heat source (solar radiation) means that reptiles are usually found in areas where suitable open basking habitats are located close to shelter. This enables reptiles to bask in the sun whilst minimising the risk of predation. Reptile distribution is also likely to be dependent on the presence of suitable prey, such as invertebrates, amphibians, other reptiles and small mammals.

The optimum combination of sheltering, basking and foraging habitats is typically found in heathland, dunes, hedgerows or along woodland rides or edges. However, a number of man-made habitats, such as road and rail embankments and some derelict brownfield sites, can also be important for reptiles (English Nature, 2004).

The mobility of reptiles varies between species but, in general, snakes range over larger areas than lizards, potentially up to several kilometres over the course of a year (Froglife, 1999). There is evidence to suggest that some snakes move to wetter areas during the late summer months (Froglife, 1999), while lizards tend to remain close to particularly good habitat, such as boulder scree.

During the last 50 years there have been marked reductions in many reptile populations for a number of reasons. These include development pressure, agricultural intensification and forestry practices (Froglife, 1999).

2.1 Legislation

Due to the unfavourable conservation status of many reptiles they are subject to specific legal protection in the UK. All four species found in north-east England receive protection under the Wildlife and Countryside Act 1981. Part of Section 9(1) and all of Section 9(5) of the Act apply, which means that all reptiles are protected against intentional killing and injuring (but not taking) and against sale, transporting for sale or publishing advertisements to buy or sell.

Paragraph 41(1) of the Natural Environment and Rural Communities Act 2006 (NERC Act 2006) states that "the Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State's opinion are of principal importance for the purpose of conserving biodiversity". This replaces a similar requirement to prepare a list under Section 74 of the Countryside and Rights of Way Act 2000 (the CROW Act). All native reptile species in the UK are now included on this list.

2.2 Biodiversity Action Plans

In addition to the specific legal protection described above, the UK Biodiversity Action Plan (BAP) highlights a number of priority species and habitats that require special protection. However, within the UK BAP sand lizard is the only reptile species listed as a priority species requiring protection at the national level. This species is not relevant in the context of the sites covered by the surveys carried out in 2008.

Reptiles are not specifically identified as species requiring protection at the local level in the Northumberland BAP. However, adder, common lizard, slow worm and grass snake are all highlighted as requiring special protection at the local level within the document 'Action for Wildlife – the Durham Biodiversity Plan.'

3 Methodology

3.1 Desk Study

A desk study has been carried out that covered all eight of the sites that have been surveyed for reptiles. Durham Biodiversity Data Service (DBDS) was contacted to obtain historical records of reptiles from an area extending 2km from each site. The County reptile recorder was also contacted to obtain information on the status of reptiles in the area, and to obtain any additional records not held by the DBDS.

In addition, general information on the distribution of reptiles in the area has been obtained from the National Biodiversity Network database (www.searchnbn.net). Whilst this information is by no means comprehensive, it does provide an indication of the range of species that might be expected in the area around the sites covered by the surveys.

The desk study also draws on data published in the Reptile Atlas of North East England (Durkin, 2008). This provides summary information on the distribution of reptile species within the study area.

3.2 Field Survey

The standard survey methodology for reptiles makes use of the fact that these species are ectothermic and need to bask in the sun before they become active. Placing artificial refugia within a site provides a place of shelter and a basking site for reptiles (if an appropriate material is used). These refugia can then be searched in appropriate weather conditions to see if reptiles are either basking on top of them or sheltering below them.

A number of 50cm x 50cm artificial refugia were prepared using heavy duty roofing felt sheets and corrugated polycarbonate roofing sheets. These materials share properties of absorbing heat readily and heating up more rapidly than the surrounding ground or vegetation, creating an ideal habitat for basking or sheltering reptiles. The corrugated sheeting has the benefit of providing space below for sheltering reptiles, and the same effect was achieved under the roofing felt sheets by placing stones or twigs to create space under the flat sheets. Stones were placed on all refugia to secure them in place in the event of strong winds.

The artificial refugia were placed in areas considered to represent optimal reptile habitat at each of the eight study sites. This varied between sites, but included heathland, acid grassland, bracken, woodland edges, rough grassland, scrub and marshy grassland. The refugia locations at each site are described in Section 4.2 and the exact locations of refugia are listed in Appendix 1.

The number of refugia used varied between sites but numbered between 30 and 60 refugia per site. This gave a relatively low density of refugia (refugia per hectare) when considered across the whole site. However, the focus of the survey was to determine reptile presence and therefore the location of refugia was biased towards the optimal habitat features. The density of refugia placed in suitable reptile habitats was in accordance with Froglife guidelines for reptile surveys (Froglife 1999).

All sites were visited on five occasions during the period April to June 2008, at which time all artificial refugia were examined for reptiles basking on top and sheltering below. Weather conditions were recorded during all visits and surveys were not undertaken in temperatures below 9°C or above 20°C. The survey dates, times and weather conditions are detailed in Appendix 2.

In addition to close examination of artificial refugia, transects were walked through areas of optimum habitats, with surveyors paying close attention to features that could act as basking or refuge areas, such as rock piles, log piles, flat stones, sheets of bark, bare ground and concrete. During the surveys all observations were made from a distance of several metres to avoid disturbing and 'flushing' basking reptiles.

Any reptiles and their shed skin (sloughs) located during each survey were recorded along with national grid reference where this was possible. Where possible, the gender of each reptile was determined and its length estimated. Using this information a crude and subjective assessment was made of the range of age classes present.

3.3 Population Assessment

The principle objective of the surveys was to determine presence of reptiles by focussing survey effort on what were considered to be the optimal habitat features present within each site. However, a tentative conclusion relating to likely population size has also been reached, where possible, using the guidance presented in Table 2 below (Froglife, 1999). It should be noted that population assessments are normally made using data collected by 'mark and recapture' survey techniques, and therefore any population estimates should be treated with caution.

A tentative assessment has also been made about whether each of the sites is likely to qualify as a "Key Reptile Site" (Froglife, 1999), which is a measure of the site's importance for reptiles. The criteria for the selection of Key Reptile Sites are set out in Table 2 below.

Table 2 - Population Size Assessment and Key Reptile Site Criteria (from Froglife 1999).

To qualify for the Key Reptile Site register, the site surveyed must meet at least one of the following criteria:			
1. Supports three or more reptile species.			
2. Supports two snake species.			
3. Supports an exceptional population of one species.			
4. Supports an assemblage of species scoring at least 4.			
5. Does not satisfy 1-5 but which is of particular regional importance due to local rarity.			
Species	Low Population Score =1	Good population Score = 2	Exceptional population Score = 3
Adder	<5	5-10	>10
Grass snake	<5	5-10	>10
Common lizard	<5	5-20	>20
Slow worm	<5	5-20	>20
Figures in the table above refer to the maximum number of adults observed and / or recorded under artificial refugia (placed at a density of up to 10/ha) by one person in one day.			

4 Results

4.1 Desk Study

4.1.1 Designated Sites

A number of designated sites have been identified within 2km of each of the eight sites surveyed. These designated sites are summarised in Table 3 below, but it is noted that none of the sites are specifically noted for their reptile fauna.

Table 3a – Designated sites within the vicinity of Derwent Reservoir

Designated site	Distance from survey site
North Pennine Moor SPA	950m S
North Pennine Moor SAC	950m S
Derwent Gorge and Horsleyhope ravine SSSI	2.6km SE
Burnhope Burn SSSI	600m SE
Muggleswick, Stanhope & Edmudbyers commons & Blanchland moors SSSI	600m S
Pow hill Bog SSSI	Within survey site

Table 3b – Designated sites within the vicinity of Honey Hill WTW

Designated site	Distance from survey site
North Pennine Moor SPA	Within survey site
North Pennine Moor SAC	Within survey site
Derwent Gorge and Horsleyhope ravine SSSI	1.3km NE
Muggleswick, Stanhope & Edmudbyers commons & Blanchland moors SSSI	Within survey site
Hisehope burn valley SSSI	300m N

Table 3c – Designated sites within the vicinity of Smiddy Shaw Reservoir

Designated site	Distance from survey site
North Pennine Moor SPA	Within survey site
North Pennine Moor SAC	Within survey site
Derwent Gorge and Horsleyhope ravine SSSI	2km NE
Muggleswick, Stanhope & Edmudbyers commons & Blanchland moors SSSI	Within survey site
Hisehope burn valley SSSI	1km NE

Table 3d – Designated sites within the vicinity of Hisehope Reservoir

Designated site	Distance from survey site
North Pennine Moor SPA	Within survey site
North Pennine Moor SAC	Within survey site
Muggleswick, Stanhope & Edmudbyers commons & Blanchland moors SSSI	Within survey site

Table 3e – Designated sites within the vicinity of Waskerley Reservoir

Designated site	Distance from survey site
North Pennine Moor SPA	Within survey site
North Pennine Moor SAC	Within survey site
Muggleswick, Stanhope & Edmudbyers commons & Blanchland moors SSSI	Within survey site

Table 3f – Designated sites within the vicinity of Tunstall Reservoir

Designated site	Distance from survey site
North Pennine Moor SPA	4.4km W
North Pennine Moor SAC	4.4km W
Backstone bank and Baal hill woods	Within survey site
Muggleswick, Stanhope & Edmudbyers commons & Blanchland moors SSSI	4.4km W

Table 3g – Designated sites within the vicinity of Presser Pump House

Designated site	Distance from survey site
North Pennine Moor SPA	Within survey site
North Pennine Moor SAC	Within survey site
Muggleswick, Stanhope & Edmudbyers commons & Blanchland moors SSSI	Within survey site

Table 3h – Designated Sites within the vicinity of Burnhope Reservoir

Designated site	Distance from survey site
North Pennine Moor SPA	3.7km SW
Moorhouse-upper Teesdale SAC	3.7km SW
Upper Teesdale SSSI	
Far High House Meadows SSSI	1km SW
Cornriggs Meadows SSSI	2.3km N
North Pennines Dales Meadows SAC	1km SW

Table 3i – Designated site details

Designated Site	Reason for designation
North Pennine Moor SPA	Breeding hen harrier, peregrine falcon, merlin and golden plover.
North Pennine Moor SAC	Dry heath, juniper communities, blanket bogs, petrifying springs, siliceous rocky slopes and sessile oak woods.
Moorhouse-upper Teesdale SAC	Alpine and boreal heathland, blanket bogs, limestone pavement, marsh saxifrage, round mouthed whorl snail.
North Pennines Dales Meadows SAC	Mountain hay meadows and <i>Molinia</i> meadows on calcareous, peaty or clayey silt-laden soils.
Derwent Gorge and Horsleyhope Ravine SSSI	Ancient woodland
Burnhope Burn SSSI	Extensive area of woodland on sheltered slope
Muggleswick, Stanhope & Edmundbyers Commons & Blanchland Moors SSSI	Extensive areas of dry heath and presence of wet heath, acid grassland, flushes, relict juniper woodland and small open

Designated Site	Reason for designation
	water bodies
Pow Hill Bog SSSI	Includes a valley mire and soligenous mire
Hisehope Burn Valley SSSI	Noted for areas of juniper scrub and soligenous mire. Valley woodland, calcareous grassland and semi-improved acidic grassland.
Backstone Bank and Baal Hill Woods	Largest expanse of semi-natural woodland in West Durham.
Upper Teesdale SSSI	Extensive upland area within the North Pennines which contains a number of nationally rare habitat types as well as a rich variety of representative habitats.
Far High House Meadows SSSI	Supports important plant communities characteristic of northern hay meadows maintained by traditional farming methods.
Cornriggs Meadows SSSI	A series of fields includes varied meadow grasslands and a grazing pasture. One field supports a large colony of a rare lady's mantle <i>Alchemilla acutiloba</i> which is endemic to Teesdale and Weardale.

4.1.2 Reptiles

The North East Reptile Atlas shows that core range of adders within County Durham is the area in which the eight study sites are located. Within the County it is reported that adders are predominately found in areas of mid-altitude moorland and in afforested areas.

Grass snake is the most scarce native reptile species occurring within north-east England. The main known population in County Durham, where two thirds of all records originate, is within the Lower Derwent valley. There are also populations of this species within the Wear valley. During the surveys carried out in 2008 anecdotal records (c. 25 years old) were received of grass snake breeding at Tunstall Reservoir from site-based personnel.

Slow worm has two core distribution areas within County Durham. The first is a coastal strip centred on Dene Mouth (NZ 456407). The second, which is the larger area, is located in mid-altitude moorland with many records coming from river valleys extending into the west of the County. The largest proportion of slow worm records comes from Hamsterley Forest to the south of the wear valley. As with adder, the main stronghold for this species is the area in which the survey sites are located.

The distribution of common lizard in County Durham is similar to that of slow worm with two main distribution areas along the coastal strip and on mid and upper altitude moorland. As with slow worm the coastal population is associated with Dene Mouth and nearby coastal cliffs. Common lizards are also present in the Teesside area, where they are found in sand dunes and derelict industrial sites. The moorland population of common lizards is probably more extensive than slow worm as they are also recorded in some bog habitats. The principle area of their distribution is the area in which the survey sites are located.

Table 4 – Historical records of reptiles within or near the survey sites (Provided by Durham Biodiversity Data Service).

Site	Record details (date and distance from site)			
	Common Lizard	Adder	Slow Worm	Grass snake.
Derwent Reservoir	-	2006. Pow Hill meadow. NZ014515 (on site)	2006. Pow Hill meadow. NZ014515 (on site)	-
	-	2005 Pow Hill, NZ010519 (on site).	2002 Pow Hill, NZ010519 (on site).	-
	-	2005 Pow Hill, NZ010518 (on site).	2005. Castleside picnic area. NZ007484. (>5km ESE of site)	-
Hisehope Reservoir	-	2006. Muggleswick common. NZ0346. >2km E of site.	-	-
Smiddy Shaw Reservoir	-	2006. Muggleswick common. NZ0346. >1km W of site.	-	-
	-	2005. Moorcock Inn Waskerley. NZ050466. >300m NE of site.	-	-
Honey Hill WTW	-	2005. Moorcock Inn Waskerley. NZ050466. >200m S of site.	-	-
	-	2006. Muggleswick common. NZ0346. >1km W of site.	-	-
	-	2005. Waskerley way disused cutting. NZ064452. >2km SE of site.	-	-
	-	2005. Waskerley way disused cutting. NZ064446. >2km SE of site.	-	-
Waskerley Reservoir	-	-	-	-
Tunstall Reservoir	-	-	2000. Tunstall reservoir NZ068408 (on site)	-
			2005. Tunstall reservoir NZ066408 (on site)	
			2005. Tunstall reservoir NZ0641 (on site)	
Burnhope Reservoir	-	-	-	-

Searches undertaken using the NBN gateway showed a similar distribution to the data provided by DBDS. In addition, records of common lizard were returned for various additional sites including Tunstall reservoir. However, these records dated from the early 1980s with no recent records available. The search using the NBN gateway also identified adder within the area surrounding the eight survey sites.

Slow worm has been recorded at Muggleswick Common, which is close to several of the survey sites. In addition, this species has been recorded at Edmundbyers, which is close to Derwent Reservoir, and at Salter's Gate, which is close to Tunstall Reservoir.

One record of grass snake from Edmundbyers is included in the NBN gateway data, however this record dates from 1958.

There are frequent adder records listed on the NBN gateway from the area within which the sites are located. This species has previously been recorded at Tunstall Reservoir Nature Reserve, Salter's Gate and Waskerley Way railway embankments.

4.2 Habitat Evaluation

In this section the habitats at each of the eight NWL sites are described, together with the survey strategy that was employed to ensure coverage of those habitats considered most likely to support reptiles.

4.2.1 Derwent Reservoir

Habitat Description

Derwent Reservoir is located on the eastern edge of the North Pennines. The habitats that surround the reservoir include grazed pasture, coniferous forestry plantation, mixed plantation woodland, dense bracken and amenity grassland on the dam wall. The area surrounding the reservoir is characterised by extensive areas of upland heather moorland. To the south and east of the reservoir the land use is characterised by enclosed fields predominately used for sheep grazing. Field boundaries are mostly fence lines and dry stone walls. There are extensive areas of gorse *Ulex europaeus* scrub present in areas such as Cronkley, which is located on the northern shore of the reservoir. Also present at Cronkley and at the western end of the reservoir are areas of unimproved acid grassland.

Survey Strategy

Four areas were targeted within the reptile survey at Derwent Reservoir and these are highlighted below.

Cronkley: Cronkley comprises a mixture of pasture fields, acid grassland, clear-felled and replanted conifer plantation and mature conifer plantation. Dense stands of gorse scrub are present within pasture to the eastern end of this part of the site. Marshy grassland is present at the margins of the reservoir.

A total of 20 refugia were set out within the clear-felled forestry, along the forestry edges and within the gorse scrub and acid grassland.

Dam area: The dam area comprises a combination of mixed plantation woodland blocks and pasture and managed grassland on and below the dam wall. Adjacent to some of the forestry blocks are areas of rough grassland and gorse scrub.

A series of 20 refugia were placed adjacent to the plantation and scrub below the dam wall. The refugia were placed in areas where public access was restricted to minimise the risk of disturbance affecting the survey results.

Nature Reserve: A total of thirty refugia were set out in the area designated as Nature Reserve and these were divided between three different areas: 10 refugia were placed in rough grassland and rush pasture around the headwaters of the reservoir; a further 10 refugia were placed between the plantation edge and the shoreline at the western end of the reservoir; and a third set of 10 refugia were set out among plantation and grassland where a small tributary enters the reservoir through woodland on the northern bank.

Two of the refugia placed in rough grassland and rush pasture around the headwaters of the reservoir were lost in April 2008 due to high water levels in the reservoir at that time. It is possible that the changing water levels may have resulted in reptile displacement from the general area.

Pow Hill: The use of refugia was limited at Pow Hill due to the large visitor numbers to this area and the high potential for disturbance. Because of concerns that reptile refugia might be interfered with it was decided to only place a small number of refugia in this area. To compensate for this additional time was spent searching areas of good reptile habitat within this part of the site.

4.2.2 Waskerley Reservoir

Habitat Description

Waskerley Reservoir is situated within an area of extensive moorland in the North Pennines. The site itself comprises a thin strip of vegetation surrounding the reservoir, and this comprises upland heathland, acid grassland, rush pasture and bog habitats. These are interspersed with wet flushes and small watercourses that run into the reservoir from the surrounding slopes. The heathland is most extensive on the southern side of the reservoir and appears to have been subject to past management. Stands of heather of different age classes were evident, with some evidence of past burning.

On the northern bank of the reservoir the habitats comprise heavily grazed grassland habitats and areas where there is a heather-grassland mosaic. An area of conifer plantation woodland is present to the north-east corner of the reservoir.

Survey Strategy

A total of 43 refugia were used at Waskerley Reservoir. These were mostly set out in linear blocks within suitable habitats due to the narrow strip of land present around the reservoir. Refugia were set out in the main habitats considered likely to support reptiles, in particular bog, dense heather, heather and acid grassland mosaic and areas of tussocky acid grassland.

4.2.3 Smiddy Shaw Reservoir

Habitat Description

Smiddy Shaw Reservoir is situated on the eastern edge of an extensive area of moorland. The site comprises upland heather moorland with some wet flushes and areas of blanket bog adjacent to the reservoir. In many areas the heather forms a mosaic with acid grassland and bog habitats. The engineered sides of the dam to the north and east are vegetated with a short grassland sward with pioneer heather developing.

Survey Strategy

A total of 30 refugia were set out at Smiddy Shaw Reservoir. Two groups of 15 refugia were placed along the southern and western edges of the reservoir, where the habitats present were considered most likely to support reptiles.

4.2.4 Hisehope Reservoir

Habitat Description

Hisehope Reservoir is situated within an area of extensive moorland in the North Pennines. The site itself comprises a broad strip of vegetation surrounding the reservoir: habitats present include upland heathland, acid grassland, bracken, rush pasture and bog. To the south of the reservoir are extensive areas of recently burnt heather interspersed with even-aged stands of heather located adjacent to the reservoir. There are also areas of heather-grassland mosaic with some boulder scree. The south shore of the reservoir is characterised by a mosaic of heather, bracken, grassland, wet flush and bog habitats. On the dam wall is an extensive area of mature heather.

Survey Strategy

A total of 42 refugia were set out at Hisehope Reservoir within the mature heather on the dam wall, within heather elsewhere within the site, and in the grassland and bracken to the north of the reservoir. To the south of the reservoir refugia were set out along the boundary between areas of burnt heather and stands of mature heather and also in areas of regenerating heather.

4.2.5 Honey Hill Water Treatment Works

Habitat Description

Honey Hill Water Treatment Works (WTW) comprises a series of built structures, areas of hard-standing and amenity grassland at the eastern end of the site. The site also comprises an extensive area of heather and grassland mosaic. Within the site are a series of settling lagoons used as part of the water treatment process. Surrounding some of the lagoons at the northernmost part of the site are areas of conifer plantation.

Survey Strategy

A total of 25 refugia were set out within the site specifically in the heather and grassland mosaic and around the lagoons. Refugia were located at habitat interfaces, such as the edges of stands of heather and habitats adjacent to lagoons.

4.2.6 Tunstall Reservoir

Habitat Description

A variety of habitats are present around Tunstall Reservoir. The eastern side of the reservoir comprises an area of broadleaved and conifer woodland. The broadleaved woodland (Blackstone Bank Wood) is situated on a steep, west-facing slope and is designated a Site of Special Scientific Interest (SSSI). The woodland comprises a mix of alder *Alnus glutinosa* ash *Fraxinus excelsior* and silver birch *Betula pendula*. The relatively open tree canopy has allowed a ground layer of grasses to develop, though this gives way to mosses and rushes where wet flushes seep down the bank to the reservoir.

At the northern end of the reservoir is an area of marshy grassland, tussocky grassland and willow scrub. This area is managed as a nature reserve.

At the western side of the site there is a thin strip of mature conifer plantation comprising Scot's pine *Pinus sylvestris*. Beneath the canopy is a ground layer of grasses including cocksfoot *Dactylis glomerata* and tufted hair grass *Deschampsia cespitosa*. Elsewhere in this part of the site the habitats comprise open grassland (dominated by the same species listed previously), amenity grassland and bramble scrub. At the northern end of this strip there is willow *Salix* sp, hawthorn *Crataegus monogyna* and alder scrub and some heathland.

Survey Strategy

Refugia were set out at four locations that were considered most likely to support reptiles. Although other suitable habitats were identified, these were ruled out due to public access and a high risk of disturbance. A total of 15 refugia were set out in marshy grassland, tussocky grassland and along the edge of areas of scrub. A further 10 refugia were set out in open areas within Blackstone Bank Wood, and a further 5 refugia were set out amongst scrub at the north-west end of the reservoir. Another 10 refugia were set out within grassland, new plantation and wasteland habitats at the south-east corner of the site.

4.2.7 Burnhope Reservoir

Habitat Description

Burnhope Reservoir is situated in Upper Weardale within an extensive area of upland moorland in the North Pennines. The area immediately surrounding the reservoir is dominated by dense conifer plantations. Beyond this to the south and west the habitats comprise heather moorland and bog. To the north and east the habitat is mostly pasture. Areas of coarse grassland and heather-grassland mosaic were identified to the north of the reservoir.

Below the dam wall there are extensive areas of marshy rush-dominated grassland and there is improved grassland present on the dam wall itself. At the western end of the reservoir habitats comprise acid grassland, bog and rush pasture.

Survey Strategy

A series of refugia were set out at the base of the dam wall within the area of rush pasture. Refugia were also set out within the coarse grassland and marshy grassland present at the north-east corner of the reservoir. Additional refugia were set out in the area of heather-acid grassland mosaic surrounding the reservoir. Refugia were also set out in the moorland habitats present at the western end of the reservoir. A total of 60 refugia were deployed at this site.

4.2.8 Presser Pump House

Habitat Description

Presser Pump House is located on the edge of moorland to the south of Blanchland. It occupies an elevated position on the side of a small valley through which the Bolts Burn flows in a northerly direction before joining the River Derwent. The site comprises areas of young plantation woodland, heather-acid grassland mosaic and semi-improved grassland. Buildings are also present within the site and there are some areas adjacent to these buildings that appear to have been landscaped. Some areas of rushes are present throughout the site. The site is bounded by fence lines and stone walls.

Survey strategy

A total of 21 refugia were set out within the site, with refugia being set out in linear groups of seven. Refugia were evenly spaced out across the site in habitats considered to be most likely to support reptiles, such as areas of heather-grassland mosaic.

5 Analysis

5.1 Presence of Reptiles and Population Size Estimates

The findings of the reptile surveys are summarised and discussed below for each of the eight NWL sites. A crude assessment of population size has been made where the data permits: populations have been rated as being 'low', 'good' and 'exceptional' using the approach suggested by Froglife (see Table 2 in Section 3.3).

For each site a summary is provided of the species recorded and the habitats in which they occurred. Whilst this provides a checklist of species and habitat associations for each site, it should be noted that the survey was biased towards optimal habitats. Consequently habitat features that were not surveyed so thoroughly (such as dense conifer plantation) cannot be discounted as potentially supporting reptiles.

In the tables that follow the confirmed presence of a species is indicated by 'Y' and where no records were obtained this is indicated with the symbol '-'. Appendix 2 provides details of the reptiles recorded at each site. Where possible a grid reference has been provided for each record.

5.1.1 Derwent Reservoir

Four areas were surveyed around Derwent Reservoir, but of these Pow Hill was the only area where reptiles were recorded. Two adders were recorded in an area of thick bracken, one of which was a small female and was carrying prey in her mouth. In addition, common lizards were recorded close to a small tributary in an area of bracken. The peak count during the surveys was 1 adder and 2 common lizards, which is indicative of a low population (Froglife, 1999). It should be noted that these results are based on a relatively low density of refugia, which was due to concerns about possible interference with refugia by the large numbers of visitors using the area.

Table 5 - Summary reptile results from Derwent Reservoir (Pow Hill area)

Species	Habitats		
	Bracken / open ground	Dense bracken	Rocky area
Common lizard	-	Y	-
Slow worm	-	-	-
Adder	Y	-	-
Grass snake	-	-	-

5.1.2 Waskerley Reservoir

Adder and common lizard were both recorded at the Waskerley Reservoir site. The habitats where reptiles were recorded were the area of heather on the south shore of the reservoir (both adder and common lizard were recorded here) and the acid grassland-heather mosaic on the north shore of the reservoir (where common lizard was recorded).

The peak reptile count from the surveys was 1 adder and 1 common lizard, which is indicative of a low population (Froglife, 1999). During all of the survey visits a total of 6 common lizards were recorded on site. Two were found underneath refugia in the acid grassland-heather mosaic and four, including a juvenile, were found on the south shore, either on top of the heather or using the refugia.

Table 6 - Summary reptile results from Waskerley Reservoir

Species	Habitats		
	Blanket	Heather	Heath & Acid grassland
Common lizard	-	Y	Y
Slow worm	-	-	-
Adder	-	Y	-
Grass snake	-	-	-

5.1.3 Smiddy Shaw Reservoir

Common lizard and adder were both recorded at Smiddy Shaw Reservoir. Both species was recorded a total of three times. Two female adders were recorded at the end of the south shore in an area of heather moorland at NZ 04054588 and NZ 04024597 on separate days. A third adder was found crushed by a car on the gravel track leading from the main road to the reservoir. Common lizards were recorded on the western and southern shore in an area of heather moorland and an area of acid grassland and bog. During the survey refugia were lost due to heather burning, and this is likely to have had an impact on the number of reptiles recorded.

Table 7 - Summary reptile results from Smiddy Shaw Reservoir

Species	Habitats		
	Blanket bog	Heather moorland	Acid grassland / bog
Common lizard	-	Y	Y
Slow worm	-	-	-
Adder	-	Y	-
Grass snake	-	-	-

5.1.4 Hisehope Reservoir

Common lizard and a slow worm were both recorded at Hisehope Reservoir. The habitats where reptiles were recorded were the areas of heathland to the east of the reservoir and the regenerating heather along the north and south banks. The slow worm was found underneath refugia in the regenerating heather on the south bank.

The peak reptile count was one lizard and one slow worm, which is indicative of a low population (Froglife, 1999).

Table 8 - Summary reptile results from Hisehope Reservoir

Species	Habitats	
	Heathland	Regenerating heather moorland
Common lizard	Y	Y
Slow worm	Y	-
Adder	-	-
Grass snake	-	-

5.1.5 Honey Hill Water Treatment Works

Common lizard was the only species recorded at Honey Hill WTW. The population of this species at this site would appear to be relatively small, with only one individual being detected during all of the survey visits. The relatively high level of disturbance from people using the works may account for the low reptile numbers recorded at this site.

5.1.6 Tunstall Reservoir

Tunstall Reservoir supports three species of reptile: adder, common lizard and slow worm. The surveys carried out at this site identified low numbers of all three species: peak counts of 1 adder, 2 common lizards and 2 slow worms) which is indicative of a low population (Froglife, 1999). Slow worm was recorded during all survey visits at Tunstall Reservoir, except for the last visit. In accordance with the criteria detailed in Table 2, the site qualifies as a Key Reptile Site as three species are present.

Slow worms were detected both in the nature reserve at the northern end of the reservoir and in the immature plantation below the dam wall. Adder was also recorded in the nature reserve. Common lizards were recorded in the grass understorey within the Scot's pine plantation on the west shore of the reservoir, and underneath refugia in the nature reserve.

Table 9 - Summary reptile results from Tunstall Reservoir

Species	Habitats			
	Marshy grassland	Bank woodland	Scrub / heathland	New plantation
Common lizard	Y	Y	-	-
Slow worm	Y	-	-	Y
Adder	Y	-	-	-
Grass snake	-	-	-	-

5.1.7 Burnhope Reservoir

Common lizard was the only reptile species recorded at this site. It was recorded in three out of the four habitat areas surveyed, which were the areas of rush pasture, rough grassland and moorland. The peak count for common lizards was 2, indicating a low population (Froglife, 1999).

Table 10 - Summary reptile results from Burnhope Reservoir

Species	Habitats			
	Rush pasture	Rough grassland	Moorland	Acid grassland
Common lizard	Y	Y	Y	-
Slow worm	-	-	-	-
Adder	-	-	-	-
Grass snake	-	-	-	-

5.1.8 Presser Pump House

No reptiles were recorded at Presser Pump House. It is not clear why reptiles were not present as suitable habitat has been identified within the site. A possible explanation could be that the site is relatively exposed due to its location, which may affect the micro-habitat conditions for reptiles..

5.2 Constraints on Study Information

All surveys were carried out at an appropriate time of the year in good weather conditions when reptiles would be expected to be active. All sites were examined thoroughly and so no constraints have been identified. It is noted that weather conditions in the weeks preceding the survey programme were generally cold and wet and this may have had an affect on reptile behaviour and possibly survival rates.

As previously noted, at Derwent Reservoir a rise in the water level resulted in the loss of two refugia during April 2008. Whilst the other refugia were unaffected it is possible that the fluctuating water levels resulted in some reptile displacement from the survey area.

6 Management Recommendations

6.1.1 Derwent Reservoir

Adder and common lizard have been detected at Pow Hill at Derwent Reservoir but no reptiles were detected at the other three sites that were surveyed. The habitat where the reptiles were recorded was in dense bracken on a steep slope in an area that has a high number of visitors. Consequently visitor-related disturbance does not appear to be a particular issue at Pow Hill.

Derwent Reservoir is surrounded by a range of habitats that are suitable for reptiles so it is unclear why so few reptiles were detected during the survey. Possible explanations include grazing pressure and disturbance from members of the public. In both cases the significance of these impacts is likely to be related to the quality of the habitat and specifically to the availability of natural refugia. It is also possible that the population has been under-recorded due to the extensive nature of the habitats that surround the reservoir. Consequently reptiles can readily relocate in response to local disturbance.

It is recommended that some areas of optimal reptile habitat are protected from excessive grazing pressure and recreational disturbance. Where feasible to do so these protected areas should be linked to habitats outside the site boundary that are considered to have high potential to support reptiles. These areas could provide a source of reptiles that will, over time, colonise the site.

6.1.2 Waskerley Reservoir

Adder and common lizard have been detected in the habitats surrounding Waskerley Reservoir. The majority of the records came from the heather habitat on the south shore of the reservoir. It is therefore recommended that this habitat is retained and managed to benefit reptiles by ensuring that stands of different age and height are created. Maintenance of a mosaic of tussocky grassland and heather will also help to benefit reptiles by creating a diverse range of foraging and sheltering habitats. Low levels of grazing will help to achieve this.

6.1.3 Smiddy Shaw Reservoir

Common lizard and adder have been recorded in low numbers at Smiddy Shaw Reservoir. These records have come from the heathland and acid grassland habitats that surround the reservoir. It is therefore recommended that this habitat is retained and managed to benefit reptiles by ensuring that stands of heather of different age and height are created. Maintenance of a mosaic of tussocky grassland and heather will also help to benefit reptiles by creating a diverse range of foraging and sheltering habitats. Low levels of grazing will help to achieve this.

6.1.4 Hisehope Reservoir

Common lizard and slow worm were recorded in heathland habitat to the east of the reservoir and in regenerating heather along the north and south banks. It is therefore recommended that the areas of heather are retained and managed to benefit reptiles by ensuring that stands of heather of different age and height are created. Maintenance of a mosaic of tussocky grassland and heather will also help to benefit reptiles by creating a diverse range of foraging and sheltering habitats. Low levels of grazing will help to achieve this.

6.1.5 Honey Hill Water Treatment Works

Surveys at Honey Hill WTW recorded only one common lizard. However the habitats within this site are considered to provide good opportunities for reptiles. The absence of reptiles at this site may be due to a combination of past disturbance and a low population in the surrounding area. Although the surrounding area was not included in the survey, it is considered to be relatively poor for reptiles due to the habitats present and the presence of sheep. If this proves to be true it is unlikely that reptiles will recolonise the Honey Hill site from adjacent habitats.

Nevertheless, the presence of common lizard indicates that a small residual population is present. It is therefore recommended that the site is managed and enhanced with a view to encouraging the future growth of this population. This could be achieved by encouraging further heather development and the retention of tussocky acid grassland as well as open basking sites. Refugia could also be created using piles of stones.

6.1.6 Tunstall Reservoir

Tunstall Reservoir supports three species of reptiles - adder, slow worm and common lizard. Although grass snake was not seen at this site, the habitats are considered to be suitable and anecdotal records from staff indicate that it has previously bred within the site. The nature reserve supports all three species of reptile and this was the only area where adders were recorded.

It appears that the habitats are currently optimal for reptiles, particularly within the nature reserve. Consequently it is recommended that the current management regime is maintained.

6.1.7 Burnhope Reservoir

Common lizard was the only species recorded at Burnhope Reservoir, but this species was recorded in three of the four habitats covered by the survey. It is recommended that a diverse habitat structure is maintained and, where possible, enhanced to benefit this species. Tussocky grassland should be preserved by restricting grazing pressure, and heather regeneration should be encouraged in suitable areas.

Plantation woodland along the northern and southern shores of the reservoir are likely to restrict reptile distribution in these areas. Selective felling could be carried out on the eastern side of the plantation blocks to create areas of new habitat into which reptiles could move from those areas where they were recorded during the most recent surveys.

6.1.8 Presser Pump House

No reptiles have been detected at Presser Pump House, despite the presence of what appears to be suitable habitat. It is possible that reptiles are absent from this site due to its exposed nature. If this is the case then the site may benefit from some tree and scrub planting to create wind-breaks around the site boundary. The introduction of refugia, such as piles of stones, may also help to encourage colonisation by reptiles.

7 Summary

Reptile populations have been detected on six of the seven sites surveyed (Waskerley Reservoir, Tunstall Reservoir, Burnhope Reservoir, Smiddy Shaw Reservoir, Hisehope Reservoir and Honey Hill WTW). Three species have been recorded at these sites: common lizard, adder and slow worm. Common lizard was the most widespread species, occurring on six of the sites. Adder occurred at Waskerley Reservoir, Smiddy Shaw Reservoir and Tunstall Reservoir, and slow worm was recorded at Tunstall Reservoir and Hisehope Reservoir. At Derwent Reservoir reptiles were only detected at the Pow Hill site (adder and slow worm).

Tunstall Reservoir was identified as supporting adder, common lizard and slow worm and thus qualified as a Key Reptile Site (as it supports three native reptile species) in accordance with Froglife guidance (1999).

A number of habitat management measures are discussed for those sites that currently support reptiles but where the populations currently appear to be low. The described measures are designed to maintain and enhance the existing habitats for reptiles, and include the creation of new habitat features where this is considered to be appropriate and beneficial.

8 References

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9 Appendix 1 - Refugia numbers and locations

Refugia No	Site and grid reference ¹							
	Derwent (NZ/NY)	Waskerley (NZ)	Smiddy Shaw (NZ)	Hisehope (NZ)	Honey Hill (NZ)	Tunstall (NZ)	Burnhope (NY)	Presser Pump house (NY)
1	NZ03012 51305	02351 43867	04576 46046	02221 46691	05156 47165	06917 41898	84800 39199	96127 47838
2	NZ03010 51312	02529 43867	04569 46043	02230 46683	05149 47136	06906 41903	84800 39199	96116 47818
3	NZ03005 51316	02526 43865	04558 46019	02238 46673	05142 47173	06882 41936	84815 39189	96107 47823
4	NZ02988 51327	02519 43866	04558 46019	02265 46626	05143 47182	06878 41934	84809 39186	96092 47812
5	NZ02983 51331	02513 43872	04547 46006	02276 46598	05143 47196	06871 41933	84805 39182	96068 47835
6	NZ02973 51334	02505 43880	04534 46002	02289 46570	05088 47143	06862 41969	84802 39182	96065 47831
7	NZ02964 51347	02493 43884	04486 45966	02294 46558	05085 47145	06856 41975	84790 39168	96054 47819
8	NZ02953 51360	02473 43898	04460 45943	02303 46542	05079 47142	06840 41989	84784 39166	96044 47818
9	NZ02940 51369	02470 43901	04444 45920	02298 46572	05076 47140	06827 41993	84770 39152	95956 47812
10	NZ02932 51377	02463 43905	04439 45298	02308 46540	05065 47147	06819 41993	84768 39140	95973 47809
11	NZ02966 51181	02435 43932	04423 45910	02068 46588	05040 47156	06806 41994	84769 39138	95988 47830
12	NZ02939 51167	02414 43938	04374 45904	02065 46582	05032 47150	06792 42000	84766 39123	95996 47836
13	NZ02936 51171	02393 43962	04333 45884	02059 46568	05015 47133	06785 42000	84724 39055	96010 47840
14	NZ02930 51177	02375 43961	04308 45886	02051 46552	05007 47121	06779 42000	84722 39053	96011 47848
15	NZ02912 51187	02343 43973	04296 45886	02050 46549	04992 46977	06770 42001	84717 39049	96028 47854
16	NZ02900 51188	02342 43972	04090 45915	02061 46522	04975 46979	06920 41709	84709 39048	96033 47860
17	NZ02866 51203	02342 43972	04069 45935	02054 46520	04961 47000	06916 41699	84703 39044	
18	NZ02858 51192	02342 43974	04058 45955	02048 46517	04966 47022	06921 41697	84696 39036	
19	NZ02795 51224	02349 43990	04063 45969	02034 46508	04969 47034	06924 41688	84685 39028	
20	NZ02776 51241	02304 43992	04031 46016	02028 46499	04969 47034	06925 41685	84685 39027	
21	NZ02414 52610	02296 43993	04033 46022	02028 46491	04970 47048	06923 41679	84520 39265	
22	NZ02415 52608	02266 44008	04031 46033	01957 46351	04975 47064	06917 41667	84520 39300	
23	NZ02454 52583	02250 43997	04031 46037	01949 46352	04975 47064	06917 41667	84502 39304	
24	NZ02480 52561	02246 43998	04028 46046	01940 46355	04992 47069	06882 41618	84498 39305	
25	NZ02521 52650	02224 44006	04030 46077	01912 46296	04994 47076	06878 41608	84479 39303	
26	NZ02527 52635	02071 44288	03981 46101	01916 46294		06809 41803	84452 39291	
27	NZ02530 52620	02066 44293	03988 46108	01915 46293		06809 41803	84436 39276	
28	NZ02589 52585	02063 44295	03994 46119	01913 46269		06810 41784	84428 39268	
29	NZ02679 52560	02061 44294	03995 46132	01999 46268		06812 41774	84421 39236	
30	NZ02675 52568	02043 44294	04004 46140	02011 46278		06753 41669	84415 39224	
31	NZ01858	02035		02026		06685	84125	

Refugia No	Site and grid reference ¹							
	Derwent (NZ/NY)	Waskerley (NZ)	Smiddy Shaw (NZ)	Hisehope (NZ)	Honey Hill (NZ)	Tunstall (NZ)	Burnhope (NY)	Presser Pump house (NY)
	52555	44299		46284		40434	39221	
32	NZ01861 52544	02011 44289		02039 46294		06672 40443	84119 39229	
33	NZ01864 52532	01996 44284		02050 46300		06672 40446	84110 39227	
34	NZ01881 52505	01983 44291		02074 46302		06659 40491	84084 39219	
35	NZ01879 52487	01959 44244		02014 46302		06652 40537	84072 39215	
36	NZ01883 52480	01939 44247		02135 46311		06650 40536	84168 39189	
37	NZ01884 52459	01926 44240		02166 46315		06646 40484	84162 39195	
38	NZ01891 52461	01907 44233		02219 46300		06652 40425	84148 39191	
39	NZ01898 52432	01591 44083		02249 46306		06638 40439	84127 39189	
40	NZ01898 52432	01591 44083		02282 46297		06641 40455	84097 39178	
41	NY98423 51531	01578 44074		02280 46304			84076 39161	
42	NY98454 51520	01583 44086		02289 46303			84059 39153	
43	NY98462 51535	01574 44081					83158 38715	
44	NY98460 51529						83164 38703	
45	NY98515 51535						83174 38701	
46	NY98518 51537						83118 38692	
47	NY98533 51529						83121 38674	
48	NY98534 51517						82984 38763	
49	98536 51515						82991 38768	
50	NY98753 52222						82997 38768	
51	NY98756 52202						83008 38767	
52	NY98781 52213						83018 38768	
53	NY98791 52207						82972 38748	
54	NY98807 52182						82982 38743	
55	NY98810 52185						82995 38737	
56	NY98869 52177						83001 38735	
57	NY98841 52122						83013 38738	
58	NY98820 52093						83086 38620	
59	NY98615 51656						83089 38619	
60	NY98596 51630						83114 38626	
61	NY98598 51630							
62	NY98606 51620							
63	NY98608 51619							
64	NY98609 51617							
65	NY98618 51609							

Refugia No	Site and grid reference ¹							
	Derwent (NZ/NY)	Waskerley (NZ)	Smiddy Shaw (NZ)	Hisehope (NZ)	Honey Hill (NZ)	Tunstall (NZ)	Burnhope (NY)	Presser Pump house (NY)
66	NY98620 51605							
67	NY98637 51599							
68	NY98649 51596							

10 Appendix 2 – Survey Dates, Times and Conditions

Site	Date	Times	Weather Conditions				Notes
			Wind	Cloud cover	Temp (°C)	Rain	
Derwent	01.05.08	9.30-14.00	SE 2-3	4-6	10 - 11	Some light showers	
Derwent	08.05.08	14.25-17.25	SE 1-2	0	c.16	None	
Derwent	04.06.08	9.30-13.45	Still	6	16.5-19.5	None	
Derwent	18.06.08	15.50-17.00	Light	8	16.5	Light rain later	
Derwent	19.06.08	9.15-11.45	Strong	7	13.5	None	
Waskerley	25.04.08	15.10-16.40	Light	8	11	Some light rain	
Waskerley	29.04.08	12.10-15.15	SSE 3-4	3	12	Light rain earlier in day	
Waskerley	04.06.08	14.30-16.00	Still	6	17	None	
Waskerley	19.06.08	15.00-15.30	Strong NE	7	12	Some rain later	
Waskerley	20.06.08	15.55-16.10	Strong NE	4	13.5	None	
Hisehope	25.04.08	12.40-13.45	Light	8	16	None	
Hisehope	29.04.08	11.15-12.50	SE 2-4	3	13	None	
Hisehope	14.05.08	11.15-13.10	NE 1	8	9.5	None	
Hisehope	10.06.08	10.30-11.15	Strong	7	14	None	
Hisehope	24.06.08	14.00-14.50	Light	8	16	None	
Smiddy Shaw	25.04.08	11.48-12.35	Light	8	14	None	
Smiddy Shaw	29.04.08	13.30-16.40	S 3-4	7	11.5	Showers earlier in the day	
Smiddy Shaw	7.05.08	13.00-15.00	SE 2	6	16	None	
Smiddy Shaw	10.06.08	11.25-11.55	Strong	6	15	None	
Smiddy Shaw	24.06.08	13.05-13.55	Light	8	16	None	
Honey Hill	25.4.08	09.30-10.20	Light NW	8	-	None	
Honey Hill	29.04.08	10.00-11.00	Light	2	12.5	None	Feeling cool in breeze
Honey Hill	14.05.08	10.15-11.10	NW 1-2	8	10.5	None	
Honey Hill	10.06.08	12.00-13.00	Strong	7	17	None	
Honey Hill	24.06.08	15.00-16.00	Light	8	16	Occasional	
Tunstall	1.05.08	15.15-16.40	SE 2-3	2-3	11	None	Follows showers earlier in day
Tunstall	8.05.08	11.45-13.00	SE 1	0	15	None	
Tunstall	14.05.08	16.50-18.30	NE 1-2	4	13	None	Bright after cloudy day.

Site	Date	Times	Weather Conditions				
			Wind	Cloud cover	Temp (°C)	Rain	Notes
Tunstall	18.06.08	10.50-12.45	Light	8	14	None	
Tunstall	20.06.08	13.15-15.00	Light NE	6	15.5	None	
Burnhope	7.05.08	15.40-17.30	NE 2	3-4	15	None	
Burnhope	14.05.08	14.00-16.10	E 2	2-5 variable	12.5	None	Sun breaking through following cloudy day
Burnhope	10.06.08	14.00-15.45	Strong	6	17	None	
Burnhope	19.06.08	12.15-13.15	Strong	7	13	None	
Burnhope	20.06.08	10.50-12.30	Strong NE	5	15	Occasional	
Presser Pump House	16.05.08	16.00-16.45					
Presser Pump House	10.06.08	16.05-16.30	Strong	7	14.5	None	
Presser Pump House	10.06.08	10.05-10.20	Strong	7	14	None	
Presser Pump House	18.06.08	13.05- 13.40	Light	7	14	None	
Presser Pump House	19.06.08	14.25-14.50	Strong	7	12	None	

11 Appendix 3 – Reptile Survey Results

Site	Date	Records	Tin no	GPS refs (where available)	Comments
Visit 1					
Smiddy Shaw	25/4/08	Common lizard x 1	12	NZ 03988 46108	On refugia darted into heather
Hisehope Reservoir	25/4/08	Common lizard x 1	10		On refugia
Waskerley Reservoir	25/04/08	Common lizard x 1	8		Under stones placed to hold refugia in place - sluggish
Tunstall Reservoir	01/05/08	Slow worm x 1	6		Under refugia – individual with tail missing
Tunstall Reservoir	01/05/08	Adder (male) x1	Near 6		Very bright individual basking in grassland adjacent to woods – retreated to hole in earth inside woods.
Visit 2					
Smiddy Shaw	29/04/08	Adder (Male) x1	n/a	NZ 04604 46045	Dead adder on hardcore track probably squashed by vehicle when basking.
Smiddy Shaw	29/04/08	Common lizard x 1	n/a	NZ 04471 45951	Common lizard with entire tail missing, ran into heather following basking in open grass.
Hisehope Reservoir	29.04.08	Common lizard x 1		NZ 02056 44436	Adult common lizard under refugia.
Honey Hill	29.04.08	Common lizard x 1	n/a		Common lizard very brief sighting before lizard disappeared into grass.
Waskerley Reservoir	29.04.08	Adder (Female) x 1	n/a	NZ 02531 43857	Adder located adjacent to matt – flushed into heather, presumed same animal was observed shortly afterwards on the matt.
Waskerley Reservoir	29.04.08	Common lizard		NZ 02467 43898	1 adult common lizard on matt
Tunstall Reservoir	8.05.08	Slow Worm (Female x 1)	6		Lying below matt, some tail missing.
Tunstall Reservoir	8.05.08	Slow Worm (male x 1)	35		Lying below matt, in immature plantation.
Derwent Reservoir	8.05.08	Adder (Small female)		NZ 013 517	Small female with dead mouse amongst bracken
Burnhope Reservoir	14.05.08	Common Lizard	30	NY 84415 39244	Adult under refugia placed on hardcore / boulder pile.
Visit 3					
Smiddy Shaw	7.05.08	Common lizard	3		Disappeared quickly into rushes below
Smiddy Shaw	7.05.08	Adder (Female)	n/a	NZ 04050 45882	Near shore of reservoir, basking.
Tunstall Reservoir	14.05.08	Slow worm (Female)	6		Presumed the same individual present under this matt on visit 2.
Tunstall Reservoir	14.05.08	Common lizard x1	n/a	NZ 0637 4118	Brief sighting in grass below scots pine plantation.
Waskerley Reservoir	04.06.08	Common lizard x1	n/a	NZ 0245 4391	Lying on top of heather
Waskerley Reservoir	04.06.08	Common lizard x1	14	NZ01915 44256	Present under mat
Derwent Reservoir	04.06.08	Adder (female)	n/a		Present in bracken at Powhill
Derwent Reservoir	04.06.08	Common lizard x 2	n/a		Basking on bracken at Powhill
Burnhope Reservoir	10.06.08	Common lizard	34	NY 8413 3920	Under mat in rough grassland above a pine plantation

Site	Date	Records	Tin no	GPS refs (where available)	Comments
Visit 4					
Waskerley Reservoir	19.06.08	Common lizard	5		Under refugia on south side
Waskerley Reservoir	19.06.08	Common lizard	2		Under refugia on north side
Burnhope Reservoir	19.06.08	Common lizard x2		NY 84122 39212 and NY 84061 39264	In rush pasture
Tunstall Reservoir	18.06.08	Common lizard		NZ 06793 41995	In the nature reserve
Tunstall Reservoir	18.06.08	Common lizard		NZ 06758 41997	In the nature reserve
Hisehope Reservoir	10.06.08	Common lizard	31	NZ02040 46283	Under refugia
Hisehope Reservoir	10.06.08	Slow worm	6		Under refugia
Visit 5					
Smiddy Shaw	24.06.08	Adder		NZ0402245975	
Tunstall Reservoir	20.06.08	Common lizard x2	n/a	NZ0689642019 and NZ0676741987	
Burnhope Reservoir	20.06.08	Common lizard x2	n/a	NY8416439214	1 male and 1 female in area of heath/acid grassland
Waskerley Reservoir	20.06.08	Common lizard	n/a	NZ0217944365	Juvenile