

The uplands of South West England.

An audit of key facts and figures.

**Describing a selection of the public benefits provided by the SW uplands
with an emphasis on the moorland.**

A short report to Cornwall Area of Outstanding Beauty,
Dartmoor National Park Authority, Exmoor National Park Authority and RSPB.

April 2008

For the purpose of this report the South West Uplands are defined as the three moors of South West England - Bodmin Moor, Dartmoor and Exmoor.

The physical features of the moors

Area

- Bodmin Moor area is 18,210 ha.
- Dartmoor area is 95,312 ha.
- Exmoor covers 267 sq. miles or 69,280 ha.
- The area of the SW uplands is 705.8 square miles or 1,828 km².
- The SW uplands cover 1.4% of England and 8% of the South West region.
- The Severely Disadvantaged Area land area is 185,365 ha of which approximately half is moorland.

Topography

- Highest points are at High Willhays on Dartmoor reaching 621 m, on Exmoor 520 m at Dunkery Beacon and at Brown Willy on Bodmin Moor (420m).
- Bodmin Moor comprises of a series of gently sloping hills with depressions and shallow valleys. A number of wave cut platforms can be discerned in the landscape (300m, 230 - 250m and 150 - 200m) and the valley profiles have been shaped by the downward movement of soil under periglacial conditions during the last ice age.
- The plateau is slightly tilted towards the south and east. Rivers have cut into it so that it stands as ridges between the valleys. The main ridge runs from west to east across the middle of the National Park and includes Exmoor's highest point: Dunkery Beacon 519m (1704 ft). This is the 3rd lowest of the highest points in the National Parks. *ENPA*
- The granite massif rises out of the Devon lowlands to form a dramatic landscape, (Dartmoor).

Climate and climate change

- Bodmin Moor's modest height combined with its south westerly location means that it is one of the warmest and wettest uplands in Britain. *Ref 1*
- Annual Rainfall exceeds 2000 mm (79 inches) on parts of Dartmoor and exceeds 1600 mm (60 inches) on Bodmin Moor and Exmoor and occurs in all months with a December peak. *Ref 2*
- Recent changes to the climate have increased the region's mildness; on Dartmoor the mean annual temperature has risen by 0.8 C in the last century. Recent evidence suggests that by 2050 summer temperatures may have increased by 3.5 degrees C and in winter by 2.0 degrees C. Recent winters have recorded few (<10) days of frost or snow and it is anticipated that the amount of winter rain could increase by 15% in the next 40 years. *Ref 3*
- Within the SW uplands winters by 2050 will be 5% - 20% wetter and summers 10% - 40% drier. *Ref. South West Water.*
- Climate change may affect disturbance regimes due to fire, pest outbreaks and severe storms. *Ref 4*
- Upland sensitivity to environmental change is widely recognised as is their influence on downstream ecosystems and economies (Burt 2001, Werritty 2002). Hence, uplands could be regarded as sentinels of regional climate change that may pre-herald impacts elsewhere (Beniston et al. 1997). *Ref 4*

- Wetter winters - greatest rate of change at high altitude (Malby et al, 2006)
- Increasing drought frequency driven by lower summer rainfall could impact adversely on upland ecosystems and water supply. Indeed, significant changes in low flows in southern England are expected as early as the 2020s *Ref 4*
- There will be an increased incidence of fire in hot dry summers. *Ref 5*

Air

- Air quality on the SW uplands is extremely high with few of the residual chemicals, associated with the industrial revolution, that are found in the northern uplands. *Ref. Environment Agency.*

Historic environment

- Almost 10% of England's Scheduled Monuments are found on the SW uplands.
- Much of the importance is due to the excellent survival of complete multi period landscapes. All periods are represented from around 6500 BC to the present. However, most remarkable are the prehistoric sites and landscapes (Dartmoor contains the largest concentration of Bronze Age remains in the country including ritual and burial sites), evidence of Roman exploitation for iron, the medieval farming systems, the 19th century agricultural reclamation, remains of a tin industry which is 700 years old and possibly much older, the artefacts remaining from 19th century industry and those from WWII training. *Ref. Dartmoor Vision*
- In the later Mesolithic period (8 to 5 millennium BC) human communities began to have an impact on the landscape; woodland clearing on Dartmoor and possibly Bodmin Moor (c6200 BC). *Ref. 6*
- The historic environment is one of the key factors that make the South West an attractive place to live, work and visit. *Ref 7*
- The SW has a remarkably high number of protected sites - 39% of England's Scheduled Monuments (SMs). *Ref 8*
- About 6% of the nation's SMs are found on Dartmoor covering 2,242 ha. and include over 4,000 archaeological items (1,206 SMs), and 17,500 entries on the Historic Environment Record. *Ref. 9*
- There are 573 SMs on Bodmin Moor and 9324 entries on the Historic Environment Record. *Ref 10*
- Exmoor has over 4,000 sites on the Historic Environment Record and 205 SMs. *Ref 11*
- Much of the importance is due to the excellent survival of complete multi period landscapes.
- On Bodmin Moor the most important elements are the prehistoric ritual and domestic landscapes (particularly Bronze Age); the deserted medieval settlements, tin streaming and agricultural landscapes and finally the post medieval mining remains around Caradon Hill (part of the Cornwall and West Devon Mining Landscape World Heritage Site). *Ref 10*

- On Exmoor all periods are represented from around 6500 BC to the present. However, most remarkable are the prehistoric sites and landscapes, evidence of Roman exploitation for iron, the medieval farming systems, the 19th century agricultural reclamation, the artefacts remaining from 19th century industry and those from WWII training. *Ref 11*
- Dartmoor has one of the most important collections of archaeological landscapes in Western Europe revealing a chronology of human activity stretching back over 8,000 years, from ancient field systems to the legacy of tin mining. *Ref 9.*
- ...layering of archaeological features, with earlier features visible within later archaeological landscapes, is best described as an archaeological palimpsest. *Ref 9*
- There are more than 70 stone rows on Dartmoor including the world's longest - 3.4 km. in length. *Ref 12*
- The Hamlet of Bolventor, on Bodmin Moor, is named after a "bold venture" in setting up tin streaming on such an exposed part of the moor. *Ref 13*
- Parts of Bodmin Moor fall within the Cornwall and West Devon Mining Landscape World Heritage site. The nominated Site consists of the most authentic and historically significant surviving components of the Cornwall and West Devon Mining Landscape from the period 1700 to 1914. This cultural landscape is a testament to the profoundly important process of pioneer metal mining, to its industrialisation, and to the innovations which occurred here and had a fundamental influence on the mining world at large during the nineteenth century. *Ref 14*
- English Heritage considers over half the scheduled monuments on Dartmoor and Bodmin Moor are at risk. The prime vulnerability of those at risk monuments is the increasing amount of scrub and bracken which itself results from the recent decrease in the amount of traditional grazing there. *Embargoed until May 2008 when there is a national launch for the new Heritage at Risk Initiative.*

Natural Resources

Biodiversity

- Internationally important blanket bog covers 12,500 ha within the SW uplands.
- SW England uplands support: >3% of England's breeding stonechat population, >9% of England's breeding wheatear population, >2% of England's breeding grasshopper warbler and meadow pipit populations, all of southern Britain's breeding ring ouzel, dunlin and red grouse and 2.3 - 4.5% of England's breeding snipe population (mostly on Dartmoor). *Ref 15,16 and 17*
- Skylark territories are seven times the density in the uplands compared to that found in the SW lowlands. *Ref RSPB*
- Within the 3 uplands over 42,805 ha are notified as Sites of Special Scientific Interest (SSSI) and the average condition of these SSSIs is such that 79.98% meet the current PSA target. *Ref 18.*
- Dartmoor holds habitats of international significance; 120 km² of Blanket Bog, 115 km² of Upland Heath and 10 km² of Valley mires of national importance. *Ref 19.*

- The hoverfly *Eristalis cryptarum* thought to be extinct in the UK was re-discovered on boggy heathland on Dartmoor in 1994. *Ref 19*
- On Exmoor the Blanket Bog covers some 1,400 ha with around 480 ha of good quality blanket bog remaining in the main moorland area. *Ref 20*
- The Ballerina wax-cap gets its name from its pink frilly cap, which bears some resemblance to a ballerina's tutu. They require a relatively close-cropped sward, and thus continued grazing of sheep and cattle is crucial to their survival. This rare fungus has a major stronghold on Exmoor and we have a major role to play in ensuring the survival of this species in Britain. *Ref 21*
- The High Brown Fritillary butterfly has declined by 94% in its range in the UK, at the present time it is confined to three strongholds, including Dartmoor and Exmoor. *Ref 21*
- The High Brown Frit stat was 41% of UK distribution by occupied 10km squares. The source is a UKBMS contract report to DEFRA - 'Plan for Regional Development of the Transect Network', Wigglesworth et al. 2005. *Ref 22*
- Rivers on the moors provide spawning grounds for salmon and trout. Salmon fishing in the SW is worth £2m to the local economy. *Ref.23*
- Salmon is a protected species under the Habitats Directive. Dartmoor is designated as a Special Area of Conservation for salmon meaning that special protection should be given to the salmon and its habitat requirements. *Ref 24*

Water quantity and quality

- 90% of drinking water provided to homes and businesses in Devon and Cornwall is collected from surface water (reservoirs & river intakes) the majority of which flows off the SW uplands. The remaining 10% is derived from groundwater (boreholes & springs). *SWW*
- The number of people receiving this water in 2007 was 1,604,950. *SWW*
- Average daily water supplied is 446.67 megalitres/day. *Ref 25*
- River abstractions account for 68.4% and reservoirs 25% of supply. *SWW*
- SW has the highest water quality in its rivers in the country (Wales slightly higher). *Ref 25*
- EA chemical survey 2006 – 100% of rivers in Cornwall and 98.91% of Devon's rivers were of good or fair quality. *EA*
- For the rivers on Exmoor, Dartmoor and Bodmin moor the 2006 classification of their chemical quality shows them to be good or very good. This is based on an assessment of the levels of ammonia, dissolved oxygen and biochemical oxygen demand. Although this classification shows the rivers to be good, this is based on a limited set of parameters and indicators such as fish populations may reflect a different situation as they may be limited by other parameters such as silt in the river. *EA*
- Upland blanket bog is essential to "hold water" and reduce spate events.
- *SWW* spend annually c£20m on water treatment (will rise to £30m in the future) to address silt and chemicals from pesticides and fertilisers. Preventing pesticides and fertilizers entering the rivers could reduce this cost. *Ref 26*

- SWW wants slower, cleaner catchment drainage and cleaner raw water. Winters by 2050 will be 5% - 20% wetter and summers 10% - 40% drier. So more water storage may be required. *Ref 27*
- Intensity of rain fall events will increase by 30% over the next 50 years. This will lead to more frequent acid flushes (kills fish), erosion and localised flooding. *Ref. EA pers comm.*
- There is no more water available from the uplands. *Ref EA*
- Erosion adding silt to reservoirs that cost <£1.5m per reservoir to remove. *Ref 27*
- Increase in fertilizer run off causing eutrophication. Adding oxygen can cost up to £3/4m per reservoir. *Ref 27*
- Pesticide levels costly to remove £4m per year. (up to £64m to fix?). *Ref 28*
- SWW hydro from 7 sites (reservoirs and 2 plants; Mary Tavy and Morwellham) generate 11 GWh. *SWW*
- For the rivers on Exmoor, Dartmoor and Bodmin moor the 2006 classification of their chemical quality shows them to be good or very good. This is based on an assessment of the levels of ammonia, dissolved oxygen and biochemical oxygen demand. Although this classification shows the rivers to be good, this is based on a limited set of parameters and indicators such as fish populations may reflect a different situation as they may be limited by other parameters such as silt in the river. *Ref 29*

Peat resource and carbon

- Over one third of the moorland on Dartmoor covers a layer of peat more than 50 cm thick and in places it is seven meters deep. *Ref 21*
- The SW uplands may remain as carbon sinks whilst the northern British uplands become sources of carbon. This could be caused by the residual chemicals found in the northern peat. *Ref. Environment Agency.*
- The calculated total volume of peat on Exmoor is approximately 10 million cubic meters. Measures taken to protect this unique habitat from total destruction via oxidation, erosion, peat cutting etc will prevent the release of an estimated 3.6 million tonnes of CO₂ into the atmosphere. Also in addition, the restoration projects will deliver healthy bog communities which will help the laying down of new peat. The restored moorland will yield approximately 10 tonnes of fresh peat /hectare/year. This equates to a carbon storage capacity for each hectare of actively accumulating peat of approximately 1.2 tonnes of carbon from the atmosphere every year. *Ref 30*
- On Dartmoor the estimate is 8.4 Mt C (million tonnes carbon) in the deep peat area, 8.8 in the shallow peat/heath areas and 5.0 in the remainder of the Moor. This is 22 Mt C in total (or 81 million tonnes CO₂ equivalent, or 9 years of Devon's per capita emissions). I should stress that these are still 'back of the envelope' calculations, but are probably more realistic than the previous figures quoted. Although this is lower than the previous estimate, it still represents a significant carbon store. *Ref 31*
- The implications of changing climatic conditions for upland peat is also an area where further research is needed, as these effects are likely to be complex with a high degree of spatial variability. Any drying out of peatlands is likely to accelerate carbon losses to the extent that it may not be possible to preserve marginal peatlands in the long term.

However, minimising carbon loss through more sympathetic land management practices will at least slow the rate of carbon loss from these systems (Holdern 2007). *Ref 32*

Fisheries

- Salmon & sea trout in 10 SW rivers are failing their spawning targets partly due to upland impacts.
- Good fisheries for salmon & sea trout in 5 other rivers depend heavily upon good upland management.
- If uplands were managed to allow maximum natural water retention, at least 10 rivers could significantly increase their value by up to £25m and £1m in annual economic benefit. Better rivers could improve by up to £20m in value and £1m in annual benefit.
- All streams and rivers in SW upland areas are important for wild brown trout. Fishing for these fish is a specialist activity, often accompanied by visits to expensive hotels or B&B and the purchase of expensive equipment, all leading to local economic benefit.
- The 20 salmon & sea trout fisheries in the SW are worth £53m with an annual economic benefit of £2m+. At least 15 of these rivers are worth £48m in total and around £1.8m in annual economic benefit. They are dependent on good upland management and would lose value and economic benefit if management declined.
- If uplands were managed in a different way, at least 10 rivers could significantly increase their value by up to £25m (doubling the value of the 10 rivers) and increase by £1m in annual benefit (doubling the benefit to those 10 rivers). In addition, many of the 'better' rivers could improve, even as much as doubling themselves in value and annual economic benefit, possibly adding around £20m in value and £1m in annual benefit.
- Some 4000 rod licences were sold in SW in 2007 for salmon and sea trout raising £200k in licence income. It is estimated that a further 18000 licences were sold to people fishing for trout (local estimate of 20% of coarse & trout licence sales) although many of these would be fishing in reservoirs. Around 6000 could be involved in fishing for wild brown trout (local estimate).
- There are an estimated 263 SW jobs dependent on salmon, sea trout or brown trout. This was taken from the 2007 Economics Study, being 130 FTEs for salmon & sea trout and a proportion (6000/18000) of 366 FTEs for trout.
- Land management of upland areas can have a profound benefit or detriment to valuable fish stocks.

All above Ref 23 and 24.

Access and recreation

- The largest expanses of open ground in Southern England subject to extreme weather conditions provide important places for people who seek quiet and tranquillity.
- The SW uplands provide 73,800 ha or 285 square miles of public access.

- Dartmoor can offer 47,000 ha. of open access land including 35,200 ha. of registered common land. Added to this are 730 km of public rights of way. *Ref 9*
- Estimate of 4.3 million visits to Dartmoor in 2005 *Ref 7*
- In 2003 Exmoor had 237,600 visitors who stayed locally and spent £49,711,000 in the local community. There were 1,894 jobs related to this tourism. *Ref 33*
- Exmoor has been described as the 'riding playground of England'. It is superb riding country and offers every facility for the horse rider.
- The economy of Exmoor is estimated to have lost £15m during the Foot and Mouth outbreak in 2000 following the “closure of the countryside”. *Ref 33*
- On Exmoor there are 18,000 ha. of open access and 1,006 km of access routes including 438 km of footpaths and 464 km of bridleways. *Ref 11*
- Bodmin has, following the CROW Act, 8,800 ha of public access land.
- The reservoirs attract over one million visitors per year. *Ref 26*

Landscape

- Both Dartmoor and Exmoor have been designated National Parks (in 1951 and 1954 respectively) in recognition of their outstanding landscapes. As is Bodmin Moor part of the Cornwall AONB. The region's National Parks and AONBs are classified at international level by the World Conservation Union (IUCN) as Category V Protected Landscapes where “the landscape has been moulded by centuries of human activity to create a strong sense of place”. *Ref 34 and 35*
- Dartmoor is a cultural landscape shaped by management of its distinctive and often harsh environment over many millennia. The moorland covers some 46,000 ha. This is an exposed, windswept upland landscape crowned by granite tors, enclosing broad shallow basins filled with blanket bog. *Ref 9*
- The Landscapes of Bodmin Moor (AONB) are a prized asset – for the community, the economy and as part of the environmental capital of Cornwall. *Ref 14*
- Bodmin Moor possesses a sense of open, untamed countryside but with visible remains of early periods of settlement which help create a tangibly historic landscape. *Ref 14*
- Bodmin Moor is recognised as an IUCN – The World Conservation Union Category V Landscape; a lived in working landscape that has been modified by people over time. *Ref 14*
- Bodmin Moor owes its existence to the underlying granite mass, reaching its highest point at the peak of Brown Willy (420m). The general relief is gently undulating with large, slightly convex moorland, known locally as Downs, and more prominent tors, often capped with granite outcrops with distinctive rugged silhouettes. *Ref 13*
- The moors of Bodmin, Dartmoor and Exmoor provide the largest stretches of open high country in the south of England; their peri-glacial morphology is unique in England. *Ref 35*
- Exmoor's scenery and landscape was for 42% of visitors the most important reason for visiting Exmoor. *Ref 36*
- The landscapes of the South West uplands are not 'natural' landscapes. They represent a living, dynamic and working environment. For

thousands of years, people have lived in, worked and farmed the uplands creating an intimate combination of open moorland and enclosed farmland. The remains of industrial landscapes are also important features found throughout these uplands.

Land management and farming

Farming

- The opportunities for diversification in the SW uplands are lower than in other parts of the region. The SWUF survey (2007) found that about 22% of hill farmers had diversified or intended to do so. The national average for all farmers is 50%, for livestock farmers 42% and for farmers within the LFA 35%. The figure for all types of farming in the SW is 46%. *Ref 37*
- Cattle account for 64% of the agricultural grazing across all three moors. On Bodmin Moor it is 79%. *Ref 38*
- Average revenue from the SPS is projected to fall substantially over the period to 2012, with decreases in the range of up to 27% compared with 2006, depending on farm type and system. *Ref 39*
- The sale of suckled calves remains the dominant form of cattle marketing with 11,300 calves going through the local markets in 2006. *SWUF Ref 40*
- Livestock numbers have declined. 40% of hill farmers have reduced stock whilst 15% have increased stock. Most have reduced their breeding beef herd (43%) compared to their sheep flock (34%). *Ref 38*
- The reforms of the CAP, introduced in 2005, will have major impacts on the profitability and management practices of farming on the moorland. (Single Farm Payment scheme). *Ref 20*
- Moorland farms make a distinctive contribution to Exmoor. Moorland farms are more involved in a range of industry and community activities and are more dependant on farm income and more likely to be affected by CAP reform. *Ref 41*

Commons.

- Bodmin Moor commons cover 6,879 ha.
- Dartmoor commons area is 35,882 ha.
- Exmoor commons cover 6,692 ha
- Common land on the SW uplands covers 494 km².
- On Bodmin Moor about 33% is open un-enclosed land (commons = 33%), on Dartmoor approximately 66% is open land (commons = c40%) and on Exmoor only 28% is open grazing (commons = 27%). *Ref 42*
- Most of the moorland is privately owned but often managed by a number of farmers holding common rights tied to their home farm or enclosed land. These Commons are managed by grazing animals (cattle, sheep and ponies) and land management including swaling (burning).
- Moorland farmers are twice as likely as non-moorland farmers to trace their family's occupancy of the farm back to before the 20th century (36 % of moorland farmers compared to 17% of non-moorland farmers). *Ref 20*

- On Bodmin Moor 80% of the farmers surveyed hold common grazing rights of which 50% exercise them. On Exmoor about 25% have common rights but 60% of these exercise their rights. *Ref 38*

Agri-environment schemes

- Involvement in agri-environment schemes is very high with 80% of those surveyed holding an agreement. *Ref 38*
- The area available for Environment Sensitive Area (ESA) on Dartmoor was 100,275 ha and on Exmoor 80,616 ha. On Bodmin Moor the area targeted for Countryside Stewardship (CSS) was 19,423 ha (the SDA land).
- On Dartmoor in 2004 approximately 60% of the ESA area was under agreement covering about 60,000 ha. In 2007 the area remaining in ESA was 48,329 ha. In 2004 there were approximately 1,000 ESA agreements and in 2008 552.
- On Exmoor there are 419 ESA agreements covering 48,330 ha and in 2000 there had been 612 agreements.
- Bodmin Moor has, in 2008, 10,861 ha under CSS agreements.
- There are 54 upland HLS agreements in the SW. April 2008. *NE*
- Moorland under a HLS – Higher Level Stewardship – agreement totals 1895.56 ha., April 2008 figures.
- Land in an ELS agreement – Entry Level Stewardship – is difficult to measure (boundaries not matching SDA/NP boundaries) but is estimated to cover about 15,400 ha. (Bodmin Moor 8,095 ha, Dartmoor 3,250 ha and Exmoor 2,200 ha) – as at January 2008.

Cultural Heritage

- The Exmoor ponies are few in number - less than 750 worldwide and only about 200 remaining on the moor. They arrived during the Ice Age, migrating with the seasons and the advance and retreat of the ice sheets whilst Britain was still joined to the continent. They lived on grasslands throughout the northern hemisphere and were amongst the original horses to be domesticated. They were probably never particularly numerous on Exmoor, but through the vagaries of history, this was the only place where they survived. *Ref 43*
- From time immemorial ponies have been running on Dartmoor. Though there have been few references through the centuries to the ponies in old writings the earliest is said to have been in about the 11th century. *Ref 44*
- The Rare Breeds Survival Trust lists the Exmoor Pony as endangered (less than 500 animals) and the Dartmoor pony as vulnerable (less than 900 animals).
- The dramatic scenic landscape of Bodmin Moor has attracted the attention of numerous writers and artists and the mystical quality of the landscape is reflected in numerous myths, legends and stories. The pub now known as 'Jamaica Inn' inspired the novel of that name by Daphne du Maurier and caused the building to be re-named after the book. *Ref 1*

- Commons are part of these uplands' cultural heritage and there is evidence of such activity stretching back thousands of years. Over two thirds of the moorland is common land covering 49,453 ha. *Ref 45*
- Dozmary Pool is a natural lake; with no visible source of supply, where it is reputed the legendary "Excalibur", sword of King Arthur was thrown by Sir Bedevere after Arthur's defeat by his wicked nephew Mordred. Folk lore also has this as a bottomless lake, which the ghost of the infamous John Tregeagle was forced to empty with a leaky limpet shell as punishment for the terrible life he had lead on earth. Whatever the truth may be, there is evidence of very early occupation within the vicinity of the lake, shaped stone tools have been found and dated at around 2000BC. *Ref 1*

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