WILDLIFE AND THE CORNISH HEDGE

Stability of Cornish hedge species / factors governing species present / effects of flailing / yearly cycle / traditional management enhanced flora / devastating arrival of flail / how a Cornish hedge works / long-term effects of flailing / loss of birds and insects / flail prevents recovery / trimming to aid wildlife / value of hedges for wildlife / loss of species / hedge-breeding butterflies wiped out / rehabilitation.

The Cornish hedge as wildlife habitat is remarkable because of its structure, the shape of the land, the mixed geology and the climate. The stone construction with variable earth infilling supports life in accordance with the hedge's type and situation, and with the different parts of the same hedge. It provides everything necessary to the complete cycle of that life - earth, stone, crevices damp and dry, sun-basking places, shelter and a huge variety of plants from microscopic fungi to broadleaved trees; giving pollen, nectar, seed, salads, leaf-litter, tree bark, cover, shade, nest sites, songbird and predator perches - a comprehensive list of amenities for a wide array of living things. Added to this diversity and variation of species and habitat is the mild, moist maritime climate, which favours activity all the year round. Flowers bloom and seeds germinate at Christmas, bats wake to hunt along the hedge on warm winter evenings, and mosses can be perpetually green and growing.

Woodland-edge flowers and ferns in Cornish hedge with trees. Cow parsley, stitchwort, buttercup, bluebell, red campion, sorrel and hawthorn flowering in May.

In a healthy Cornish hedge the stone facing is intact and solidly tied in by the roots of the diverse mix of wild flower species and native grasses growing crammed together in the crevices between the stones. The verge at the foot is likewise filled with a medley of hundreds of flowering species, while bushes, trees and woody species - hawthorn, holly, gorse, honeysuckle, dog rose - flourish along the top of the hedge-bank. Variable amounts of stone will be visible according to the time of year and the situation of the hedge, either damp or dry. On these stones will be a mass of different mosses and lichens. The stones themselves widely vary according to locality.

Cornwall's geological past has left a chaotic profile of a rising plateau erupted and eroded into short steep hills, many with exposed granite tops, and deep valleys, with other areas of a more open, rolling character. Irregular zones of igneous, metamorphic and sedimentary rock have their accompanying soils varying from peat to clay. With the county's maze of roads and ancient narrow lanes in an often intricate landscape, the hedges built of these localised stones and earth make a pattern of combined, changing and recurring habitats. In the highway hedges alone, it is as if strips of rocky woodland floor, scrub, flower meadow, heathland, moor and mountain scree, maybe several yards wide, were laid in a vertical fold along both sides of the road, changing from one type and orientation to another as it goes uphill and down, winding along or across the contours.

Coming up out of the valleys where the lane-side hedge shows a damp shaded woodland flora and fauna, there is a sudden change as the trees thin to woodland edge with dappled sunshine. This continues after the woods are left behind, as long as there are trees and bushes on the hedge. Where the road goes on climbing, the hedge is transformed into a scrub habitat merging with rich flower meadow, often co-existing on hedge-top and sides for miles as the rounded hills level out. Heath and moorland grasses and flowers mingle in with the relict woodlanders, bringing a breadth and number of species unparalleled by any other type of hedge, wall or hedgerow. On higher hills, heath plants predominate in the gorse-topped hedges, and at the extreme height and exposure, stone hedges show a classic scree population of lichens, mosses, succulents and small ferns. Wherever the hedges meet the coast they contain the flowers of cliff and seashore. Where they adjoin wet places or have a ditch alongside they nurture a damp-loving population of plants and animals.

STABILITY OF CORNISH HEDGE SPECIES

The local character of short lengths of hedge in Cornwall questions the general theory of hedges as wildlife 'corridors'. This word suggests a comforting picture of vaguely-identified 'wildlife' trotting busily along the hedges and founding new dynasties in some equally hazy 'habitat' at the far end. It creates an impression that all hedge life is readily mobile, which is far from the truth. These vital links must be maintained, not so much for the travelling along them as for the lack of travelling. Not so much the pathway to life, hedges themselves are the life. They are the habitat, and usually the only tenable habitat within reach for such as dwell in them. Hedge removal has a far more profound effect than just making the wildlife trot a little further round an enlarged field. Removing even a short length can wipe out a sole remaining ancient colony for ever. Removal does not necessarily mean bulldozing clearance. Any treatment or change that renders a hedge untenable for its old-established species removes that hedge in effect as far as those species are concerned.

Heathland hedge in August. Wild golden rod, devil's-bit scabious, betony, yarrow, woodsage, sheep's sorrel, ox-eye daisy, umbellate hawkweed and western gorse.

Continual and detailed personal observation of Cornish hedges over five decades has shown that here floral and animal colonies are remarkably static, local, and persistent. Voluntary movement is centred in the home territory, including species that are not territorial in the sense of actively fighting for it. When all their needs

are constant and undisturbed around them, many butterflies, moths and other insects remain for life within yards of their hatching. Snails return to the same roost after every foray. Most mammals and birds operate from a home base and within a defined area, to which the latter return even after migration, and to the extent of reusing last year's nest. Resident birds too will use the same nesting place year after year. As parents die, their young take over the site where they were reared, a succession of 'local family' that can last for centuries. If the succession dies out and neighbouring population is not increasing, the site will remain deserted.

If wildlife, other than the known itinerants, does seem to move in when the right conditions are created, it is usually because individuals were surviving nearby, or were dormant in the soil; it shows not so much the mobility of species, as the burgeoning of depressed populations as soon as they have the chance, when conditions are right for them. Usually it takes some form of stress, a population becoming overcrowded or deterioration of local conditions, to cause deliberate travelling of non-migrants - and then, many species cannot move fast enough or find sufficient suitable habitat nearby to survive.

Movement otherwise is not necessarily along the hedge but downwind in the case of flying insects, wind-pollinated plants and fluffy seeds, preferentially upwind in the case of mammals, and responding to various instinctive factors in the case of itinerant or migrant species. Slow natural progression occurs, if conditions are right, not so much along the hedge as along the contour. Across the contours short sections of a hedge habitat type show distinct populations that have persisted though effectively cut off, marooned on a small linear island, by natural physical changes at each end, and by man's activities to each side. Before the arrival of prehistoric man the gradual spread of species had been inhibited only by changes in the natural features: climate, soil, water, aspect and altitude. When the land was cleared for farming, the native life in the immediate vicinity took root and refuge in the hedges and ditches that were made during those operations. In building a Cornish hedge the long strip of virgin soil dug out to seat its foundation was placed along the top of the finished stonework, preserving existing plant, seed and larval stock in the fabric of the hedge itself. The pace of change, dictated by handwork, was slow enough and on a small enough scale to allow species to survive the disturbance and move into the nearest cover, now provided by the hedge. In its sanctuary, there they stayed.

The evidence gathered over a lifetime from studying Cornish hedges and their environs suggests that most of the species have remained there ever since, self-sustaining in the unique hedge motherland that, in the continuously-farmed landscape, is the only remaining local fragment of the original habitat. There they have lived in a balanced act of tolerance and inter-dependence quite unlike the 'savage battle for survival' sometimes assumed to be the course of all nature, but more often the effect of ill-advised interference. As long as it was treated with respect, descendants of the ancestral plants and wildlife could be found year after year, decade after decade, and without doubt century after century and millennium after millennium, in the same part of the hedge.

Garden marguerites and great bindweed planted in a Cornish hedge still mark the site of an old cottage.

The bounds of long-vanished cottage gardens are precisely marked out by introduced species still growing in the surviving hedges. Land that has been farmed for thousands of years has Cornish, stone or turf hedges that still contain living relics of the original wilderness. Having nowhere else to

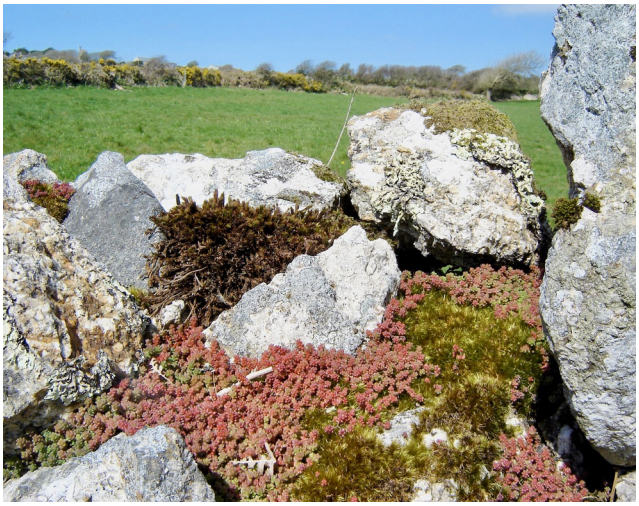
go, they have remained, lived and reproduced right there in those same hedges. They have been able to do so because the hedge, being built on the original site of that wild population, not only contains actual material from the site but enjoys the same physical aspect and so continues to mimic the original habitat - but only to the point at which the local climate, soil or aspect changes. Hence the change from plants of the vanished woodland, such as ramsons and wood sorrel, to those of the vanished heath, such as bell heather and tormentil, as the hedge climbs to a more open aspect, a more acid soil, and a lighter, more porous substratum.

FACTORS GOVERNING SPECIES PRESENT

A Cornish hedge relies more on the moisture it draws up from below than on the direct rainfall from above, especially in summer when it can be maintained by this rising damp acting with condensation and the natural insulation of stone, matted roots and green growth. Although a heathland hedge receives probably more direct rain, counting hill fogs, than a woodland one, and less of the fall is intercepted by foliage, it is drier because of the usually elevated slope and the porosity of the subsoil which drains away excess wetness. On the granite hills the subsoil is mainly of 'growan', the decomposed crystals of the granite like a kind of fine gravel of mainly quartz and feldspar. The woodland edge hedge receives perhaps less from above, and the foliage deflects more, yet is damper because the subsoil is likely to contain more clay, and situated in the valley it receives more water from below in the form of run-off. In addition, it has more shade from its vegetation, so loses less by evaporation than the heathland hedge open to the sun and drying wind.

The heath hedge therefore hosts a plant population economical in water use, minimally transpiring, small-leaved, low-growing and often wiry-stemmed, while the woodland hedge has plants and trees with juicier growth and larger leaves which cast a cooler shade on the structure beneath. The ability of the subsoil to hold water governs the amount of moisture drawn up by the hedge, and this, along with the amount of exposure to wind and sun, decides the type of vegetation and the quantity of leafage the hedge can carry. As long as the seasonal growth and seeding of this vegetation is not interfered with, the hedge's natural irrigation system, according to the configuration of the land and its substrata, maintains the steady presence of balanced populations despite fluctuations in rainfall.

There is a popular theory that hedges acquire more woody species at a certain rate over time and can be dated by a species count. In fifty years of looking at Cornish hedges only one instance of new species acquisition was noted, other than by fly-tipping or misguided planting. This was a seedling oak by the pavement at the foot of a town hedge, from an acorn probably dropped by a child. By the popular reckoning of one new species every hundred years, half of these hedges should have acquired a new woody species in that time. Disregarding the obvious snags, that a hedge might be planted with many species at any time, and that nature's multiple causes defy the simplistic rule book, the theory is based on spurious assumption; that because this old hedge has a few more species than this new one, they must be increasing with age. It



Stonecrop, mosses and lichens make a fascinating scree community on a granite stone hedge.

could more realistically be assumed that as it was formed in a much richer environment and has only a few more, they must be decreasing.

Putting misleading assumptions aside, it can actually be seen within a lifetime that, unless given extraordinary care, species decline over time in a limited habitat area subject to human intervention, such as a hedge. Older hedges may or may not contain more species than newer ones, but if they do it is likely to be because they were made at a place where the land at the time was rich in species, and due to favourable circumstances and correct management they have retained a good selection of that original abundance.

Intensive cultivation (not only a modern practice) rapidly decreases the natural seed-bank. A hedge established on seed-depleted soil would start with fewer species than a hedge established, perhaps much later, on less-cultivated ground that still retained a diverse seed-bank. This is only true of English hedgerows up to a point, as these tend to be planted with certain species, or a single species, which then suppresses natural growth. It is certainly true of Cornish hedges which traditionally are not planted along the top but left to natural regeneration. Cornish hedges are also more susceptible to damage from incorrect management. Two recently-built hedges starkly illustrated this. One was built on unenclosed moorland, the other between a field and a lane but evidently with soil brought in from elsewhere, possibly taken from waste land. Both produced a high species count in their first year, but within two or three years more the lane-side hedge had lost most of them to the rampant growth of ivy encouraged by ill-advised maintenance.

Wind- or animal-borne acquisitions can be made, as can those from activities such as fly-tipping or ill-advised planting, but these are random, some remain casual and die out, and some may eliminate earlier species. This can make acquisition a negligible factor except in the case of rampant or rapacious introductions, which can cause a serious decline in originals. The number of species surviving to the present day does not depend on age as such, or even on the original seed-bank or animal population, but on the viability of the hedge as continuous and balanced habitat. This relatively static persistence (given no extra cause of depletion, such as bad trimming management) is particularly noticeable in the Cornish hedge. Its solid and locally distinctive stone structure creates a more stable environment than the ever-growing-and-dying hedgerow, and is less easily affected by whatever is done in the field alongside. And while a hedgerow's denizens tend to move out of its comparatively unproductive shade and shelter to seek flowers, seeds or insects in the field or verge by day, a Cornish hedge provides all these needs within itself.

Cornish hedge in granite country with coastal flora, including thrift and salt-tolerant bristle bent and fescue grasses.

Worryingly, many naturalists have been found to have little appreciation of the life that was, is or should be in Cornwall's hedges. They seem to have no idea of the reasons it can thrive there permanently, or of the maintenance required to ensure this, or of the damage already done by departing from it. They seem not even to realise the ways in which a Cornish hedge radically differs from an English hedgerow. Tenets that can only be applied, perhaps dubiously, to hedgerows, are even more erroneously applied to Cornish hedges. Perpetually one hears Cornish hedges incorrectly called hedgerows or walls. 'Hedgerow' refers strictly to a row of bushes or trees,

rooted at ground level or planted on a low earth bank. 'Wall' applies to a rigid stone structure where the two sides, usually vertical, are tied together by through-stones. A 'hedge' is a 'fence of bushes or low trees, living or dead, or of turf, stone, etc, line of things ... forming barrier' (Concise Oxford Dictionary). So, while a hedgerow may be called a hedge, a hedge of stone or turf cannot be called a hedgerow. Similarly, a Cornish stone hedge, which is a flexible structure with a stone core, usually with a curved batter, or a simple line of rocks or boulders, is a hedge, not a wall.

Even when the difference is realised, the usual description 'stone-faced bank' conveys little understanding of the complex interaction of the Cornish hedge's many varieties of stone, core and vegetation in supporting life, and hence its extraordinary wildlife potential. It most often contains the diversity of mixed scrub hedgerow, meadow and wall put together, and according to situation, hosts unusual species from marsh to mountain scree. It reflects the natural environment because it generates itself naturally. In villages, the top might be planted with a single shrub species such as tamarisk or fuchsia, while cottages usually had an elder, privet or hawthorn bush planted on the back-yard hedge (perhaps a half-conscious survival of an ancient superstition for household protection). Farmsteads were sheltered by a row of planted elms, and large estates in earlier times might plant their hedges with oak, ash or beech for production of timber and coppice-wood.

Otherwise, the ubiquitous gorse, hawthorn, blackthorn, holly, sessile oak, sycamore, ivy, honeysuckle and wild rose mainly appeared on the bushy hedge-top of their own accord, from seed contained in the soil used to top the hedge when it was built. So did the grassy and herbaceous growth, annual, biennial and perennial, that appeared between the stones of the hedge-bank, a spontaneous growth from the native soil, except where householders have planted or dumped garden plants in their nearby hedges.

Species' estimates based on hedgerows can be widely inaccurate for Cornish hedges. The effect of the construction and long-term stability and regeneration, in typically tripling the botanical species as compared to the hedgerow, is echoed by the invertebrate diversity; not only a wider spectrum of families use Cornish hedges, but more genera and species of each family are likely to be found there. For example somewhat less than half of British butterflies are generally considered likely to breed in hedgerows, but this should be increased to around two-thirds for Cornish hedges. These include some specialist butterflies, for eample Cornish hedges being a perfect environment for fritillaries requiring a combination of violets and scrub growth, and for 'blues' needing fine grasses and the assistance of ants.

There can also be unrecognised quirks. For twenty years (1965-85) the 'non-resident' pale clouded yellow was observed by the author to breed successfully on greater bird's-foot trefoil in a sheltered Cornish hedge near St Erth, emerging every spring to haunt the spot for another season. There was no knowing how long it had already been there. Then the hedge, which until then had miraculously escaped attention, was visited for the first time by the flail, and the little dynasty was exterminated. This butterfly is normally a far-ranging migrant; presumably in the balanced and mixed hedge environment the migration-triggering population surge does not readily occur. This was one of many observed instances in Cornish hedges of the settled inhabitants' cheerfully ignoring their corridor opportunities - and their textbook instructions.

CATASTROPHIC EFFECTS OF FLAILING

A more suitable word than 'corridor' is 'network'. An aerial view of hedges suggests the links and meshes of a vast net laid across the land. In Cornwall it is a net of many different threads, sometimes just a single link differing from those all around. Alterations to the localised

life of one mesh or strand of the net, especially in a hilly country with a complex geological heritage, can prove to be as permanent as is possible in a living environment.

That is why the invention of the tractor-mounted flail-mower was a catastrophe for Cornwall's wildlife. Unlike the English hedgerow, the structure of the Cornish hedge supports seemingly incompatible forms of life in a system of its own. Bog liverworts and bare-rock lichens, foxgloves and heather, for instance, can grow literally side by side. Moss species that according to the textbooks live only where spray from a waterfall wets the rocks grow on the bare hilltop stone hedges, washed instead by the frequent sea-mizzle and mists. Its construction accounts for the Cornish hedge's teeming and various inhabitants, and is the source of its great beauty; all its jewels and treasures are displayed on the outside of its solid bulk.

This makes it vulnerable. The difference between flailing an English hedgerow and flailing a Cornish hedge is the difference between a haircut and a scalping. In a hedgerow, though the outer part may be badly damaged and much life lost, some can remain protected within, and severed branches and twigs do not rely on seeding to regenerate; but one pass of the flail along a Cornish hedge destroys almost every living thing as it close-shaves the growth, leaving between the stones only the roots of tough perennial plants, a diminished seed-bank and a very few lucky escapes among invertebrates in the crevices.

In that one pass along the hedge's face, the flail removes not only this year's flowers and insects, but the seeds, chrysalids and eggs for next year, and denies their future progeny. It takes every nest, cocoon and larva in its path, of all kinds, even most of the crevice-nesters, either by direct destruction, by the removal of cover and sustenance, or by suffocation under the thick, fermenting lumps of mashed debris it leaves behind. It does this not only by the error of trimming at the wrong times of year, but because, unlike previous forms of hedge-trimming by hand or machine, the flail-mower with its battering cyclonic action destroys everything it touches. It macerates the green herbage of the hedge, and smashes every creature on or in the herbage at the time - and that is exactly where most of them will be, hanging out in the path of the flail. If they try to withdraw, they are simply trapped by the flail against the stone side of the hedge-bank. Even insects on the wing along the hedge rarely escape.

Woodland hedge in early years of flailing shows invasion of ivy, nettles and cleavers. The brown-lipped snail, so far a lucky survivor, aestivating on hart's-tongue fern, shows why the flail kills so many invertebrates. Awake or asleep on the greenery like this, they have no time to get out of the way. [Photo: Cyril Orchard.]

An examination of its work shows that the flail does not cut; it bashes, tears and shreds the vegetation, leaving a chewed mess that is grandly called, by those who do not understand the requirements of a Cornish hedge and its wildlife, a 'mulch'. This notion is often ignorantly put forward as a 'benefit' of flailing, in that it 'returns nutrients to the soil'. This may be useful in gardens, though no sane gardener mashes his flowers and bumblebees for the purpose. In hedges the mulch effect is another of the evils, smothering and rotting the delicate organisms trapped beneath it, and enriching the soil with the characteristic of all green manures so that rank weeds overwhelm the original flora. One of the signs of the routinely flailed hedge is the high proportion of hogweed, docks, nettles and cleavers growing along the foot of the hedge where a lot of the

'mulch' has fallen. Enriched soil is the last thing the wild flowers or the structure of a Cornish hedge want. Worse, by rendering down the natural diverse growth into manure and removing all competition, the flail gives a free lunch to the invasive plants dumped in hedges, and their thick and rapid spread prevents other species from growing.

Admirers of the 'mulch' are obviously unaware that it contains the pulped remains of the hedge-side butterflies and bees, among countless other victims. A trim with the flail on a Cornish hedge means instant annihilation for a big swathe of life at every pass. With the modernisation of agriculture and gardening, that swathe along the hedge too often represents the last stock of diverse natural life remaining in the area. Even allowing for some local movement across the network, there is little life left to re-populate the hedge.

This is shown by the continued absence of grasshoppers, among the more mobile of hedge life, from flailed hedges where they used to be numerous beyond even remotely accurate estimation. By destroying invertebrates in these astronomical numbers the flail has its most dire and lasting effect on the wildlife in the area. Spring, summer and autumn, the months of March to October inclusive, are nature's most active times of the year and, in all circumstances, the wrong time to trim unless to encourage grasses; but a cut with a scythe, as in the old hayfields, does at least allow living things to creep or fly away from the cleanly severed stems, and in those days they had the sanctuary of nearby hedges to creep or fly to, where they could breed safely.

YEARLY CYCLE OF LIFE IN CORNISH HEDGES

Most hedge life relies entirely on annual reproduction. Decimating one year's breeding adults and young, and removing flowers and seeds, causes such a population crash as can take many years even partly to recover. So far no hedge has been shown to recover more than a handful of species after even one summer flailing. Flailing year after year spells speedy extinction for all but the toughest perennial rootstock and itinerant predator. Too many Cornish hedges now prove this sad truth, the only life noticeably surviving in some of them being long stretches of stunted gorse, winter heliotrope or ivy, and a roving magpie or crow. These are hedges that have been persistently flailed at active times of the year, usually in the height of summer. Hundreds, in some cases thousands, of years of natural evolution in this remarkably nurturing environment, the Cornish hedge, have been wiped out over a few decades. Before the flail arrived these same hedges carried, as a rule, between one and two hundred different flowering herbaceous species per mile of hedge, supporting untold numbers of living creatures.

Harmful flail-mowings lie rotting on this heathland hedge rapidly being ruined by flailing in May. Hedge-top gorse dying, bracken increasing and most of the floral species already lost. The beautiful Guernsey cow, once the mainstay in Cornwall but now also a vanishing breed, appears uncomfortably exposed. Even on a low hedge like this, the destruction of hedge-top bushes by the flail deprives livestock of appreciable shelter from Atlantic gales. The buzzard flying overhead is hunting the rabbits which flourish as the flailing dries the hedge.

One of the rare values of the Cornish hedge is its ability to produce in succession many different species on the same spot throughout the year. The face of the hedge-bank, with its

efficient system of rainfall absorption and drainage, promotes an airy tangle of cover as some plants shoot upwards and others trail downwards, while smaller ones creep among them. Spaced and regulated by the stones between which they are rooted, the growth of seasonally successive plants can overlay earlier ones without smothering them. This summer cover protects damp-loving spring plants from drought, so relict woodlanders such as primroses and violets, ground ivy, bluebells and wood anemones can continue to grow on heathy hedge-sides and top, where more than one ecological era is preserved. With annual seeding, the seasonal succession is perpetuated, and supports in its turn the seasonal and yearly succession of insect life. Removing the summer cover and preventing seeding disrupts the whole process and cripples nature's recovery mechanisms.

Now that most of the hedges in Cornwall have been spoilt and corrupted by the flail, the massed display of annuals and biennials such as fumitory and foxglove that used to be seen on hedges every year may seem unlikely, as these are thought of as essentially fugitive colonisers where ground has been broken or woods felled. In Cornish hedges the abundant presence of short-lived plants and 'arable' wild flowers is an indication of the sensitive balance of the hedge's system, and illustrates a fundamental rule of its proper management.

TRADITIONAL MANAGEMENT ENHANCED FLORA

Floral succession depends on the relatively small amount of seed lodged on the surface of the hedge-bank between the stones of its facing. This limited collection of seed, once exhausted, cannot be replenished by breaking ground and bringing older seed to light, as can be done along a hedgerow field margin. The narrow earthy interstices of the stones cannot be disturbed to activate buried seed, as this would risk loosening the stonework, and the softened earth would simply wash away. Neither can the hedge-top soil be broken without endangering the structure. With correct management, maintaining this superficial seed-bank is no problem; every season's growth is allowed to flower, to set seed and to ripen and scatter it, before the trimming is done with a clean cut in winter. This trimming only takes the woody scrub growth from the side of the hedge, leaving the grasses, ferns and floral species untouched.

Historically this work was done by the roadman or the farm worker with his sharp-edged hand tools, the sickle (hook), bill-hook and slasher. He cut woody growth right back to the soil between the stones, and taking the brambles out carefully at the root every winter from between the herbaceous growth kept them virtually eliminated from the side of the hedge, while those growing along the top were left to flower and fruit. In the mid-20th century, the tractor-mounted reciprocating scythe (finger-bar cutter) took over, and although less discriminating it still did a good job. It could not pass too near the hedge stones for fear of damaging the blade, so safely left invertebrate life in the herbaceous growth. Like the old tools, it severed the stems cleanly with a single cut, allowing living things to escape, and minimising damage from subsequent die-back or disease in the cut wood. The only drawback was that the stubs of bramble and scrub were left at about 8 inches long, and soon sprouted again, making a mild inconvenience to walkers in summer.

High hedge-top trees were lopped or selectively coppiced by hand in winter, the Council's workmen using a converted open-topped double-decker bus as a combined work platform and brushwood cart. The only trimming carried out in summer was by the roadman's hand-hook on blind corners and in the ditches where necessary to keep culverts open. He would also knock off any long bramble whips or broken vegetation sticking out in the roadway. He took a craftsman's pleasure in his work and was often to be seen carefully avoiding resident wildlife, and artistically working around a fine fern specimen or some pretty flowers, while discouraging coarser weeds

from growing out into the road. When he did his main hedge trimming in winter, his method was to cut out the rough, woody growth from the hedge-bank's face, leaving the herbaceous and grassy growth unharmed and fit to grow again naturally in spring. He would prune or partially coppice the hedge-top bushes if necessary to prevent wind-rock or to rejuvenate growth, keeping their natural-looking outline. These methods, while making the roads safe, preserved the diversity and enhanced the quality of the hedge-side flora and its animal life. Cutting in winter with a clean blade did not convert the trimmings into green manure, or destroy life before it could reproduce.

The old practice of 'casting up' - every few years returning the soil and plant debris that has gradually washed down to the foot of the hedge, by digging it out with a Cornish shovel and throwing it up on to the top of the hedge-bank - not only helped to hold the stones in place, but returned fallen seed to the hedge-top to renew the cycle of downward-scattering and slow descent. Meanwhile, between castings up, every year's uninterrupted seeding peppered the hedge-face in autumn with a fresh supply, and every winter's trim of dead and woody growth with sharp tools maintained the open conditions required for germination, and kept the low level of fertility that most wild flowers demand. Orchids are a typical example of species that must seed annually, and they were among the hardest hit when the flail first arrived. Prior to that they grew abundantly along so many Cornish hedge-sides, but after the first flailing hardly any reappeared the following spring, and they never returned.

Casting up was one of the roadman's duties done after the winter hedge trimming, along with cleaning out the ditches. In modern mechanised removal of earth from the foot of the roadside hedges, it is cut away, scooped up in a tractor bucket and taken for dumping elsewhere. This has been an unnecessary waste of public money, as the normal passage of tyres on the tarmac automatically limits the hedge-foot soil from creeping outwards. Where the hedge belongs to the adjoining land, such removal might be construed as theft. The fallen seed and the replacement soil for the hedge's structure are no longer returned to the hedge-top. An indicator of this was the steady descent of some flowering species, until they grew only at the bottom of the hedge, when casting up fell out of practice. On hedges that used to be floor-to-ceiling primroses, the plants have been seen to walk down the hedge like an ebbing tide until they disappear at the bottom. Hogweed and cow parsley used almost always to grow on top of the hedge, kept in check by competition from the shrubby growth and looking very handsome against the sky. Now they are all along the bottom, where, enriched by the flail-mulch and encouraged by removal of competition, they spread and grow like mad, overwhelming and shading out the finer hedge-bank flowers and often flopping out awkwardly into the roadway.

Hogweed, brambles and nettles growing from flail-enriched soil at base of hedge. Taken in August 2001 this shows loss of summer flowers to flail-induced invasion of rank weeds, bracken and coarse grasses on hedge sides, a uniformly dreary effect. Hedge-top gorse and thorn bushes gone. Before the flail arrived in this area in 1972, a great diversity of self-regulating heath flowers grew close to hedge stones, giving a mosaic of colour while presenting no hazard to road users.

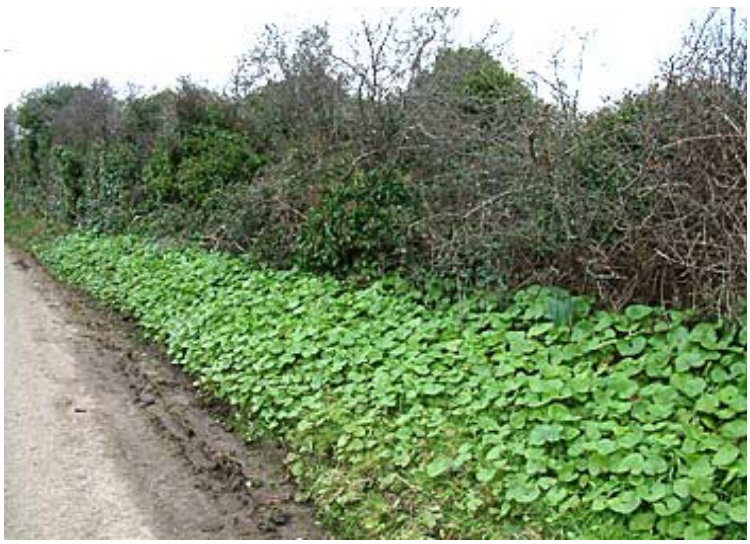
Whereas the burst of foxgloves in a fresh woodland clearing or of fumitory in a ploughed field diminishes as other growth overtakes it, in the traditionally-managed Cornish hedge

the conditions for germination and growth remain constant from year to year. Hence the extraordinary perpetual regeneration of its flora, including species that are usually ephemeral and rely on soil-stirring, such as sow thistle, black nightshade, red deadnettle, groundsel, pimpernel, chickweed and shepherd's purse. That fresh burst of foxgloves has been repeated annually on the hedge for hundreds of years since the wood-land was cleared and the hedge built with its soil. There is no reason why it should not continue as long as the hedge stands (and a Cornish hedge can stand for thousands of years) if allowed every year to cast its seed, and shrubby growth on the hedge-face is removed in winter with a clean-cutting blade.

Unfortunately there are too few hedges in Cornwall where these conditions of care have been maintained. In most hedges today, species denied seeding are in deep trouble, and for many of them the last of their dormant seed has gone, so they cannot return. These hedges have repeatedly been flailed before the plants could ripen seed and replace their dormant stocks. Vetches, the food-plants for many moths and butterflies, are foremost among the losses. Where the trimming programme is improved, easily-seeding species tolerating a richer soil, such as red campion, can make an explosive recovery; others, less robust, do not reappear.

Now that the mis-use of the flail has resulted in loss of normal seeding from the hedge-face, and has brought an invasion of rampant species along the foot of so many hedges, casting up could be a problem; whether returned to the hedge-top or carted away, the hedge-foot soil is now too often a source of re-infestation rather than regeneration. As tends to happen, abandoning the tried-and-tested old ways has caused seemingly irreparable mischief. The tough roots of these mainly alien species have to be kept out of the stonework, so they must not be placed on top in shovelfuls of earth as casting up. This ban includes such weeds as winter heliotrope, variegated deadnettle, three-cornered leek, nettles, montbretia, periwinkle and Japanese knotweed. The remedy is repeatedly to cut them during their growth period, until they die out. As the summer flailing has sadly proved, trimming in the growing period will soon kill any plant; so although normally taboo, it is the best way to eliminate unwelcome species. Starting early in the spring, as the weeds begin to grow, has the most severe effect on them, and avoids the risk of injuring wildlife which may otherwise later on be using the plants for nesting shelter.

This early selective removal, repeated as soon as the plants try to regrow, is essential, as once these weeds are allowed to make some leafy growth they quickly re-invigorate their roots. Prevent this and even the toughest give up, often quite suddenly, though with the worst ones it might take up to five years or so really to get rid of them. (Japanese knotweed, with its deep storage roots, may yet attempt to reappear after this, so cutting down, or preferably hand-pulling, the young stems needs to continue as long as it does so.) Original native species (which must not be cut while the weeds are removed) then have a chance to re-assert themselves. Once the rampant weeds are eliminated, casting up can be re-established.



Rampant flail-encouraged winter heliotrope (Petasites fragrans) now covers many miles of hedge-foot and verge to the exclusion of nearly all other species. This section of woodland-edge hedge pre-flail contained over a hundred plant species. [Photo: Mark Ventham.]

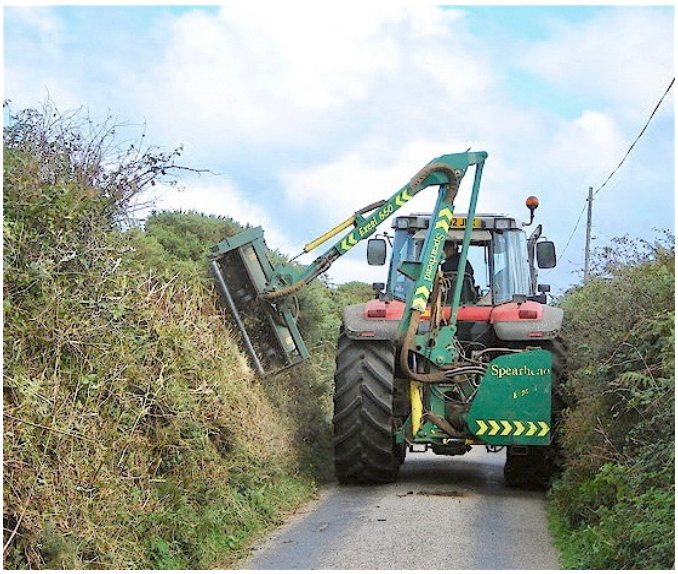
The roadman was responsible to the local community, many being his family relatives, and like the farm-worker of his day did his job with the care of one who understood local conditions and the cycle of natural life. Working by hand, he was intimately acquainted with the hedge and its wildlife, and knew that the vast majority of it was in or on the green herbaceous growth, depending on it for cover or food or both, and it must not be interfered with.

The modern man sitting in a tractor cab, steering the machine, cannot see the individual damage the flail does, and has no idea of the consequences; he is simply doing as he believes he should - trimming the hedge, like mowing the lawn or vacuuming the carpet, a tidying chore. He has no idea that as he wipes the green growth off the face of the hedge he is wiping its wildlife off the face of the earth. As the poet Gerard Manly Hopkins wrote in a plea for Nature, "Oh, if we but knew what we do when we delve or hew, hack and rack the growing green!"

Most of the drivers would welcome the chance to use their initiative for the sake of wildlife, and enjoy using the trimmer with finely-adjusted skill. The flail is a wholly bad tool from the ecological and environmental point of view, but is more or less capable of skimming off the long bramble whips, removing certain rampant weeds and leaving the desired grassy growth and herbaceous flowers intact on the hedge-side. Unfortunately the driver's orders may decree, or be thought to decree, otherwise, and the result is a shaved and square-topped eyesore and wildlife slaughtered wholesale. Far from being a valued member of the community, this soon made the flail-driver universally hated and reviled. Unjustly, though understandably, so many distressed members of the public vented their anger on the unfortunate man on the job that if anyone stopped him a hunted look automatically came into his face, followed by surprised relief if the greeting was polite.

DEVASTATING ARRIVAL OF FLAIL

The flail was introduced and first used on Cornish roadside hedges in the early 1970s. As noted at the time: 'The devastation was appalling. As it passed, the glory of summer flowers dancing with harmless insects vanished, leaving on the hedge only a hideous shorn, messy stubble among the scarred and battered stones of the hedge's surface. The road was carpeted with shredded leaves, stems and flower-heads, crushed snails, beetles and bees, the shattered wings and soft bodies of thousands of moths and butterflies, and every few yards pieces of smashed voles, shrews, slow-worms and toads.' Everyone who saw this tragedy at close quarters must have realised that the Cornish countryside would never recover. A storm of protest from the public bombarded the County Council, but met with denial, prevarication, ridicule and emotional blackmail. "If we stopped doing it because you don't like it, and someone was killed on the road, it would be your fault," protesters were told, despite making it clear they were asking for a sensible, safe policy, with blind corners, junctions and passing-places trimmed in summer and the main trim being done in winter.



The flail mower has been a disaster for Cornwall's wildlife and the structure of the Cornish hedge.

The suggestion that the wholesale summer flailing was necessary for road safety was ludicrous, when the authorities consistently flailed drought-stunted grass a few inches high from hedges set back from straight roads, and left five-foot stands of Japanese knotweed untouched and blocking the motorist's view. Shaving the hedges was seen to make the narrower roads and lanes less safe, as it gave an illusion of space and vision that was not actually there, so drivers speeded up inappropriately. People living beside blind bends observed that instead of coming round with caution, cars now came flying round carelessly. Vehicles frequently hit the hedges while attempting to pass each other in narrow lanes, instead of using the passing-places. Cyclists, pram-pushers, walkers and riders all knew that from the moment the flailing was done, they were in danger from the increased speed of summer traffic. The road-kill of wildlife escalated.

Deeply-concerned people were forced to watch helplessly while, because of the special nature of the Cornish hedge, irreversible damage was being done. The hedges' populations of insects and flowering plants immediately crashed, the more rare or vulnerable species being wiped out in two or three seasons' flailing. The more resistant declined over the next five years, most to the brink of disappearance, and around two-thirds of the plant species have not been seen in those hedges since. Nor have most of the insects and birds. At a conservative estimate, overall 90% of the original flora and fauna has been extinguished. Only the toughest plants, and the most common insect or animal species, able to reproduce their cycle away from the hedges, managed to survive in drastically reduced numbers the first ten years of summer flailing. As this disastrous elimination of reproductive material continued in the face of furious public opposition, other flail-related factors began to hasten the decline, principally the effects of dehydration on the shorn hedge-bank, and the spread of rampant species revelling in the enrichment of soil and the removal of competition.

HOW A CORNISH HEDGE WORKS

The natural system of the Cornish hedge relies on maintaining a capillary action, and rests on the fact that the earth core never dries right out. It acts like a slightly damp sponge to draw up and absorb rainfall, while the outer coat of rocks and plant matter quickly drains and dries. Moisture suction and the entwined and impacted growth of healthy fibrous roots help to hold the stones and earth of the well-built hedge strongly in place. Even in the longest drought of summer the earth core still draws up rising damp from the subsoil and remains cool beneath the green seasonal growth. In the wettest winter the tightly built and root-packed stone cladding throws off rainfall sufficiently to avoid excessive wetness of the core and water-logging of the plant growth, which could otherwise result in rock-fall. This never-too-wet, never-too-dry regulation of the core works best in the properly built hedge with the core resting on the subsoil and having a clay or shale content, as these are cooling and help to induce condensation. This is one good reason why hedges should be filled with 'rab', or subsoil, not topsoil, when they are built. Correct laying of stone and proper inwardly curving batter also direct and conserve moisture absorption.

False oat grass (Arrhenatherium) overwhelms heath flowers on hedgebank in earlier stages of degradation by flail. Bracken, brambles, matted scrub and ivy, with heavy weeds at base, then take over as flailing enriches soil with mowings.

The low fertility of the core (another of the good reasons for using rab) and the tightness of the stones resist the establishment of rank weeds which would otherwise destroy the integrity of the hedge-bank and reduce the biodiversity. The hedge's natural seasonal covering of plant growth also plays a vital part in regulating the capillary system.

If vegetation is removed from the hedge during the eight months of March to October, when the Cornish sun is hot and rainfall might be low, the insulation, shade and dew-catching provided by the greenery is lost. The amount of moisture rising from below, nearly always less at this time of year, may not be able to compensate. The core of the hedge then dries out entirely and acts, as a dry sponge or any dust-dry substance does, by repelling water; dampness no longer rises from below. Rainfall is prevented from percolating in, and merely water-logs the surface earth around the stones, so, wherever the flails have loosened them or the hedge has lost its batter and developed a bulge, they fall away from the dry core under their own weight. A vicious circle is established; green and bushy growth is removed so the hedge dries. As the hedge dries growth is inhibited, so it dries further, and more stones fall. The core of the hedge eventually remains dust-dry all the year round, unable to benefit from winter rains.

Lone hedge brown butterfly in a roadside hedge where successive flail-induced invasions show clearly. Initial take-over by false oat grass now smothered by development of thick matted gorse on hedge face. Brambles taking over lower down crowd out red campion, which had previously replaced original heath species as soil became richer. Before flailing began in 1972, this exposed south-facing hedge was a treasury of heath flowers. In this exact piece of hedge in the camera's viewfinder, dog violet, English stonecrop, sheep's-bit scabious, tormentil, barren strawberry, pignut, ivy-leaved bellflower, heath milkwort, autumnal hawkbit, heath bedstraw, trailing St John's wort, betony, cat's ear, wild golden rod, yarrow, thyme-leaved speedwell, umbellate hawkweed, ivy-leaved toadflax, sheep's sorrel, black spleenwort and early hair grass once grew in exquisite mosaic, the hedge stones showing here and there, encrusted with mosses and lichens. It would have been difficult then to photograph fewer than four or five butterflies at a time at this distance, and they would have included any of thirty species. Nobody bothered to photograph them because they were there every summer. After the flail had passed once, in July 1972, it was too late. The hedges were wiped clean of butterflies and their young, and around 98% of them never came back.

If the hedge has been built with a topsoil core, or the clay core has with the passage of time acquired a humus content, the hedge face slumps more easily under these conditions. Established plants die, the desiccated soil slides out from between the stones and the rain washes it away like quicksilver, taking with it the hedge's limited stock of dormant seed and the material in which it should have germinated. This insidious loss is added to the direct loss of seeding species by trimming before they ripen, or by ripe seed and young plants rotting under the fermenting mowings. The logical conclusion of continued summer flailing is the final death and disintegration of the hedge into a pile of stones with ivy and a few tough weeds growing through it. Many of the most-flailed hedges in Cornwall already answer this description.

LONG-TERM EFFECTS OF FLAILING

Roadside hedges which prior to the introduction of the flail had been described by many

who knew them as 'a paradise' of flowers and creatures, by the early 1980s after ten years of flailing were brown and barren all the year round. In August 1984 just one wandering bumblebee was recorded, searching in vain for a flower in a mile of lane where, until the first flailing twelve years previously, many hundreds of bees had revelled among the massed blooms. The loss was directly and entirely due to the flail, as was proved not only by eye witness to the initial massacre but by adjacent sections of hedge not flailed, which continued to flourish until either flailed themselves or eventually adversely affected by the decline in the flailed hedges around them.

The damage was plainly visible from that first tragedy of July 1972, which, as the brand-new machine passed slowly along them, left the flailed hedges silent and still, empty of the teeming life they had displayed every summer since time immemorial. Millions upon millions of butterflies, moths, bees and other insects were sucked into the flails with the flowers and beaten to death that first day. With the loss of them went the birds, and very few have returned. Initially, they moved into the un-flailed farm hedges alongside, then up on to the higher land where there were uncultivated areas of heath, or into the valley woods, while many crowded into gardens adjacent to the flailed hedges. Very soon, with shortage of food and nesting sites for the hordes of refugees, bird numbers fell sharply in these areas too.

The survivors suffered further decimation as predators repeatedly raided these little 'larders', whereas previously they had ranged the hedges among resilient populations of prey. This problem of over-predation at all levels of the food chain in such small survival areas is still acute today, causing ever-falling numbers and inevitable local disappearances. For example, in one such pocket sanctuary surrounded by flailed-out hedges, the larger moths observed each season fell in twenty years from sixty-one species to four, due to birds and bats being confined to hunting in this small space. During the same time the number of bats was reduced to one, and the nesting bird pairs fell by three-quarters, with total loss of song-thrushes and swallows to observed predation by cats and sparrow-hawks.

The damage from late-summer-to-autumn flailing on this hedge is clearly visible in September 1987. Hedge-bank dehydrated except along foot (note green line at base) so little recovery after each trimming. No seed-heads, berries or late summer flowers left, once abundant here. Hedge-top bushes gone so no shelter for birds, and hedge outline is unattractive. Poor germination, few foxgloves and campion for next year. Main constituent of hedge is dead stalks and thick detritus underlying bracken, gorse and brambles (recently trimmed off when this photo was taken) that cover most of the hedge's face after 15 yers of flailing. Since the 1980s hedges that then looked like this have been further overtaken by ivy spread. [Photo:Jenny Smith]

In 1987 a petition collected at every house in a rural Cornish parish found over 90% of the people asked were furiously opposed to the flailing, and many people outside the parish and from the nearest town also clamoured to sign. Only two people actually spoke in favour, because they 'didn't want their car to be scratched', exploding another County Council myth that this was the wish of 'nearly everybody'. The owner of the largest and shiniest car in the parish observed, "It's careless driving and bad manners that scratches cars, not our beautiful hedge flowers."

Public pressure at last produced some result, in the Council's decision to 'reduce expenditure' on flailing. Unfortunately they did this not by sensibly reducing their excessive over-trimming but

by transferring the responsibility for roadside trimming to the landowners, much to the disapproval of the people who had campaigned for a proper Council policy. After fifteen years of close summer flailing, many farmers felt obliged to continue with it, afraid of the suggestion of blame for any accident, and the threat that if they neglected it the Council would do the work and charge it to them.

Gradually a more uneven and slightly friendlier management developed as the Council's reduced activity was seen to be confined to summer-trimming blind junctions, with more general trimming left till after September. Far too late, urbanising attitudes slightly relaxed, and the ruined hedges began a slow and partial recovery. As flailing eased a little in the late 1980s, the extent of the damage became apparent even to the casual eye, in the utterly changed appearance of the hedge-banks, the once-exquisite mosaic of wild flowers now a rank jungle of bracken and other coarse vegetation.

Heath hedge completely overrun by ivy. This is an end result of flailing. As the flail removes competition, prevents original flora seeding and enriches soil, the once minimal threads of ivy on hedge-bank spread fast, overcoming the hedge-bank with this deep, strangling pall preventing resurrection of other species. Only bracken still grows through. One polypody fern (lower right) is all that remains in this piece of hedge which pre-flail contained 29 flowering species, mainly small heath plants, in the camera's viewfinder as shown here.

Today, with the cumulative damage of the flailing years, the wildlife is sadly changed and depleted. It is difficult to convey the true value of a healthy Cornish hedge to any person who never saw one - and anyone who did not see Cornwall before the early 1970s probably never did. The flail has reduced to uniformity hedges that used to be of widely-differing character. From damp woodland hedges to dry heathland, the banks now frequently show a solid wall of ivy, especially noticeable after the hedge is trimmed. Gorse, thorn and bramble on the hedge-side, instead of being regularly cut out to their single points of entry between the stones are formed by the flail into a mat, forcing them to dense sideways spread, through which few other plants can grow. Miles of verge are overtaken by introduced weeds; Japanese knotweed, winter heliotrope, three-cornered leek, dumped by gardeners and then, like the ivy, disastrously helped to spread as a result of flailing. Apart from these, brambles, bracken, nettles, hogweed and false oat-grass have universally overwhelmed the original flora. Precious heath hedges with their small slow-growing species have suffered most. The more tolerant woodland edge type, where the tree-shaded hedge is slower to dehydrate, has plants that seed more readily and grow quickly, so they can endure a little more competition and recover more easily if flailing ceases. Even here the hedges can be severely deranged.

This degradation of habitat, along with the directly destructive action of the flail, is responsible for the continuing dearth of wildlife. To see two or three butterflies or birds in half a mile of hedge can give no idea of the abundance that the hedge should be supporting. This pathetic number is now typical even in sunny lanes where in high summer, until the introduction of flailing, a cyclist would dismount and walk to avoid harming the multi-species swarms of hedge butterflies that, drunk with nectar, fluttered and basked all over the sun-heated tarmac; and where every few yards of hedge revealed a busily foraging bird.

LOSS OF BIRDS AND INSECTS

The scarcity of butterflies and birds along the roads is not, as now sometimes thought, merely a symptom of the general decline in the countryside. The roadside numbers pre-1970, under the old trimming regime, were already far greater than the numbers in the internal farm hedges. Most of these hedges were either grazed by livestock, trimmed at corn-harvest time, or left untrimmed and overgrown, so that few boasted the floral abundance and diversity of the road side of the hedge which was carefully tended by the old successful council policy.

The road hedge had other advantages over the open fields. It was more sheltered, tending to have more dappled shade giving a valuable woodland-edge habitat. On higher ground the lanes provided very warm areas for heath-loving species, heated by the sun on the road surface. With the opposing aspect each side of the road, these advantages could more than double the plant and invertebrate diversity from that found on the field side of the same hedges.

It was impossible to walk along any Cornish lane without seeing scores of small birds working along the roadside hedge, one at least for every dozen steps you took; blackbirds, thrushes, robins, wrens, sparrows, tits, chaffinches, all the familiar garden birds, mingling happily with the small country birds, the hedge-sparrows, meadow pipits, corn buntings, linnets, skylarks, goldfinches, greenfinches and yellowhammers, chiffchaffs, blackcaps, flycatchers, stonechats and wheatears, and the warblers and less common migrants such as redstarts in their time. Without pause, birds would be flitting as you walked, some to hide in the foliage of the hedge until you had passed, others to travel along just ahead or loop back and land again behind you, while many were so accustomed to their situation that they simply ignored you. In the fields beyond, you saw almost exclusively the birds of the open land - crows and buzzards, flocks of rooks and gulls, and in their season lapwing, snipe and starlings. Finch flocks would use the fields at times but they preferred hedges, perpetually working along the lanes where, as for the other birds, their food stock was so abundant.

Once species-rich hedge displays, in May 2006, typical long-term flail-damage. Three-cornered leek (Allium triquetrum) along foot, ivy on hedge side, brambles on top - and nothing else. In May 1961, before the days of the flail, a cart-load of mixed wild flowers was picked from 10 yards of this hedge, seen in the camera's viewfinder, and so many still remained you could not see that any had been taken. This was not an exceptional hedge. Many miles of the once so diverse Cornish roadside hedges now look like this - dead boring, and empty of insect and bird life.

Numbers of all hedge species were then assured, with no more than the normal seasonal or population fluctuations, and had been largely unaffected by farming changes since the war. Cornwall remained traditional until the 1970s, with few hedges being removed. Already the greater seed and insect supplies were in the hedges, with most of all in the roadside hedge. Consequently the majority of small mammals, birds and reptiles were to be seen hunting in the roadside hedges. When the flail was introduced and first used along every road and lane, the resulting massacre smashed across this whole wide spectrum of species, and birds from the denuded roadsides could not survive in the field hedges

alone. Two miles of field hedges could hardly equal a mile of rich lane hedge-side, and already held their quota of birds.

The general countryside decline followed this, hastened through the 1970s and '80s as farmers themselves scrapped their old finger-bar cutters and adopted the flail-mower. Other changes such as hedge removal, increase of silage and arable cropping, use of farm and garden pesticides, spreading urban sprawl and the garden-centre boom in exotic plants useless to our wildlife, contributed during these years. These trends reduced the chances of re-population from field or garden to hedge; but it was the flail, destroying the county-wide sanctuary of the hedges and the high proportion of life they contained, that caused the disastrous decline in Cornwall.

FLAIL PREVENTS RECOVERY

The continuing use and mis-use of the flail has prevented the well-known ability of native life to bounce back. Even the adoption of improved trimming programmes, though relieving the pressure on some of the plants, has little effect in restoring lost insects and birds. In most hedges they have continued to decline, despite some floral revival. However carefully the timing is arranged, even when flailing is performed only during winter and in rotation, as often recommended for field hedges, the fact still remains that whenever it is done, the flail by its battering action destroys every vestige of life it touches. That means far too much of the wildlife, even in the dormant phase. The few survivors are further depleted by death from exposure, smothering or enhanced predation. Most of the remaining species have been reduced to the point where the flailing leaves them no buffer against the normal toll from predation or accident. Seriously reduced populations of songbirds are short of food and safe nesting sites at a time when the big predators - sparrowhawks, crows, cats and grey squirrels - have increased in number, aided by legal protection, road-kill carrion and the popularity of cat-doors and garden bird-feeders.

There is little advantage in letting the hedge's populations breed for two or three years, with half or a third of the hedges done each year in a system of rotational trimming, when the implement wipes out at one go the recovery they have made in each of those areas. Rotational trimming is usually given as the answer to make the flail acceptable, and as an improvement on annual trimming, but after every flailing, regardless of the size of the invertebrate populations in the hedge at the time, only a desperately small number of individuals survives in that hedge. The 'corridor' idea suggesting that for those three years the wildlife has been running off to live and thrive elsewhere and will run back again as soon as the hedge re-grows, is sadly unsubstantiated in regard to Cornish hedges, and certainly a forlorn hope where most species are concerned. With all the hedges in the locality being flailed, even rotationally, there is not enough wildlife surviving nearby to recolonise or to maintain anything like normal numbers.

The flail-damage everyone hates to see - but what about the damage nobody does see? The force that destroyed the greater part of this willow tree smashes the soft bodies of invertebrates to pulp. Typically one pass of the flail in the active season of the year (March to October inclusive) will kill over 90% of the insect life in the hedge. Unlike the tough willow, which will probably regrow after a fashion, they and their progeny have gone for ever.

Only three adjustments to flailing policy can really aid survival; to trim only in the dead of winter, to leave at least 8-12 inches (20-30 cm) of herbaceous growth on the hedge-side, and to trim alternate sides of the hedge (not alternate lengths both sides) in different years rotationally. This is easily organised by thinking of the fields as a chess-board, trimming the black squares this winter and the white squares next winter or, if growth allows, on a two-year rotation with each side done once every four years.

Trimming alternate sides permits fruiting of thorns and brambles and seeding of biennials on each succeeding side in its second and third year, and gives half the hedge's wildlife always at least one year's full cycle to breed. Most wildlife, though unable to move right off the area and back again between trims, is probably capable of spreading some of its population over the top of the hedge to the other side in one or two seasons, and back again the next. The limiting factor is the difference in aspect on a north-facing hedge, or of salt-wind exposure on one side of a coastal hedge. The chess-board plan ensures that the four aspects round the field all have their chance to reproduce between flailings, and that at least some individuals of most species have a chance of surviving the next flailing. For roadside hedges, even this alleviation of the flail's effects cannot help. 8 - 12 inches (20 - 30 cm) depth of herbaceous growth should be left unharmed on the hedge-face, and where growth or road-width permits, the hedges should be left for two years between trims. Woody growth (gorse, thorn, etc.) on the hedge side, not top, should be cut right out every few years. The main trimming should only be done in January and February. The hedge-top should never be trimmed horizontally.

There cannot be real recovery until the trimming of all hedges and verges is done with a clean-cutting type of implement coupled with alternate-side winter-trimming, leaving sufficient growth on the hedge to protect its structure, its herbaceous plants and most of its dormant wildlife.

TRIMMING TO AID WILDLIFE

Using the reciprocating scythe or finger-bar cutter in January or February (only on wet land it may have to be at any time after leaf-fall) when much of the vegetation should already have died back, lessens the problem of disposal of the cut material which is a common objection to this type of hedge-trimmer. It also slowly reduces fertility so in time there is less luxuriant growth and so less material to cut and disperse. To begin with, big flail-induced mats of woody growth such as gorse and blackthorn on the sides of the hedge-bank may need to be selectively cut out, back to the stone facing. The general trim should leave at least 8 inches (20 cm) of growth on the hedge. This leaves intact grass-tussocks and the large leaves of plants such as foxglove. Much of the cut material remains on the hedge. Any that falls may be left to lie, unless causing an obstruction to road traffic or farm operations, when it may be thrown back on to the hedge, or if abundant picked up and piled nearby as a habitat resource. Leaving a wildlife margin around the field avoids any problem from the fallen trimmings.

By the time this winter trimming is done, the growth has withered and dried sufficiently that it has little harmful smothering effect when cut and left on the hedge or margin. Nor does it over-enrich the soil as the highly nutritional content of green summer trimming does, so it can safely be left on the hedge to break down naturally. Importantly, it helps to protect the hedge and its sleeping inhabitants from cold winds, frost or snow. From its debris emerge unscathed the insects and other invertebrates that have overwintered in its stems, including butterflies that hibernate either as caterpillars or pupae. Left where it falls, it gradually disappears, meanwhile supporting many more species in it as it decays. By early summer little of this cut material, except where it has been piled up in quantity, will be in evidence, hidden by the fresh growth. This

method mimics nature's own method of disposal, returning the right stuff to the soil, at the right time.

Hedges showing heavy infestation with rank weeds such as ragwort, nettle, dock or hogweed, might be a special case for wildlife enthusiasts prepared for hand work on hedges, and who can be relied on not to disturb nesting birds or destroy plants hosting invertebrate colonies. By persistently cutting out these weeds as they run up to flower and carting them away, they are prevented from reproducing, their roots are exhausted, and the soil fertility falls. Work should start in spring as the weeds begin to grow, and they should be removed selectively, leaving other herbaceous growth unharmed. In a few seasons they will be reduced to more normal proportions, and the gentler native species will have a chance to re-establish.

Similarly, while bracken is a natural member of heathland hedges, over-infestation left by the flail can be discouraged by skimming the 'crooks' off the tops of the young growth before the fronds open fully. Even the arch-fiend Japanese knotweed (Fallopia japonica) eventually succumbs to this method if the soft young stems are repeatedly cut off before their leaves open, and never allowed to grow beyond this stage. The trouble is that when it gives up it does so quite suddenly, usually in about the third year of this treatment, so people are tempted to slacken off, allowing it to grow again. Keep whipping off every last, weakest growth, until it appears as dead as a doornail - and then watch the space with an eagle eye.

Hedge-top gorse bush spread downwards over hedge face by repeated flailing, now forms a thick mat through which nothing else can grow. Only cow parsley, dock, nettle, cleavers, bramble and strong grasses now grow along the foot of this hedge which until introduction of the flail was rich in flowering species, including early purple orchis, four species of vetch and five of fumitory.

VALUE OF HEDGES UNREALISED

Another difficulty in conveying the value of Cornish hedges as permanent wildlife habitat is that few naturalists seem to have taken them seriously into consideration. By their own admission, in those crucial years of the 1960s to the 1980s the people who should have been active in objecting to the flail were driving unthinkingly, on their way to the coastline and the special sites, past hedges that were crying out for their attention. The Victorian naturalists were equally culpable in this habit of visiting the 'honey-pots' where their studies were carried out, though at least they did not have the basic disadvantage of life-long estrangement by car from their natural surroundings. Today, many more hours are spent driving about, sitting in front of a computer screen, or talking about conservation, than are spent out in the open air living with nature. Site visits, spot-checks, samples, weekend walks and occasional species-recording forays cannot replace the long-term daily round-the-clock observation that lead to thorough knowledge of the ecological systems and trends operating on the ground.

The emphasis on 'the wealth of wildlife on our protected reserves', and the focus on the most charming or spectacular animals and birds and rare or photogenic flowers, has its drawbacks. Many people admit that, to them, 'wildlife' means 'badgers and orchids and things', and they have become used to the idea that you go to see this 'wildlife' like visiting lions at the zoo.

There has been a lack of respect for anything outside the cherished reserves, or less appealing to the camera, which has led to the outrageous freedom of big machines to hoover-up fields, hedges, gardens, waste ground, and even beaches and inshore waters. Instead it needs to be emphasised that buttercups, green slime and slugs are wildlife, and so are soil bacteria and other microscopic organisms. Look after the ordinary, unglamorous things at the bottom of the food chain, and the picture-postcard ones will then, on the whole, be able to look after themselves - as, indeed, the orchids used to do, rioting in the Cornish hedges along with the buttercups.

Before the flail this was one of the magically pretty semi-woodland lanes in the environs of Mount's Bay. Foaming masses of blackthorn blossom crowned this hedge-bank full of violets, primroses, stitchwort and little evergreen spleenworts, later the big ferns with bluebells, campion, foxgloves and many other summer flowers, followed by garlands of bryony and bittersweet berries in autumn. Blackthorn now reduced to deformed stumps, nothing left on the hedge-side but ivy, and a tell-tale horizontal line of drought-tolerant wall pennywort taking advantage of minimal relief where slanting upper trimming swathe meets lower swathe. [Photo: Mark Ventham.]

Our most important wildlife of all is the hidden nation of creepy-crawlies inhabiting the common wild plants and the natural processes of decay. These, the less mobile or adaptable species, unable to withstand the big hoovers' greedy gathering or pointless and neurotic tidying up, are the ones that have to be cherished. On their abundance depends the survival of all the higher forms of life, including the human. The easiest and most extensive place to begin protecting viable quantities of them is in the hedges and verges. It is in exterminating so many of the common species here that the flail has had its appalling effect, and at the same time been overlooked by people whose eyes are fastened on the otters and the red kites. Even when they do eventually notice that wild flowers, hedge-sparrows and moths are getting scarce, they find themselves without much notion as to the cause. If they knew what really happens when a flail-mower or strimmer goes to work, they would be out marching in the streets screaming for a ban on their manufacture and use.

Specialisation is another unfortunate factor resulting in a lamentable lack of understanding of a hedge's miscellaneous life, or the way it works. Canvassing experts on the association of their favoured wildlife species with Cornish hedges usually brings the confession that they have never thought of any particular connection. Guesses as to species numbers using hedges and their place in the hedge's ecosystem, and the extent of hedge importance to them, are usually well below reality even for hedges depleted as they are now.

The standard of information passing current is, with one or two shining exceptions, mainly such as could be gleaned from a run-of-the-mill nature handbook, and the ability to translate these in application to the Cornish hedge seems to be generally lacking. Habitat given as, for example, 'coppice', 'dry heathy areas' or 'rocky crevices' should not lead to the assumption that such species are only to be found in managed woods or on heathland, cliffs or tors. In fact they can be thriving merrily in the hedges where these same conditions are found. Cornish hedges contain many

interwoven habitats, and for several thousand years have been the reservoir of species often thought to have occurred only in specialised areas. As those areas shrank before man's repeated advances, the hedges became ever more important to the species they harboured, until by the mid-20th century they were paramount to future succession and survival as the vast majority of our wildlife was living in them. Unbelievably, nobody in authority or positions of influence seemed to realise it; worse, they failed to heed the warnings given by the more discerning public voice.

The result of this paucity of study and lack of understanding has been that the desecration by flail of Cornwall's most widespread, diverse and antique reserve of nature was allowed to happen without any educated objection from the wildlife experts. Most still appear ignorant of the effects of flailing. Conservation spokesmen admit to not knowing why our songbirds, bats, butterflies, moths and bumblebees in particular went into spectacular decline after 1970, or why 'action plans' fail to reverse the overall loss. They are not recognising the massive role of the hedges in the first place. They have never walked behind a flail along a hedge in a previously unflailed countryside and witnessed the colossal magnitude of the kill. They have not even noticed the concurrence of the flail era with the steep decline, which followed immediately on the introduction of the flail into the British countryside.

The under-recording of hedge wildlife points to this general lack of recognition, and may create scepticism even now it has become fashionable to speak of the value of 'hedgerows'. Their full value, and the intrinsic superiority of Cornish hedges, seems still unrealised. The more damaged they are allowed to become, the less realised it will be. Already we have two generations of naturalists with no recollection of the pre-flail hedges and their teeming life.

Added to the extra wildlife amenities of its construction (those 'rocky crevices' and 'dry heathy' tops) as compared with the ordinary hedgerow, a Cornish hedge triples the area of ground its footprint covers. Taking the usual estimate of 30,000 miles of hedges in Cornwall, and reckoning the typical hedge at 4 - 5 feet high, 2' 6" wide at the top, and with at least a one foot strip of uncultivated ground at its feet, the gross area of Cornwall's hedges for wildlife would be about 50,000 acres. After man's various activities over the millennia, most of Cornwall's terrestrial wildlife provision is at best substituted mimic-habitat or semi-wilderness reversion. These areas would typically contain fewer species than the (pre-flail) hedges alongside, having been impoverished to some extent by periods of cultivation, while the hedge continued to support more of the pre-cultivation species. The value of the hedges can be set in clear comparison to the county's recognised and protected nature reserves, the sum total of which, at about 9,000 acres, is only one-fifth of the area of the county's hedges, once so rich in a vast diversity of life, and still with so much potential for wildlife revival.

The last bluebell in 30 yards of hedge-bottom, up to its neck in the tide of rank weeds induced by flailing - brambles, nettles, winter heliotrope, hogweed and Italian arum.

Disconcertingly it appears that the majority of the records might have been collected on a minority of the countryside area, and may sometimes represent not population indicators but repeated sightings of individuals at honey-pots. There must be a distinction between monitoring the viability of species on designated sites, and surveying species generally. Unless all information, including date, numbers observed and relevant anecdote, is also noted, it easily degenerates into a trophy-hunting exercise. The eager quest for a sighting of rarities leads to abuse, such as group expeditions to sensitive areas as a form of entertainment, with consequent disturbance and damage to the very wildlife the hunters profess to be helping. There is a moral boundary between protection and interference, which is too often overstepped. The craze for moth-trapping, for instance, seemingly without regard to the effects of stress and the loss of a night's activity on their short life cycle, is scandalous. Moths should be recorded the safe, non-invasive way with a lit-up white sheet outdoors. Unfortunately, setting a trap and going home to a comfortable night's sleep before waking up like Christmas morning to open an exciting box of goodies is much easier.

Wildlife surveys are carried out without regard to the nesting season, or to trampling and other after-effects of meddling. The practice of dropping 'quadrats' into the hedge flora at fixed intervals, an unnecessary 'aid' to recording species, is deplorable. Groups are actually instructed to carry out their survey in June or July so that the amateur participants can more easily recognise the flowers. They are not even warned that songbirds as well as invertebrates are as likely to nest in the hedge-bank as in the bushes and trees. The limited value of the data from such irresponsible styles of recording is their own indictment.

Common violet being strangled by ivy spread. The last plant of Viola riviniana in this 100 yards of Cornish hedge (once thick with wide masses of these violets) about to disappear in April 2006. After 35 years of flailing this once-gorgeous woodland-edge hedge full of different wild flowers is now almost 100% ivy for its entire length.

Concentration on well-known little areas and on the rarer species can be seen in wildlife atlases which are not, as might be implied, maps of the distribution of species. They are of recorded sightings, so may be accurate maps of the distribution of recorders, but tend to show clumps of every species in the same places. Latterly much more effort has been made to cover under-recorded areas, but if this takes the form of special forays it can still tend to concentrate on promising spots with easy access, rather than representing a genuine cross-section of ordinary country-side. These shortcomings result in a misplaced belief that if a thing has not been recorded, it was probably not there; and nowadays, in the failure to realise how badly the once abundant and wide-spread species are faring, and why. Conversely, the general public probably thinks that if a thing is there, it will have been recorded.

Ordinary people have always taken delight in the Cornish hedge, which is where most of us see wildlife every day. This is why intelligent complaints about the flailing almost invariably come from the general public, not from the specialists. However, even those members of the public who know what they are seeing have usually no idea it might be of interest for the records in that area - after all they've been seeing it so regularly when they walk the dog - or that it is worth

writing down the information the hedges give them daily. Further, many people purposely refrain from reporting what they have seen, to protect it from interference. Thus the vast majority of observed species in the common workaday hedges has remained unrecorded. This is not necessarily a bad thing. It would be a great pity if the trophy-hunting attitude invaded the nature-loving public at large; but a lot of knowledge may be untapped due to their believing that anything they know must be already well-documented. In fact, the reverse seems to be true; the huge resource of open country and hedges has been passed over in favour of select sites, and there may be more records of a scarce species than equate with those of a common one.

Nor do the past records adequately indicate the numbers of species found, or that used to be found, outside the special sites, or whether a species' local presence is increasing or in decline, or the factors that might be responsible for change. When looking for statistical or comparative evidence, recorded sightings alone are less than helpful. Out of the county list standing (in the year 2001) at around one million records of terrestrial species, only 2,100 were noted as having been recorded in hedges. (Rather strangely sea-trout and sole were among them. A Cornish hedge may harbour in its crevices the most surprising presence; perhaps this was an estuarine waterfront hedge - or just a computer error.) Much dedication goes into collecting records, but these always need to be supported by the relevant anecdotal data if useful conclusions are to be drawn from them. Forms used for recording are now more detailed, but it is a little late. A large number of these million sightings might have been in the hedges, but without consistent details the records are of little help in confirming the value of hedges as habitat, and may, indeed, appear to imply otherwise.

Greater stitchwort and one or two bluebell plants disappearing under ivy and bracken, the last survivors in April 2006 to show that this typical Cornish hedge was once full of flowering species, before flail-induced spread of ivy took over.

This taking for granted of Cornwall's hedges seems to have led to many species still being classified as 'common' in the county, when they have slumped to disappearance in great tracts of ordinary country-side where, in the pre-flail hedges, they were common indeed. It has perhaps also led to a policy of concentrating resources in the belief that certain species must inhabit certain special areas, because that is where they have consistently been recorded. In fact they lived in any suitable hedge before the flail arrived, and resources would have been far better applied in counteracting that menace. The necessary well-informed representations from conservation bodies have been lacking.

HEDGE-BREEDING BUTTERFLIES WIPED OUT BY FLAIL

A good example is the grayling butterfly, now usually believed to be almost exclusively a creature of heathland or cliff-top, whereas anyone who walked or cycled the Cornish countryside before the days of the flail knows that graylings were commonly seen along many a sunny lane, happily using the hedge grasses as their breeding-ground and the hedge stones or the surface of the road for their basking. Their numbers were comparable to those of that other avid basker, the wall brown; both were widely abundant in this situation, as were the hedge brown, meadow brown, ringlet, small heath, small skipper and small copper. Other butterflies regularly breeding

in Cornish hedges and often seen there before that time included the silver-studded blue, the heath fritillary, the marsh fritillary and the wood white. By the 1960s far more of such species as these were living in our hedges than in the special habitats, and it was the unrecorded bulk of their populations that was lost when the flail was introduced.

Common violet, Viola riviniana, grew in breathtaking masses on Cornish hedges, hosting several of the fritillary butterflies until the first flailing wiped out so many of the larvae that they could not recover. In 1985 over 90% of the violet plants in summer-flailed hedges died of dehydration. Now flail-induced ivy-smother and matted scrub on hedge sides, with loss of violet seeding and too much competition from grasses and heavy weeds in the mulch-enriched soil, prevent recovery.

If the records were to be taken as an indication, the wood white never existed west of Trencrom, but in fact this unmistakeable little white butterfly with its slightly rounded wings and weakly wavering flight was present along many of West Penwith's more sheltered lanes, breeding mainly on the abundant meadow vetchling. In the woods, where it would normally be looked for by those intent on recording, it flies more boldly than when out in the open, so its absence may more easily be discerned. In those parts of Cornwall with less woodland, it was more usual on the roadside hedges. The wood white's disappearance in the early 1970s, along with so many others, was due to the vetches and their larval life having been immediate victims of the flailing. Similarly the heath fritillary, using common hedge plants in the absence of coppice and cow-wheat, disappeared from the roadsides at the same time. These butterflies did not go elsewhere; they were killed, almost all in the initial massacre, by the ill-timed use of a crassly unsuitable machine.

Species can be closely examined and easily identified in a Cornish hedge, which shows its wares in an orderly display. In the roadside hedge, the mobile creatures can be followed along the smooth tarmac without troubling them, until they pause to feed or rest, or come to the end of their territory and turn back. Their whole interest is concentrated on the spot, so rich in supplies of all they seek, and there are only three directions in which they can flee. Most are reluctant to run or fly up, over and away, as this brings them into the wind that is usually blowing. On the roadside they are actually less inclined to flee. Like farm livestock kept in roadside fields they are little disturbed by the traffic, and will allow a quiet passer-by so close as almost to touch them. It is a tragic irony that these peaceful creatures readily and widely available to the eye were not appreciated as a study resource, and were those soonest swept away by the arrival of the flail.

REHABILITATION OF FLAIL–DAMAGED HEDGES

Among the reckless eliminations of old-established ecosystems, loss by flail is surely the least recognised and least justified; yet it might be one of the more economically and usefully remedied. Many flail machines are elderly and when inevitably scrapped can be replaced by the modern finger-bar cutters now available. Habitat restoration, rather than creation, makes sense. Habitat creation often fails in its precise aim if it seeks to establish species which may never have existed there, or which, for reasons un-researched, require an ancient habitat. Added to the

problems of over-exposure to the public, and the non-sustainability of some species in small isolated areas subject to interference and predation, this results in 'wildlife management' which too often means wild flower gardening and a kind of zoo-keeping. Without regular weeding, tidying, seeding and repeated re-introduction, the site is not viable. There is nothing against this as a helpful hobby or a conservation stop-gap or nucleus for a wider project, but it is neither permanent nor sufficient without the support of general countryside rehabilitation. In restoring a badly degraded habitat such as the flailed hedges, a certain amount of gardening might be required for a while to reinstate floral balance, but once this is achieved re-introduction should be successfully self-regenerating. It should also be less necessary, as during the restoration many species may revive. Much can be gained in the less damaged hedges simply by using the right machine or tool for the job, at the right time of year, and allowing nature to heal.

The object of all assisted habitat creation or restoration must be that once achieved, normal country-side management, or in many cases actually leaving well alone, will perpetuate it, without wildlife gardening. A Cornish hedge needing at first selective removal of ivy, flail-matted woody species and rampant weeds, reduction of fertility, and some help in re-introducing its original species, should later continue to improve and sustain its populations with only the normal help of a winter trim by blade cutter along alternate sides of the hedge-bank in different years.

Without knowing the precise numbers of exactly which species were formerly present, it is impossible to return the hedge absolutely to its former diversity, and some re-introductions might not succeed as the species did before, even here; but the chances of a good proportion of success, and the ultimate value of the restored hedges, would be far greater than in some frankly uneducated attempts at habitat creation on which funds are sometimes misspent. One could cite the 'landscaping' of former mining areas, and the planting-up of smallholdings with foreign trees for 'amenity', as among Cornwall's ecological and cultural misfortunes.

Luckily there are signs that environmentalists are now taking a real interest in hedges, and if they can thoroughly understand what has happened in the past decades, some worthwhile work may surely emerge. With the present emphasis on bio-diversity, there is a need for studying the different types of habitat harmonising in the Cornish hedge when it is as it should be, and for promoting species restoration. Of the native or commonly naturalised plants recorded for Cornwall, around 100 woody species and 600 flowering herbaceous species (not counting sub-species or hybrids), 70 grasses, 60 rushes and sedges, 300 common mosses, 50 liverworts, 100 lichens, and 30 ferns will grow, many in great profusion, in our hedges. There is no estimating the fungi, and nobody knows how many of the less common species of flowerless plants might also be or have been there. A mile of Cornish hedge would typically contain between two and three hundred easily-visible plant species.

In most hedges today, the flail will have eliminated around 80% of these species and reduced the quantity of most of those remaining by about the same, having replaced them with spreading areas of a few invasive weeds, particularly ivy. The invertebrate life supported by the original diversity would have amounted to more than ten thousand species. Roadside hedges that pre-flail hosted several hundred moth species per mile can now be down to below half a dozen, and less easily-counted insects and other invertebrates have suffered as badly. Without a comprehensive captive breeding programme it may already be too late for many of our moths and butterflies to return to the hedges; and even with this help, re-location of individuals, despite a habitat's previously proven suitability, is notoriously liable to fail. All the more urgent is the need to save those still precariously remaining there.

We have before us the sad but rewarding task of restoring Cornwall's ravaged hedges to regain as far as possible their heritage of plant and animal life. If this requires far-seeing and

This piece of hedge has recovered well from summer flailing since policy eased. Bushes on top improved, one or two ferns regrown. Foxglove, campion, bluebell, sorrel and cow parsley have increased enough to make a pretty picture on this sunny hedge. Don't be fooled. Twenty-seven flowering species have been eliminated by flail from these few yards of hedge, and not a single butterfly or bumblebee appears in this picture taken in June 2004. Even after fifteen years of lighter flailing, none of the plant species has reappeared. The remaining insect species have continued to decline.

painstaking work, largely to be carried out by hand, it is the price we must pay for allowing past mistakes. Much could be done by the redirection of available resources, and the intelligent use of voluntary labour. [Methods are given in detail in Cornish Hedges Library 'Restoring Biodiversity in Cornish Hedges'.]

Rampant weeds and ivy need to be removed, now-scarce wild flowers encouraged. Some hopelessly infested and ruined hedges may need extensive repair or actual rebuilding by a craftsman hedger, re-using the existing materials after removing weed roots and ivy, and taking care to preserve the mossy or lichened face of the stones and place them with this face outward as before. Topping a rebuilt hedge with its original earth core may re-activate some of its lost plant species.

Lasting benefit from these remedial works can be achieved, and sooner, by ceasing all use of the flail or any rotary type of machine in trimming hedges and verges, and returning to the clean-cutting blade. As long as the flail is used on Cornish hedges, the structural deterioration will continue, restoration will be in vain, and the decline of the last vulnerable remaining species will inevitably end in widespread local extinction.

Please see also Cornish Hedges Library The Life and Death of a Flailed Cornish Hedge and Restoring Biodiversity in Cornish Hedges.

Source material: Except where otherwise stated, all data and conclusions drawn therefrom are from the author's original study and observation over her lifetime, using standard textbooks for identification, and monitoring with notebook and pencil.

With thanks to Colin French for kindly taking time and trouble to extract hedge records from his database.

The following titles of papers are available at www.cornishhedges.co.uk

Advice for Trimming Roadside Hedges	How Old is That Cornish Hedge?
Advice for Working on Roadside Hedges	Literature Sources
Building Hedges in Cornwall	Mediæval Hedges in Cornwall (450AD - 1550)
Building and Repairing Cornish Stone Stiles	Modern Hedges in Cornwall (1840 - present day)
Building a Turf Hedge	Mosses, Lichens, Fungi and Ferns in Cornish Hedges
Butterflies, Moths and Other Insects in Cornish Hedges	Pipe-laying and Other Cross-country Works Involving Hedges
Check-list for Inspecting New or Restored Hedges in Cornwall	Post-Mediæval Hedges in Cornwall (1550 - 1840)
Check-list of Types of Cornish Hedge Flora	Prehistoric Hedges in Cornwall (5,000BC - 450AD)
Code of Good Practice for Cornish Hedges	Repairing Cornish Hedges and Stone Hedges
Comments on the © Defra *Hedgerow Survey Handbook* (1st Edition)	Repairing Turf Hedges
	Restoring Biodiversity in Cornish Hedges
Comments on the © Defra *Hedgerow Survey Handbook* (2nd Edition)	Risk Assessment Guidance for working on Cornish Hedges
	Roadside Hedges and Verges in Cornwall
Cornish Hedges and the Climate Crisis	The Curse of Rabbits in Cornish Hedges
Cornish Hedges in Gardens	The Life and Death of a Flailed Cornish Hedge
Cornish Hedges on Development and Housing Sites	Trees on Hedges in Cornwall
Gates and Gateways in Cornish hedges	Unusual Old Features in Cornish Hedges
Geology and Hedges in Cornwall	Who Owns that Cornish Hedge?
Glossary of some Cornish Words used in the Countryside	Wildlife and the Cornish Hedge
Hedges in the Cornish Landscape	
How to Look After a Cornish Hedge	