The Natural News

Central North Field Naturalist inc.
(CNFN)

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WALKS PROGRAM: (see insert for details)

AUGUST 5TH LOBSTER FALLS
Meet at 10.00 at the parking lot off B12, the road from Red Hills to Mole Creek

SEPTEMBER 2ND LIFFEY BUSH HERITAGE
Meet at 10.00 at the Liffey Falls bottom car park

OCTOBER 7TH HENRY SOMERSET RESERVE
Meet at 10.00 at the carpark on B13 (Spreyton - Railton Road)

NOVEMBER 4TH WESTBURY FOREST RESERVE
Meet at 10.00 on the roadside approx 7 km north of Westbury on B72.

NOVEMBER 16TH - 18TH
The Federation of field naturalists weekend will be hosted by the Launceston Field Naturalists. For more details contact Sarah.

THE SILENT CICADA & OTHER NATURAL SOUNDS

By Sarah Lloyd

I know our roof cavities are full of ants because I see them walk the beams like they were footpaths and an intriguing collection of discarded pupal cases, pimelea corolla tubes, buds and flowers of the local eucalypt, lomandra seeds, small twigs and woollen insulation falls to the floor and accumulates in piles below their nests. On warm summer days I hear the muffled shuffling of thousands of tiny animals stirring in the ceilings; but it's the tap-tap-tapping sound coming from above that's had me mystified for many years.

Ants mostly communicate by pheromones, and this is well documented in the definitive book by Bert Holldobler and E.O. Wilson called simply: The Ants. In that large tome, 28 pages are devoted to chemical communication, with the internal structure of a typical worker ant (described by the authors as "a walking battery of endocrine glands") illustrated with many beautiful line drawings. Just 2 pages are needed to cover acoustical communication; it doesn't happen that much among ants.

Ants are nearly deaf to airborne sounds but are sensitive to vibrations in the substrate. Consequently the ants that do make sounds are usually arboreal and the sounds they make are achieved by either stridulation or by tapping.

The mysterious tappings and accumulation of debris in our house indicate that there are numerous nests of *Polyrhachis hexacantha* in our ceiling. Fortunately these ants are non-smelly, non-biting, medium sized insects with a placid, rather endearing disposition and a curious habit of curling their gaster under their bodies, presumably in response to perceived danger. Although these nocturnal *Polyrhachis* are often found mooching around our kitchen they usually inhabit small cavities in dead wood and it may be that their propensity for sound making has not yet been fully documented. It has, however, been studied in other *Polyrhachis* species and the related genera *Camponotus*. In these ants the workers tap the substrate with their mandibles and gasters while rocking their bodies back and forth.

The functions of the sound signals in ants, which are often used in conjunction with chemical signals, include alarm, recruitment, the termination of mating by females and the modulation of other communication and forms of behaviour.

Tasmania has the distinction of having one of only two species of silent cicadas in the world, the endemic Tasmanian Hairy Cicada (*Tettigarcta tomentosa*) in the genus Tettigarcta. (The other species is found in mountainous regions in south eastern New South Wales and Victoria.)

Although the silent cicadas do possess tymbals and associated muscles, the sound producing mechanisms found in singing cicadas, they are poorly developed and produce no audible or inaudible high-frequency sounds. Furthermore there are no air sacs in the abdomen, which in the singing cicadas act as resonating chambers.

But are they really silent? It may be that they, like their close relatives with similarly constructed tymbals, the leafhoppers, planthoppersandfroghoppers,communicate by sound transmitted via the substrate. These insects produce low intensity sounds that vibrate through the plant on which they land and can be detected by other individuals in contact with the same plant. All legs of Tettigarcta possess tarsal empodia (a.k.a bristly feet!) which probably act as substrate sound receptors. Singing cicadas don't have such things.

The singing Cicadas in the family Cicadidae produce some of the most familiar sounds of summer. At almost 120 decibels, the males of some cicada species emit the loudest of all insect sounds that at close range approach the pain threshold of the human ear. The sounds are generated by the tymbals, ribbed membranes that are situated on either side of the abdomen. Muscles attached to the tymbals control the "click" mechanism which is akin to a tin lid being clicked in and out. A tensor muscle, also attached to the tymbals, adjusts the volume by stiffening the tymbal membrane. Air sacs, which amplify the sound, take up most of the space in a male's abdomen while the other organs, those used for inhalation and digestion, take up minimal space.

Although the main purpose of the cicada's song is to attract a mate, the loud sound is known to repel their major predators, birds. The sound is not only painful to birds' ears it also interferes with avian communication. Furthermore, the ventriloqual nature of the sounds means that the vertebrate ear has difficulty pinpointing its source.

Invertebrates don't have a vocal organ equivalent to our larynx or a bird's syrinx, but use other methods for sound production including percussion (as in the *Polyrhachis* ants), vibration (the 'silent' Tettigarcta), click mechanisms (singing cicada) and occasionally air expulsion, a method of sound production more often encountered in vertebrates. Stridulation (humans "stridulate" when they run a fingernail along the teeth of a comb or play a stringed instrument, like a violin) is a widespread method of sound production in arthropods and is used by insects, arachnids and crustaceans.

Crickets and grasshoppers (Orthoptera) are masters of stridulation. The two most commonly used methods are the tooth and comb technique and the washboard technique. The former involves rubbing specialised veins on the base of the forewings; the latter relies on friction between a row of pegs on the inside of the leg which, like a file, is drawn across a pronounced vein on the forewing. Relative to size, the sound a cricket produces can be extraordinarily loud, mainly because of the design of its sound producing organ. In addition, some species of bush crickets build complex underground chambers that amplify the sounds and enable them to be heard almost 2 km away.

As in other species, sound is mainly used by males to advertise territory, for defence, or to attract mates. In some families the males and females sing mating duets.

The ears of crickets and grasshoppers are found either on their abdomen or on their legs, and some have such acute hearing that they are able to detect bats 30 meters away – long before the bats locate them.

Many birds also produce non-vocal sounds. Grey Shrike-thrushes, common in eucalypt forests throughout the country, often punctuate their melodious vocal repertoire with the sound of clapping mandibles. Some birds, including grebes, herons, crows, storks and penguins incorporate bill fencing in their ritualised mating displays. Whether the sounds produced are significant or simply incidental to the performance is difficult to determine.

Woodpeckers make irregular tapping sounds as a by-product of their search for insects or nest excavation activities. Some species also make deliberate rapid drumming sounds which replace the territorial and mating vocalisations of songbirds. The rhythm, speed and intensity of the drumming can identify a species.

Downy Woodpecker

When searching for suitable nesting sites some woodpeckers seek trees with fungal infections as nesting hollows take less time to excavate when fungi have already softened the wood. How woodpeckers locate the decay remains a mystery. They either detect it by the visible presence of fungal fruits or they may tap the trunks and listen for a telltale resonance.

Ground dwelling birds such as quails and pigeons sometimes take flight with a startling flap of their wings, possibly to momentarily distract would-be predators. The low boom of the emu, which originates in the syrinx, can be heard up to 2 km away because an inflatable sac in the oesophagus acts as a resonating chamber.

Birds such as Common Bronzewings (above), doves and pigeons take flight with a loud clap of their wings.

Of all the non-vocal avian sounds those made by Manakins are perhaps the most intriguing because, unique among the vertebrates, they are achieved by stridulation.

Manakins are a large group of small, stocky, brightly-coloured birds that inhabit the tropical forests of central and South America. Naturalists, including Charles Darwin, first became aware of their astonishing sound generating abilities in the 1800s and since then they have been closely studied.

Like grouse, bowerbirds, birds-of-paradise and some other polygynous birds, manakins congregate at traditional courting places known as leks or courts. Depending on the species, traditional courts are either in the trees or on the ground and incorporate props such as saplings, twigs or branches. Males, either individually or cooperatively, again depending on the species, perform to the visiting female who will mate with the male she considers to have the most impressive vocal and visual display.

Manakins eat fruit and as fruit is an abundant and ever present commodity in lush tropical forests little time is needed for foraging. The males, who play no part in nest building or the rearing of young, devote their time to performing spectacular courtship dances. A cooperative event can include up to 60 males, each with a small area but within metres of the neighbouring rival. They hop, leap, jump and slide and enhance their highly ritualised movements with an extraordinary array of non-vocal sounds. The firecracker-like pops, whooshing noises, growls and in one species, a violin-like sound are all produced by their modified wing feathers.

For many years the Club-winged Manakin has been known to produce a clear violin-like sound with its wings, but it is only recently that researchers, equipped with digital cameras that can record 1,000 frames a second, have determined exactly how this is achieved.

When the bird raises its wings over its back, it shakes them back and forth over 100 times a second (some small hummingbirds flap their wings 80 times a second) thus producing the sound. On each wing there is a feather with a series of ridges; sitting alongside this ridged feather is one with a stiff rounded tip. With each shake of its wings, the tip rakes across the ridges of the adjacent feather and emits a sound with a frequency of 1400 cycles a second.

Meanwhile, at Black Sugarloaf where the lack of city noises ensures a quiet sound environment soon the lengthening days and warming temperatures will stir animals from their winter repose; ceiling shuffling will resume and birds will return to their breeding territories, tentatively rehearsing for their full performance in spring.

Many animals emit sounds too low or too high for our ears. How fascinating it would be if we could detect the ultrasonic clicks of moths, the abdominal vibrations of lacewings, or the signals transmitted through spiders' webs, sounds beyond our range of hearing.

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ACROBATICS WITH PERCUSSION: THE SOUND OF THE SNIPE

Two Canada Geese swam away and then took off from the remote mountain lake on the border of Norway and Sweden; the Heron left as we arrived. A Yellow Wagtail, Brambling and unknown warblers sang their sparse mid-afternoon songs and the distant sound of the Cuckoo came closer, though we never saw the bird.

As we trudged the boggy mire a soft eerie whirring sound came from a copse of twisted birch. The sound moved as we approached; as if an illusion, a trick of the terrain.

The explanation was above us: high overhead a snipe was flying. After making a steep ascent it dived, winnowing, forcing air between the outer feathers of its spreading tail; indicating its territory to other snipe – or a warning to intruders.

STIMULATING BREWS FROM THE HOP BUSHES

By Phil Watson

Hop Bushes, or more endearingly called 'Dods' (*Dodonaea viscosa* spp.), provide an interesting brew of enthralling plant characteristics, uses and interrelationships. Their robustness enables them to flourish across a diverse range of open vegetation communities spanning areas of continental Africa, America, Australia and India. Their natural habitat includes exposed coastal fore dunes and cliffs, barren rocky ridges and grassy woodlands and they have a reputation as hardy water misers. With their many uses, attractive appearance (vividly coloured 3 to 4 winged fruits & glossy leaves) and natural hedging ability, they deserve their popularity as landscape and revegetation plants.

Subspecies of *Dodonaea viscosa* have distinctive characteristics

Dodonaea viscosa has a series of subspecies occurring in open woodlands in south eastern Australia. Their size, distinctive leaf shape and habitat range help to distinguish between them. Key examples include *D. viscosa* ssp. *viscosa* (large, nearly stalkless, elliptical leaf), robust *D. viscosa* ssp. *spathulata*, (spoon shaped leaf), *D. viscosa* ssp. *angustissima*, (delicate linear leaves), the arid area *D. viscosa* ssp. *mucronata* (pointy tipped spoon-shape leaves) and the purple leafed screening or accent favourite from New Zealand *D. viscosa* ssp. *purpurea*.

Recently variegated and prostrate forms of *D. viscosa* ssp. *spathulata* have proved very popular as landscape features and accent plants. All the above species form excellent water wise informal screens or formal hedges (biennial pruning necessary). Some of the most classic forms of these plants can be enjoyed in very exposed sites such as sea cliffs or frontal dunes where wind shearing results in unique and photogenic botanical marvels.

Hop Bushes are unusual members of the Soapberry family

There are 66 *Dodonaea* species, the largest genus of the 150 genera Soapberry family *Sapindaceae* ("*Sapo*" Latin for soap). Many family members contain a *saponin* glycoside, which provides plants with a detergent-like foaming attribute acting to reduce the water tension when shaken under water. In contrast to the hop bushes that flourish in open dry woodlands, most of the family members are found in closed tropical forests and are prized for their fruits. These include the luscious Lychee *Litchi chinensis*, Rambutan *Nephaleum lappaceum* and the sticky sweet Tamarind seed pods *Tamarinus indica*. All these tropical members attract pollinating insects and birds by boldly marketing their flowers with alluring nectaries, scents and colours. Their irresistible fruits ensure wide dispersal of their seeds.

Hop bushes, unlike their tropical relatives, are wind pollinated. The flowers are at the ends of branches and their stigmas having a broad sticky collecting surface ideal for catching airborne pollen. With disproportionate numbers of anthers (relative to stigmas) they are capable of wafting clouds of fine pollen which can travel some 2 kilometres[1]. Hop Bushes, like other wind pollinated native trees and shrubs such as She-oak (*Allocasuarina verticillata*) and South Esk Pine (*Callitris oblonga*), establish themselves in prominent single species groves within low diversity, open plant assemblages, thus improving their chance of receiving pollen. All these species are dioecious (male and female flowers on separate plants) and pollen transfer occurs during the warm dry breezy conditions of late spring to early summer.

Hop Bushes enhance bird & insect diversity

Hop bushes' three dimensional twiggy and leafy frameworks are an open invitation for spiders to weave their intricate webs. These webs are collected for binding nesting material by insectivorous birds such as Brown Thornbills, Flame, Scarlet and Dusky Robins, Welcome Swallows, Strong-billed and Black-headed Honeyeaters, Grey Fantails, Eastern Spinebills and Dusky Woodswallows. Seed eaters such as Bronzewings, Beautiful Firetail, Musk Lorikeet and Green and Eastern Rosella devour the nutritious winged seed clusters before they are either feasted on by seed weevils or glide to ground. Mid storey bushes like hop bush and native box (*Bursaria spinosa*) planted in park style urban landscapes and gardens provide an important role in helping to attract these birds.

Seeds are protected by Ants

Once the Hop Bushes release their seeds ants assist their survival, protecting them from both fire and seed predation. This symbiotic relationship relies on the attraction to the ant of the nutritious fleshy attachments (elaisomes) which they collect and subsequently bury a couple of centimetres below the soil surface. Here in an underground larder they are protected from surface environmental vagaries. (This dispersal process of seeds by ants has the descriptive name of *myrmecophory* (*myrmex*: Latin for ant)). Abandoned seeds respond to moisture and heat from surface bush fires which crack their hard coats, enabling germination. Critical to the survival of the seedlings is their root's requirement to establish a symbiotic relationship with mycorrhizal fungi. These fungi act as "soil postmen" supplying water and nutrients to the plants' roots which in turn provides a supply of carbohydrates to the fungi.

Hop bushes have important cultural and medicinal roles

Aborigines and colonists alike had a great affinity for hop bushes, which prove to be true "people plants" due to their cultural significance and medicinal properties. Known as "oyster bush" by aboriginal tribes, their conspicuous orange/red winged seed capsules acted as a seasonal indicator which heralded the most opportune time to collect the bounty of succulent oysters from the nearby rocky estuarine foreshores. The colonists, impressed by the similarity in looks and taste the seed capsules had to hops, successfully brewed a tangy, bitter but acceptable beer alternative.

Recent pharmacological analyses of hop bushes reveals the presence of a rich set of active alkaloids, tannins, flavonoids, organic acids and *1-8 cineole* rich oils. The relative concentrations of these ingredients vary widely depending on the environmental conditions and habitats where they occur. This variation in relative potency of active ingredients is also subject to seasonal differences at the time of harvest. Although the hop bushes are found in many distant countries, it is uncanny how unrelated local indigenous populations attributed similar cultural and medicinal uses to this ubiquitous plant.

Cultural uses by Aboriginal populations

Common amongst older aborigines were the persistent problems of toothache as a result of decades of grinding highly fibrous diets. By chewing the leaves of the oyster bush, mild analgesic and euphoric effects provided relief from nagging toothache. Aboriginals used the term "Pitori" for plants such as hop bushes that acted as painkillers.

Inflammations from rashes and bruises as well as jelly fish and stonefish stings were eased by binding wads of chewed leaf pulp on the affected areas. The bitter juice exuded from the leaves during the preparation of these wads was not swallowed but collected as an antiseptic. The leaves were known to reduce inflamation and swelling as well as imparting an antimicrobial protection to open wounds and infections.

The Central Australian Aborigines (like indigenous Indian tribes) were reported to rely on the leafy branches as a customary means for relief of flu-like fever and body aches. The leafy branches were smoked on warm ash beds releasing *1-8 cineole* rich oils (well known active ingredient in the essential oils extracted from Gum, *Eucalyptus sp.*, Tea Tree *Leptospermum sp.*, Paperbarks *Melaleuca sp.* and native mint bush *Prostanthera sp*). The smoke would act as a febrifuge (fever reducing agent) by reducing the swelling of mucous membranes and loosening phlegm thus freeing the airways.

Also common amongst colonists and aboriginals were digestion and elimination problems. This was a result of hot weather, poor food hygiene and sub-standard nutrition. Australian aboriginals, like indigenous people from North America, Mexico and South Africa, used the tannins (dried stems/leaves contain 14% tannin) and flavonoids properties of the hop bush by applying poultices of fresh leaves to relieve diarrhoea, stomach and uterine cramps. The typical mode of action (as reported in pharmacological studies) acts to sedate smooth muscle contractions.

The Aborigines of south eastern Australian preferred to construct their temporary shelters from *D. viscosa var. angustissima* simply because the dead branches retained their leaves.

It has been recorded that the South America Peruvian Indians developed a culturally accepted practise of chewing the hop bush leaves in the knowledge that it acted as a substitute for Coca (*Erythroxylum coca*). Like betel nut, the younger viscous (sticky) leaves were often chewed with ash, lime or magnesia to neutralise the organic acids binding the active ingredients, thus enhancing its stimulant and euphoric effects. Of course, akin to betel nut chewers, the lime would have caused rapid tooth decay.

Conclusion:

Like their companion woodland plants, she-oak, native box and black wattle, hop bushes are often disregarded as common uninteresting mid-storey species. However this new brew of information about their rich tapestry of cultural uses and interrelationships, hopefully will entice a more in-depth appreciation of the plants and lead to their further use as revegetation or landscape framework species.

Footnotes

[1] Judy West " A Revision of *Dodonaea* Miller (Sapindaceae) in Australia" published in Brunonia No. 7, 1984

Recommended Readings:

Whiting, J., etal., 2004. *Tasmania's Natural Flora*. Tasmania's Natural Flora Committee;

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KEEPING A NATURAL HISTORY DIARY

By Lisa Clarkson

I have been prompted to write this article by the recent appearance of European Greenfinches *(Carduelis chloris)* outside my kitchen door. Although an introduced species to Tasmania, the Greenfinch (which looks very much like a greenish sparrow) is an uncommon visitor to my suburban garden. This recent observation prompted me to consult my natural history diary which I have kept (in earnest) for the last 5 years to ascertain my last sighting of these birds. I was quite certain that I had observed them about 5 years ago when they came to feed in my neighbour's cotoneaster bush (along with all the other exotic and native species that appear in autumn to relish the berries of these notorious weeds). Surprisingly, I had got it wrong – my first suburban encounter with the Greenfinch was 2005! Which leads me to the point of this article – the merits of keeping a written natural history diary. It is incredibly difficult to recall, from memory, all the details and timing of encounters or to unravel the natural (or not so natural) cycles of species especially now that ecosystems are subjected to such rapid environmental change. Of course, some may question the need for such detail, afterall, does it really matter when I last saw Greenfinches in my neighbourhood? And yet from a personal viewpoint, I believe that those with an interest in natural history are uniquely positioned to provide the observations that can document environmental change in the local context and in far greater detail.

I first became interested in documenting my observations (of the natural kind) when a friend gave me a Gould League natural history diary for a christmas present about 16 years ago. This diary was very much in the style of a pictorial calendar and represented a year's worth of observation. For a couple of years (whilst my children were very young), I recorded small snippets about my own semi-rural garden, the weather and visitors (the faunal kind) to my property. I no longer have these lovely diaries and must have thrown them out at some stage when I became "too busy" to fill them in. However, on joining the CNFN in 2002, I became inspired to start logging my observations again. My diaries (yes I have several different ones!) are now just simple spiral-bound note books but they have become more complex and detailed as I continue to broaden my sphere of interests and learn more about the natural world.

I have also found that requests from others for information has resulted in a further broadening of interest to include those endeavours in my own personal observations. For example, I began entering data on frog encounters to the WWF Frogs! programme in Tasmania in 2003, but have continued to document all observations in a frog diary ever since although the original programme has since disbanded in Tasmania. In addition, I have kept personal records for Robin species ever since Sarah Lloyd requested information in 2002. I have learnt a lot more about the seasonal behaviour and the cycles of these wonderful birds since I started documenting my sightings, however, as I look back upon these observations I note (with concern) that I simply do not encounter Dusky Robins (*Melanodryas vittata*) as frequently as I used to in my area. Is this a natural cycle or an ominous sign of decline of another woodland species?

Today, the value of these amateur observations is increasingly being recognised by many in scientific fields. Flannery (2005) claims that the "jottings" of birdwatchers, fishermen and other nature watchers are one of the most powerful tools available to researchers wishing to document the response of nature to climate change. In Great Britain the long-established tradition of local enthusiasm for natural history is being tapped by the UK Phenology Network (phenology is the study of periodically recurring natural phenomena, especially in relation to climate). 24,000 amateur observers are contributing valuable information to track the shifting timing of natural events [in Steffen(ed), 2006]. A great example in Australia is the Fungimap project that uses data collected from around Australia by amateurs, many of whom had no previous experience in identifying fungi but are keen observers and quick learners!

Fortunately, amateurs can now use an array of technology such as GPS and digital photography to validate their observations and to provide evidence to support their records. These tools are increasingly important as "collecting" becomes further prohibited (especially to the amateur). I recently regretted not using photography when I happened to stumble (literally) upon a rare fungus. I was not, at the time, aware of its rarity and did not validate my finding with a photograph but did log its location (but have subsequently been unable to find the fungus again despite a GPS reading). I therefore have no proof of this finding – and although I am sure of what I saw, because of its rarity, this observation cannot be formally accepted. I am sure there is a lesson in this!

If I haven't convinced you of the merits of keeping a natural history diary then consider its value as a legacy to future generations who just might be "intrigued" by your encounters with species that have since become extinct. In writing this, I immediately think of my last encounter with wild Tasmanian Devils - confirmed by 3 words written in my diary, on the 26 March 2005, as "devils heard squabbling". Paradoxically, at no time in human history has the need for observers of the natural world been greater as radical environmental change invokes havoc upon the natural cycles of many species and yet the world is time-poor and the art of observing is dying, considered a luxury that many cannot afford.

References

Watts, D. (2002). Field Guide to Tasmanian Birds, Reed New Holland, Sydney.

Flannery, T. (2005). The Weather Makers – The History and Future Impact of Climate Change, The Text Publishing Co., Melbourne.

Steffen, A. (ed.), (2006). World Changing: A Users Guide for the 21st Century, Abrams, New York.

Above: Juvenile Dusky Robin

Dusky Robins are being seen less frequently in many parts of Tasmania. (Ed)

ROAD KILL SURVEY BY PUSHBIKE

By Steve Cronin

In January this year my youngest son Tristan and I rode our pushbikes from our home at Exeter in the central north of Tasmania to Cockle Creek in the south. The route taken was via Bracknell, Poatina, Arthurs Lake, Bronte Park, Ouse (via the Victoria Valley), Bushy Park, New Norfolk, Lachlan, Huonville (via Jeffries Track over the Wellington Range), Geeveston, Lune River, Cockle Creek; we then walked in to South Cape Bay completing a 500 km trip consisting of a 480 km ride and 20 km walk.

On our way we recorded all road kills to get some idea of the amount of animals killed on Tasmanian roads. I set a number of rules before we left to make the recordings consistent:

1. If an animal could not be identified then it was not recorded.
2. We did not record anything older than 2 weeks therefore restricting the observations to a time period (a value judgement based on past experience including past long term road kill surveys).
3. On a number of occasions if dead animals were smelt but not seen as we rode then we did not go back to find these animals.

Hundreds of thousands of native wildlife individuals are killed each year in Tasmania on our roads and tracks. A study conducted in New South Wales found that 529 road kills of 53 vertebrate species were recorded along a 100 kilometre circuit of three major roads during twenty weekly surveys across winter, spring and summer (Taylor and Goldingay 2004).

During an ecological study at Cradle Mountain in 1991 road widening and sealing was carried out on the access road with a resultant halving of the Tasmanian devil population in 17 months (Jones 2000). Measures were implemented to reduce the vehicle/wildlife collisions and there was some indication that the Tasmanian devil population was recovering (Jones 2000).

There is limited information on the number of road kills in Tasmania and this was an opportunity to add some information and observations.

So assuming the following:

1. All records no older than 14 days.
2. Tracks and roads, habitat types, and elevations are a reasonable representation of the recorded tracks and roads in Tasmania.
3. An estimate of 90% of road kills were recorded given that anything not readily identifiable was not recorded. Carrion feeders (e.g. Ravens) would have reduced the number of road kills by eating and removing them off the roads; and people taking road killed animals for domestic animal food (mainly for dogs). Additionally some dead animals were smelt but not seen.
4. That all animals observed were killed by a vehicle of some sort.
5. The period observed is representative of the full year (that is, we must assume there is no seasonal change in road kill amounts).
6. 26,700 km of roads in Tasmania

The numbers observed can be calculated to estimate the number of road kills in Tasmania per year, as follows:

Known facts:

We covered 464.6 km
208 road kills were recorded
There are 26,700 km of roads in Tasmania
Therefore:

roadkills (208) ÷ distance travelled (464)
= 0.448 roadkills/ km/ 14 days

roadkills (0.488) x Tas road length (26,700)
= 11,961.6 animals/14 days

In one year there are 26 x 14 day periods
Therefore roadkills per year:

26 x 11,961.6
= 311,001

+ 31,100 (10% not counted for various reasons)

Total road kill in Tasmania per year: 342,100

So basically, on our trip we made a set of observations with rules of time and basic assumptions. Our trip covered a full range of road types, habitat types, weather and altitude. Based on these observations we calculate that the number of animals killed on roads in Tasmania is approximately 340,000 animals per annum with the following make up:

4.3% threatened species
7.7% introduced animals
Mammals 91.8%
Birds 6.25%
Insects 1.4%
Reptiles 0.48%

Conclusions

This was a snapshot over 14 days covering a variety of habitat types, road types and altitudes.

Because we were travelling by bicycle a large percentage of dead animals were counted adding to the accuracy of the count. (e.g. we were able to record small insects and birds which would most likely not be recorded in a vehicle based survey). The assumptions made were on the cautious side and I think the estimate of 340,000 animals killed per year on Tasmanian roads is conservative.

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DIER. (2003) Roads and vehicles-Government owned road lengths by municipal area. Transport division.

DPIWE. (2005b) Tasmanian Devil Facial Tumour Disease (DFTD)-Disease Management Strategy.

Jones, M. E. (2000) Road upgrade, road mortality and remedial measures: impacts on a population of eastern quolls and Tasmanian devils. Wildlife Research 27, pp. 289-296. doi:10.1071/WR 98069

Taylor, B. D. and Goldingay, R. L. (2004) Wildlife road-kills on three major roads in north-eastern New South Wales. Wildlife Research 31, pp. 83-91.

TABLE: The 21 species observed are listed below in order of highest numbers observed to lowest. Detailed information on species numbers, dates, locations etc can be accessed if required.

Rufous wallaby (Pademelon)	100
Brush-tailed possum	31
Bennetts wallaby	27
Wombat	10
Rabbit	9
Eastern barred bandicoot	6
Forest Raven	4
Tasmanian Native Hen	3
Tasmanian devil	3
Ring-tailed possum	2
House Sparrow	2
Laughing Kookaburra	2
butterfly sp. (brown)	1
Fallow deer	1
Bumble bee	1
White-lipped snake	1
moth sp.	1
Masked Lapwing	1
Yellow-throated Honeyeater	1
lamb	1
Southern brown bandicoot	1