



Biodiversity Loss 2025

Introduction.

This report updates my paper 'Biodiversity Loss 2022' pages 18-22[1], incorporating added data for the last three years. I define biodiversity, give a measurable definition of biodiversity loss and then develop a trendline over time for biodiversity loss in Australia. This is extended to show that the present trend is unsustainable and set out some suggestions that may alleviate the problem.

Definition of Biodiversity.

Every hectare on earth evolved as a **unique community** of living organisms, each dependent on the Community and with the Community dependent on each organism. A community is made up of sub-communities and collections of communities make larger communities. Each one is unique, like fingerprints. Sometimes this is called the 'web of life'. We have somewhere between 3 million and 100 million species of living organisms living within these communities. About 3 million are described and named while the rest are neither described nor named. The collection of all these communities, the organisms within them and the links between the different organisms, all together give us this amazing thing we call **biodiversity (biological diversity)**.

The health of Biodiversity.

We do not have a measure of biodiversity as such, but we can measure **Biodiversity Loss**. As the links binding these organisms together are broken, some species lose their place and reduce in numbers. When this occurs, for a species, across many communities, the number of this species decreases dramatically. It loses the niche it evolved to fill, and we class it as **threatened with extinction**. We define **biodiversity loss, for a class of organisms, as the percentage of species, within the class, threatened with extinction**.

Whereas we may not know the total number of species threatened with extinction within a class, we can get a fair estimate of the percentage threatened simply by taking a sample and looking at the percentage of the class that is threatened with extinction, as we do with polling to guess who is going to win an election.

An Example.

At the commencement of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) the list of threatened species, ecological communities and threatening processes consisted only of those previously listed under the Endangered Species Protection Act 1992.

Under the EPBC Act new categories have been added for listed threatened species and ecological communities. Critically endangered, conservation dependant and extinct in the wild have been added to the previous categories of endangered, vulnerable and extinct for threatened species and critically

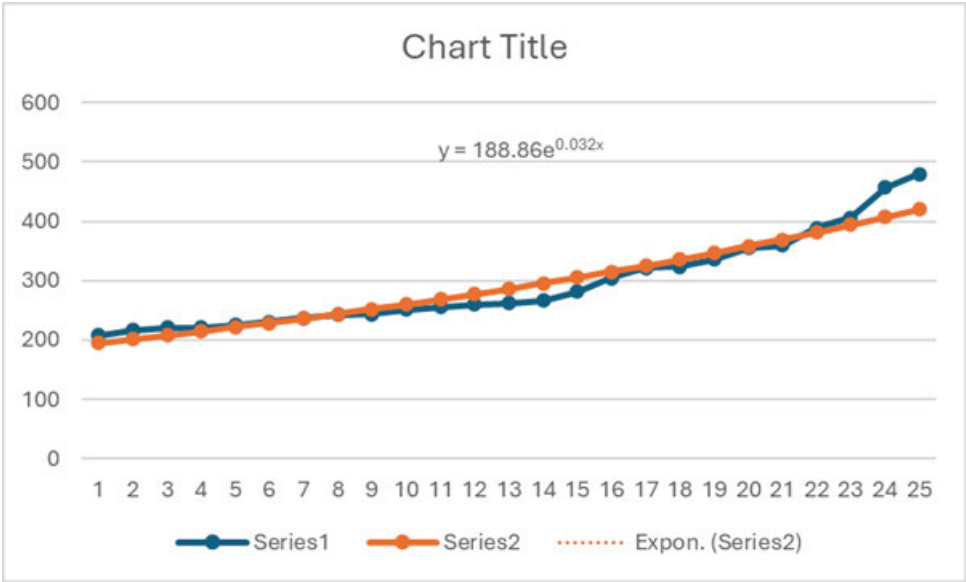
endangered and vulnerable have been added to the previous category of endangered for ecological communities. The definition of a species under the EPBC Act includes sub-species and distinct populations that the Minister has determined to be species for the purposes of the Act.

New nominations for species and ecological communities will be assessed under the EPBC Act by the Threatened Species Scientific Committee (TSSC) according to the criteria for the new categories and listed accordingly. The TSSC will reconsider the status of the initial list of threatened species and communities in line with the new refined EPBC categories as information is updated and made available for assessment. [2]

This gives us a complete list of Australian Land Vertebrates that were threatened with extinction, each year from 2000 to 2024. This list is:

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
208	217	221	221	225	231	237	242	244	251	255	260	262	266	281	304	322	324	336	355	359	389	406	457	480

Giving these numbers to EXCEL and asking it to give you a trendline you get the following chart:



Changing the horizontal axis to the years 2000 to 2024, and changing the formula to use 2 instead of e gives us:

The number of threatened vertebrates = $2^{(t-1836)/21.67}$.

The important bits are, the 1836 tells us that the first Australian vertebrate to become threatened was about 1836, just 48 years after white settlement. The 21.67 tells us that since 1836 the number of threatened vertebrates steadily doubled every 21 years and 8 months. Which in turn tells us that we have done nothing, since 1836, to reduce this steady growth. In fact the numbers for the last three years have been 22, 61 and 71 above trend respectively, which can only be described as shocking. Whereas the trendline shows that within 50 years all 2400 Australian Vertebrate species will be threatened with extinction, if the last three year trend is repeated we will reach have reached 2400.

Exponential Growth.

To better understand the gravity of Biodiversity Loss, there is a need to understand **Exponential Growth**. Every living organism is capable of exponential growth if the environment suits it. It is only because external forces control its growth that we have the feeling of stability. In 2005, Ray Kurzweil published his book titled “THE SINGULARITY IS NEAR” [3] consisting of 600 odd pages trying to explain exponential growth to non-mathematicians. I will attempt to do it in one page.

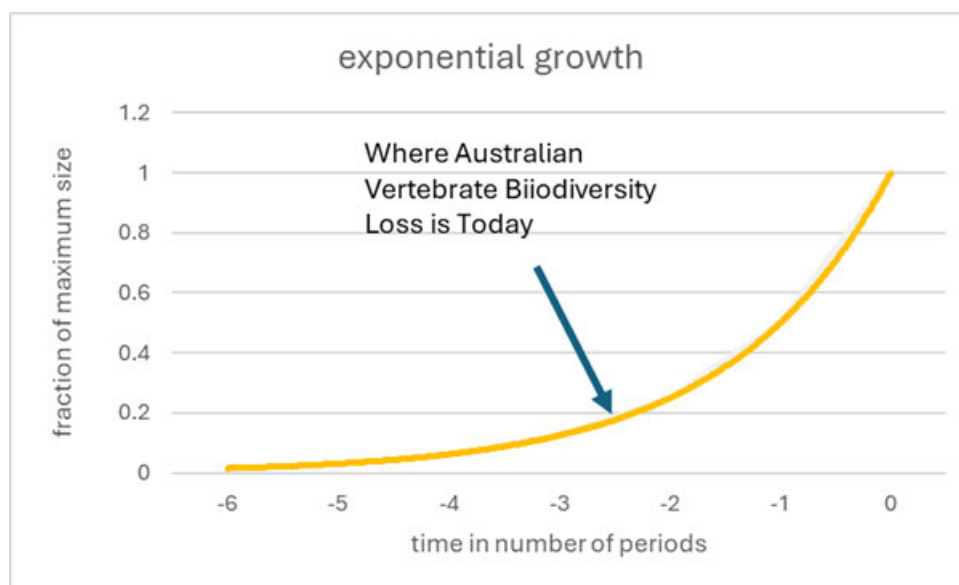
An example of exponential growth is fully defined by giving its doubling period, together with one data point. We start with the classic water lily puzzle [4], which asks the following question – ‘**Question:** In the middle of a round pool lies a beautiful water lily. The water lily doubles in size every day. After exactly 20 days, the lily will cover the complete pool. After how many days will the water lily cover half of the pool?’

Answer: Because the water lily doubles its size every day and the complete pool is covered after 20 days, half of the pool will be covered one day before that, i.e. after 19 days.’

We can extend this puzzle to any example of exponential growth. Every example of exponential growth is associated with a doubling period. We can therefore take our time scale as the number of doubling periods. Since we live on a finite earth any exponential growth must reach a limit. If we designate this limit as 1, we can use fractions of 1 (the limit) as our measure of the size. In addition, we can take our time as zero when we are at the limit.

By doing this, every example of exponential growth is given by one example as shown below.

Every example of exponential growth is given by the following chart:



In the example given above the doubling period is 21 years and 8 months and at present we have 20% of our Land vertebrates threatened with extinction. **So! If the present trend continues, we will be at 100% by 2074.**

The important point here is that we do not need to know the total number of threatened species in a class. We just need to know the %age of the class that is threatened with extinction. To find this out, we simply take a random sample. The size of the sample can be found simply by going to the Australian Bureau of Statistics' website [5]. A sample size of 250 will probably give you suitable accuracy.

One interesting point is that the trend in biodiversity loss for Australian Land Vertebrates correlates exactly with the growth in Australia's GDP. So, when our Treasurer tells us that he expects 3% growth next year. He is telling us that he expects the number of threatened Land Vertebrates in Australia to increase by 3%. It is as simple as that. Biodiversity is totally caused by Human Activity. It is not caused by farmers and miners. It is caused by you and me. Of course, our farmers and miners are causing the damage, but we are demanding they do it.

What we know.

If we look at the world stage. According to the International Union for Conservation of Nature (IUCN) [6], 18% of the 63,761 vertebrates they have evaluated are threatened with extinction. 23% of the 27,906 invertebrates they have evaluated are threatened with extinction and 28% of the total number they have evaluated are threatened with extinction. If the present trend continues, and there is no reason to believe it won't, then in 40 years 100% of the world's vertebrates will be threatened with extinction. Although IUCN states ‘

Where <80% of species within a group have been evaluated, figures for % threatened species are not provided because there is insufficient coverage for these groups. It is only possible to provide reliable figures for % threatened species for those groups that are completely or almost completely evaluated (e.g., mammals, birds, amphibians and gymnosperms.’

Table 1a: Number of species evaluated in relation to the overall number of described species, and numbers of threatened species by major groups of organisms.

	Estimated Number of described species ¹	Number of species evaluated by 2024 (IUCN Red List version 2024-2)	% of described species evaluated by 2024 (IUCN Red List version 2024-2)	Number of threatened species ² by 2024 (IUCN Red List version 2024-2)	Estimated % threatened species in 2024 (IUCN Red List version 2024-2) ^{3,4}		
					Lower estimate (threatened spp. as % of extant evaluated species)	Best estimate (threatened spp. as % of extant data sufficient evaluated species)	Upper estimate (threatened and DD spp. as % of extant evaluated species)
VERTEBRATES							
Mammals ⁵	6,736	5,991	89%	1,354	23%	27%	36%
Birds	11,195	11,195	100%	1,311	12%	12%	12%
Reptiles	12,263	10,311	84%	1,845	18%	21%	33%
Amphibians	8,776	8,009	91%	2,873	36%	41%	47%
Fishes	36,953	28,255	76%	4,017	Insufficient coverage		
Subtotal	75,923	63,761	84%	11,400	18%	21%	31%
INVERTEBRATES							
Insects	1,053,578	12,747	1.2%	2,423	Insufficient coverage		
Molluscs	87,254	9,127	10%	2,456	Insufficient coverage		
Crustaceans ⁶	90,820	3,213	4%	748	Insufficient coverage		
Corals	5,641	927	16%	334	Insufficient coverage		
Arachnids	95,966	787	0.82%	283	Insufficient coverage		
Velvet Worms	222	11	5%	9	Insufficient coverage		
Horseshoe Crabs	4	4	100%	2	50%	100%	100%
Others	156,447	1,090	0.70%	177	Insufficient coverage		
Subtotal	1,489,932	27,906	2%	6,432			
PLANTS ⁷							
Mosses ⁸	21,925	327	1.5%	181	Insufficient coverage		
Ferns and Allies ⁹	11,800	822	7%	322	Insufficient coverage		
Gymnosperms	1,113	1,061	95%	450	42%	43%	44%
Flowering Plants	369,000	71,253	19%	27,197	Insufficient coverage		
Green Algae ¹⁰	14,151	17	0.1%	0	Insufficient coverage		
Red Algae ¹⁰	7,690	78	1.0%	9	Insufficient coverage		
Subtotal	425,679	73,558	17%	28,159			
FUNGI & PROTISTS ¹¹							
Mushrooms, etc.	157,648	818	0.5%	340	Insufficient coverage		
Brown Algae ¹⁰	4,756	18	0.4%	6	Insufficient coverage		
Subtotal	162,404	836	0.5%	346			
TOTAL	2,153,938	166,061	8%	46,337			

Insects.

Quoting from a United Nations Report of 2019 [7]:

“Insects make up about half of all known living organisms. They play key roles in, pollination, nutrient cycling, food chains for birds and other insectivores, and are one of the pillars of our ecosystems.

“Across the world, more than 40 per cent of insect species are declining and a third are endangered, the analysis found. **The rate of extinction is eight times faster than that of mammals, birds and reptiles.**”

Therefore, if 40% were declining 5 years ago, we can assume 80% are declining today. Or! In a recent article I wrote, “There ain’t no insects no more” pages 24-26 [8].

If the United Nations figures for insect loss are correct, and there is good reason to believe that they are, then not only do insects have the general problems affecting all other living species, but they are especially

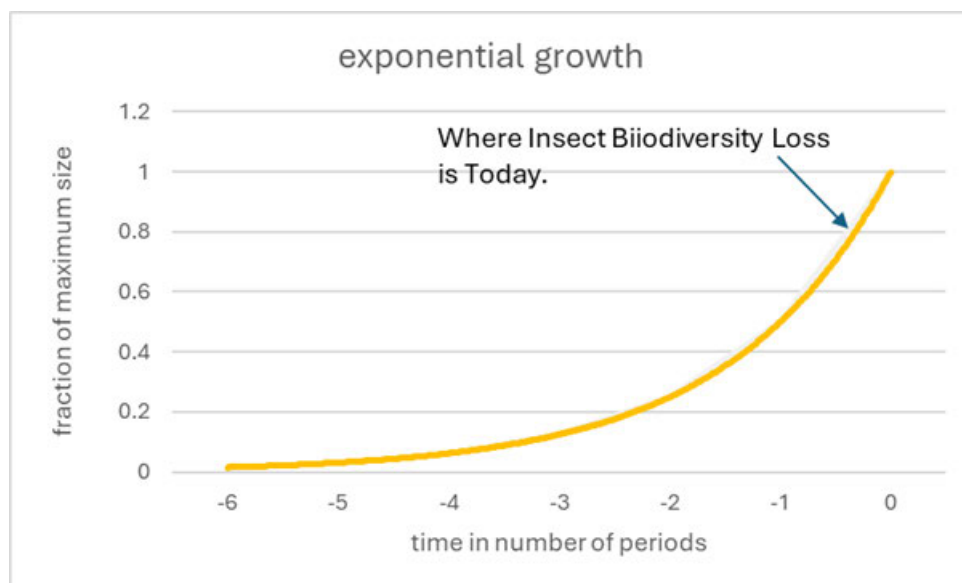
affected by climate change, and we wage a relentless war against insects. We have actively targeted them. We have already successfully exterminated so many of them.

The most widely used groups of insecticides in recent years have been the organophosphates which include parathion methyl, chlorpyrifos, dimethoate, profenofos and diazinon. Around 5,000 tonnes of active ingredients from this group, which comprises around 30 identifiably distinct chemicals, have been used annually in Australia. The next most significant group of insecticides are the acetyl choline esterase inhibitors, comprising various carbamates, of which about 3,000 tonnes have been used each year. Metham sodium is the most highly used carbamate. Over 500 tonnes per annum are used of those insecticides which act as GABA-gated chloride channel antagonists, the most important of these being endosulfan, which is a cyclodiene organochlorine, but which does not build up in the fat of mammals or persist in the environment. Of the remaining insecticides, the twenty chemicals in the pyrethroids and pyrethrins group are the most widely used, totalling up to a couple of hundred tonnes per annum.

Over 1% of Australia is soaked with insecticide every year. Every invertebrate on that 1% is killed every year. The runoff ensures that every invertebrate in every creek from this 1% is also killed.

In addition, most households have a can of fly spray so that any unwary insect venturing into humanity's living space can be quickly dealt with.

The life cycle of many species of insects is driven by climate. For example, the times of hatching of males and females may vary and depend on climate. I have a cabin in the Flinders Ranges and on a recent visit there was a plague of harlequin bugs. There were literally millions of them. But there was none of the normal harlequin bug hanky-panky. They appeared to be all the same sex. No baby harlequin bugs this year. Does this mean the end of that species?



How Biodiversity Loss is managed in Australia.

The short answer to how Australia manages biodiversity loss is that it doesn't. It monitors some species. If it is decided that a species is threatened, it hands it over to the '**Threatened Species Commissioner**' whose job it is to make sure they do not go extinct. The trend in threatened species shows that nothing, which actually works, is done to stop species from becoming threatened. The result is that sometime between now and the end of the century, all Australian species will be classed as threatened.

What does all this mean?

This would mean that, probably the only species left would be those with links to us (homo sapiens) and weed species. There will be domestic stock, pets, plants grown for food and fibre, garden plants, and of course both weeds and animal pests. And of course, there will be Zoos and Botanic Gardens. There will not be this thing called 'the wild', as we now know it, anymore. This probably will not worry most Australians who spend their time in cities, but it certainly worries me.

Some suggested Directions.

Sixty one percent of Australia's land is used for **agriculture**. Therefore! How it is managed plays the biggest role in the loss of biodiversity, but this need not be the case. **Regenerative agriculture** is an evolution of conventional agriculture, reducing the use of water and other inputs, and preventing land degradation and deforestation. It protects and improves soil, biodiversity, climate resilience and water resources while making farming more productive and profitable. **Organic agriculture** also called ecological or biological farming, is an agricultural system that uses fertilizers of organic origin such as composted manure, green manure, or bone meal and places emphasis on techniques such as crop rotation and companion planting. **Natural farming** is an agroecology based diversified farming system which integrates crops, trees and livestock with functional biodiversity. These are all improvements on present farming practices which could greatly reduce biodiversity loss. However! They need to be 'the norm' rather than a minority practice.

The last three years has seen a dramatic increase in biodiversity loss in Australia. Maybe, this can be attributed to climate change. However, that doesn't excuse the disaster we have created. Whatever the Australian government did over the last three years to reduce biodiversity loss, it achieved the opposite. The solution is very clear. For a start, **30% of Australia must be 'protected' by 2030**. Something Australia has agreed to do. The problem is in their definition of protected. There must be some sort of scoring used to give a weighting to protected land that is truly protected rather than to so called 'protected land' full of invasive plants and animals. Land is not protected from human activity if it is still suffering from past human activity.

Of course we must become more serious about **sorting climate change**.

Conclusion.

Using the accepted definition of biodiversity, together with data supplied by the Australian Department of Environment, the IUCN and the United Nations Environment Programme, it has been shown that biodiversity has continued to be lost above trend and **will pass, what some experts consider to be the 'Tipping Point' by 2050**. It is also very clear that the Draft Biodiversity Act[9], now open for community consultation, does not address any of the above concerns in any meaningful way and just cements past methodologies which have been proven to fail.

References.

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