

10. Measuring Wellington City Council's performance

Accurately and openly monitoring biodiversity trends (and the results of actions we are taking) is essential to determine if progress has been made. Performance measures are used to translate goals and objectives into measurable indicators of progress. They are a vital part of an adaptive management approach, and provide useful information for decision makers to evaluate if actions are successful in addressing goals and objectives.

In addition to these performance measures, Council will establish a consistent monitoring framework (see objective 4.2.2) which will bring together existing monitoring and address any gaps.

Performance measures have been divided into two categories, the City Biodiversity Index (which measures outcomes) and Operational monitoring (which measures outputs).

Unfortunately there is limited historical data in some areas available to measure our progress against. In these cases we need to establish baseline information to ensure that our progress into the future can be measured.

10.1 City Biodiversity Index

The following indicators are from the City Biodiversity Index¹⁷ and will be used as a baseline measure for the city, and then a measure by which we can assess our progress. The aim is to see an increase in all these indicator measures to increase over time. This index provides high level monitoring to look at long term trends and how we are tracking to achieve our outcomes. City wide bird counts are incorporated into this index, and also reported through Council annual plans.

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¹⁷ Convention on Biological Diversity. User's Manual for the City Biodiversity Index. 2012.



Above: We need to ensure we continue to engage with and educate children. Inviting schools along to planting sites is one way of achieving this.

Opposite: Streams such as this one in Khandallah Park look beautiful, but we need to monitor the water quality and habitat to ensure that we are meeting our aim of protecting freshwater ecosystems. Photo: Sin Hoi Phang

Indicator	Explanation	How to calculate
1. Proportion of natural areas in Wellington City	Natural ecosystems harbour more species than disturbed ones, hence the percentage of natural areas compared to that of the total city area gives an indication of the biodiversity richness. Natural areas comprise predominantly native species and natural ecosystems, which are no longer, or only slightly influenced by human actions, except where such action is intended to protect or restore native biodiversity.	(Total area of natural areas, restored and regenerated areas) / (Total area of city) * 100%
2. Connectivity between ecological sites	Fragmentation of natural areas is one of the main threats to biodiversity in a city. The fragmentation of natural areas affects species differently. To encourage positive action to increase connectivity or reduce barriers to connectivity, it is more meaningful to measure connectivity rather than fragmented plots. This indicator score can be improved when more of the fragments are connected.	$\frac{1}{A_{total}} = (A_1^2 + A_2^2 + A_3^2 + \dots + A_n^2)$ <p>Where:</p> <ul style="list-style-type: none"> • n is the total number of connected natural areas • A_{total} is the total area of all natural areas • A₁ to A_n are areas that are distinct from each other (i.e. not connected). They may consist of areas that are the sum of two or more smaller patches which are connected (less than 100m apart). <p>However, exceptions to the above rule includes anthropogenic barriers such as:</p> <ul style="list-style-type: none"> • Roads (15m or more in width; or are smaller but have a high traffic volume of more than 5000 cars per day) • Any other artificial structures that the Council would consider as a barrier
3. Native biodiversity in built-up areas (bird species)	Cities comprise largely of urban, suburban and rural sites with minimal natural features. However, built-up areas do harbour biodiversity. Some urban, suburban and rural sites have more biodiversity than others. By enhancing certain features in such areas, the biodiversity could improve. Hence, native biodiversity in urban, suburban and rural sites should be an indicator. We have the most data on bird species, therefore this taxonomic group will be used as the indicator. Implementing appropriate measures such as planting, may attract birds into these areas of the city.	The total number of native bird species in built-up areas which includes urban parks, golf courses, private gardens, cemeteries, roadside planting and impermeable surfaces like buildings and roads.

Indicator	Explanation	How to calculate
4. Change in number of native species	Five key taxonomic groups have been selected as "core indicators" – birds, vascular plants, butterflies, lizards and freshwater fish. The indicators will measure the change in number of species over time rather than the absolute number of the species. Conducting more surveys on the target groups will result in the finding of and reintroducing 'extinct' native species would help to increase the number of extant native species.	Once a baseline has been established, net change in species from one survey to the next is measured as: Total increase in number of species (as a result of rediscovery, new species found, re-introduction) minus the number of species that have gone locally extinct
5. Proportion of protected natural areas	Protected or secured natural areas indicate the city's commitment to biodiversity conservation. The definition of protected natural areas includes legally protected, formally secured areas, and other administratively protected areas.	$(\text{Area of protected or secured natural area}) / (\text{Total area of the city}) * 100\%$
6. Climate regulation: carbon storage and cooling effect of vegetation	Two important aspects of climate regulation are carbon storage and cooling effects provided by vegetation, in particular tree canopy cover. Canopy cover of trees, which includes those that are naturally occurring and planted, is accepted as an indirect measure of the carbon sequestration and storage services. The extent of tree canopy cover can also act as a proxy measure for filtering of air and numerous other biodiversity benefits.	Tree canopy cover can be measured via satellite and LIDAR imagery. $(\text{Tree canopy cover}) / (\text{Total terrestrial area of the city}) * 100\%$
7. Amount of accessible green space	Biodiversity provides invaluable recreational, spiritual, cultural and educational services. It is essential for physical and psychological health. This measure ensures social equity within the community with regards to equal access to natural areas	$(\text{Area of parks and reserves with natural areas}) / 1000 \text{ persons}$
8. Proportion of invasive exotic species (as opposed to native species)	Exotic invasive species are species whose introduction and/ or spread threaten biodiversity. It is inevitable in cities, which are open to external influences, to have exotic species. Exotic species which are not invasive or detrimental to native species are not considered in this indicator. In fact in many cities, exotic species enhance the diversity.	To ensure that the comparison of invasive exotic species with that of native species is meaningful, it needs to be a comparison of identical taxonomic groups. Therefore for this measure we will look at vascular plants and bird species. $(\text{Number of invasive exotic species}) / (\text{Number of native species}) * 100\%$

Indicator	Explanation	How to calculate
9. Regulation of the quantity of water	Climate change is in many places predicted to result in increased variability in precipitation which in urban landscapes translates to high peaks in water-flow and damage to construction, business and transport. Open space and vegetation has a significant effect in reducing the rate of flow of water through the urban landscape. This indicator looks at the proportion of all permeable areas to the total terrestrial area of the city.	Proportion of all permeable areas (including areas identified in Indicator 1 plus other parks, roadside greenery, green roofs, private gardens, streams etc) to total terrestrial area of the city (excluding marine areas and artificial permeable surfaces) (Total permeable area) / (Total terrestrial area of the city) * 100%
10. Number of formal education visits per child to natural areas	Involving our young people with nature is an essential part of achieving our goals. This measure gives an indication of school children's use of recreational services provided by ecosystems and ensures that our green spaces are being utilised by formal education providers.	Number of formal education visits per child below 16 years to parks and reserves with natural areas. The Council will have to work with schools to gather information on this measure.
11. Number of biodiversity projects implemented by the city annually	This indicator measures the number of biodiversity related projects and programmes that the Council is involved in, either as the main player or in partnership. Projects could include those about species conservation, biodiversity surveys and restoration projects. For a project or programme to be included in this indicator, biodiversity must be an important consideration. A programme designed to conserve non-native species, but threatened elsewhere, can also be considered.	Total number of programmes and projects that are being implemented by the Council or in partnership or support of the Council. This list will then be categorised by type into projects and programmes that are: <ul style="list-style-type: none"> • Biodiversity related • Ecosystem services related
12. Number of organisations/ companies/NGOs/ academic institutions with which the city is partnering in biodiversity activities, projects and programmes	As it is impossible for any single agency to carry out all the activities, responsibilities, projects and programmes that have biodiversity implications, it is inevitable that engagement of all levels of the population must be facilitated. This measures the extent of informal and/or formal partnerships, or collaboration with other entities. Such partnerships should have substantial and long-term involvement from the Council.	Total number of organisations/ companies/ NGOs/academic institutions with which the city is partnering in inter-agency cooperation around biodiversity activities, projects and programmes
13. Number of outreach or public awareness events held in Wellington City per year	The event should either be organised entirely by the Council, or there should be a heavy involvement of the Council before the event to be considered for inclusion in the indicator. Events that just take place within Wellington city with no Council involvement or support will not be considered as part of this indicator.	Total number of outreach or public awareness events held in Wellington city per year

10.2 Operational monitoring

These are short term output measures tracking on-the-ground implementation of management actions. Outputs measure activities carried out in order to reach outcomes. The following table shows the progress that has been made since the 2007 Wellington City Council Biodiversity Action Plan, the situation in 2014 when Our Natural Capital was written and the targets we want to reach by the time this plan is scheduled for review in 2020.

Measure	2007 (actual)	2014 (actual)	2020 (target)
Ecological management plans created per year for sites with significant biodiversity value	0	4 per year	All significant ecological sites
Native plantings undertaken by the Council annually*	43,000	45,000	45,000
Survival of plants in Council plantings	65%	77%	90%
Native plants provided annually by the Council for community planting*	27,160	34,000	40,000
Number of enrichment species available for restoration planting	200	1000	2000
Total plants planted in Wellington for ecological restoration	700 000	1 240 000	2 000 000
Amount of land under active weed control (number of sites and hectares)	25 sites	75 sites	85 sites
	No information	570ha	1000ha
Reserves surveyed for high threat Regional Pest Management Plan pest plants on public land	25	50	85
Integrated pest control on Council reserve land (both weed control and control of at least two animal pests)*	No information	52%	70%
Number of sites where animal pest species are monitored	3	3	20
Number of behaviour change programmes (to address behaviour that has a negative impact on biodiversity) per year	0	1	2
Hours worked by environmental volunteers*	7,500	34,611	55,000

Our Natural Capital - Biodiversity Strategy and Action Plan will undergo a comprehensive review, with community consultation, after 5 years, and the action plan updated.

* LTP measures

