2019-2024

University of Canterbury Biodiversity Plan

Sustainability Office

University of Canterbury

2018

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Cover image: 'Tūrama', kaitiaki of Okeover Stream/ Wai-ututu
Image credit: Tim Logan

Definitions

Biodiversity: Biological diversity, or the variety of life found in a given place. This can be measured in terms of species richness. It can also be measured in terms of prevalence of specific kinds of species. For the purposes of this Plan, biodiversity efforts are directed towards increasing the diversity of species native to New Zealand.[1]

Ecosystem: The complex of living organisms, their physical environment, and all their interrelationships in a particular unit of space.[2]

Ecological restoration: The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed.[3]

Cultural Narrative

This strategy acknowledges the importance of the cultural narrative for UC, which has been developed with Ngai Tuahuriri.

[1] Following https://www.britannica.com/science/biodiversity
[2] https://www.britannica.com/science/ecosystem
[3] https://www.ser.org/

MANA	WHAKAPAPA	TOHU
The status of iwi and hapū as mana whenua is recognised and respected.	Māori names are celebrated.	Mana whenua significant sites and cultural landmarks are acknowledged.

TAIAO	MAHI TOI	AHI KĀ
The natural environment is protected, restored and/or enhanced.	Iwi/hapū narratives are captured and expressed creatively.	Iwi/hapū have a living and enduring presence and are secure and valued within their role.

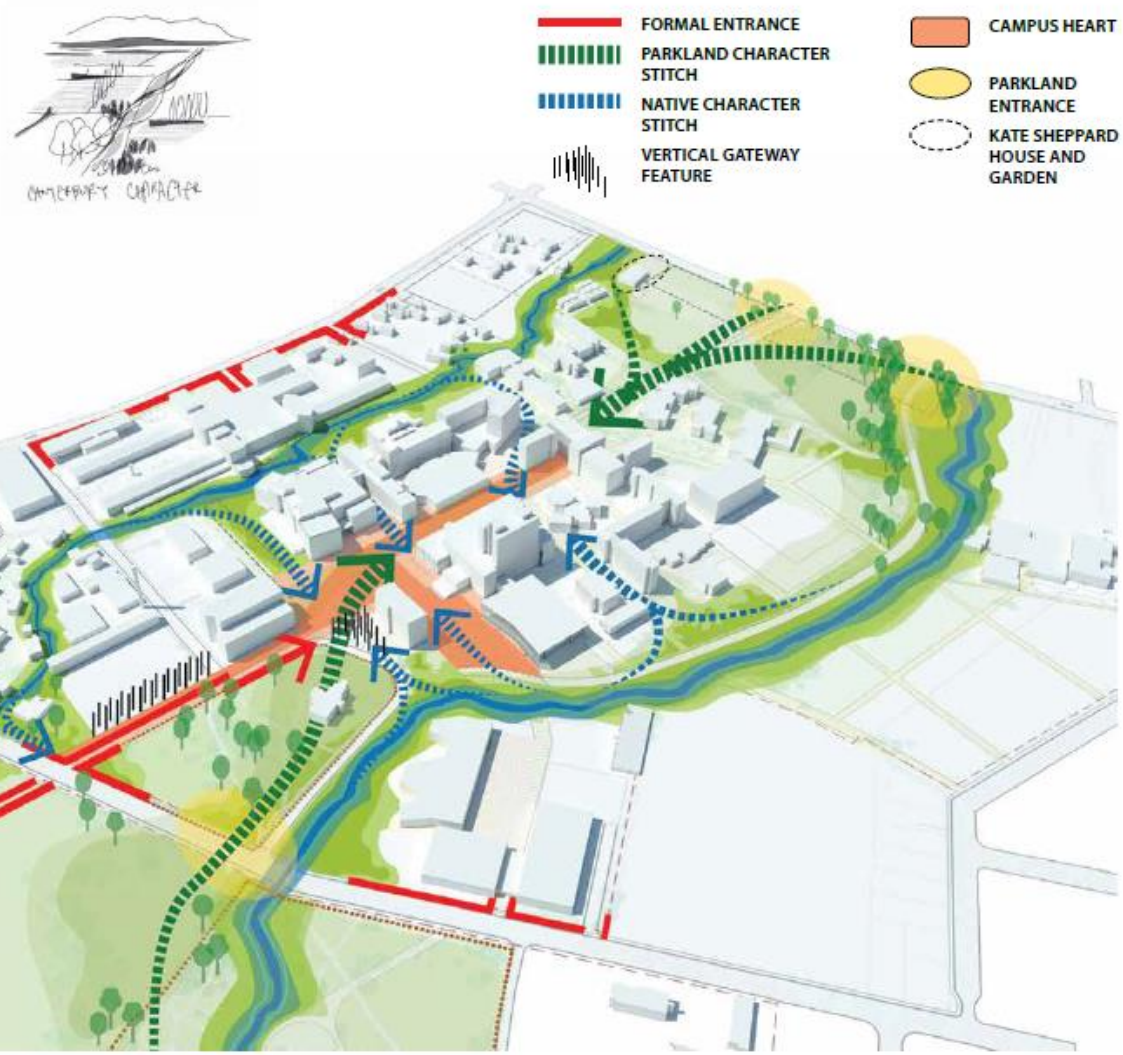
Background

The University has introduced many measures over the years aimed at enhancing the ecological wellbeing of Ilam and Dovedale campuses, and Ilam Fields. These have mainly focused on native plantings of the waterways and other areas, and stormwater filtration. While many plans, frameworks and strategies over the last twenty years have referred to ecological restoration and/or biodiversity enhancement, there has not previously been a plan that brings together the different initiatives in a coherent package, or clearly identifies the priorities for this work. Key planning documents include the Campus Master Plan and the Landscape Master Plan. Two examples from the latter are included below; a detailed summary of several documents is in the appendix.

3.2 Theme: University Story

Inward and outward expression of University of Canterbury identity and character with a shared cultural landscape that expresses:

- **[Tikanga]** - Weaving cultural narratives into the campus character, balancing existing parkland and historic character with mana whenua and Pasifika values, as an expression of the university story and the University of Canterbury's place in the Canterbury Plains.
- **[Rangatiratanga]** - Leadership and outward expression of institutional distinctiveness and grandeur with assertive landscape gestures that define gateways and perimeters.
- **[Whanaungatanga]** - Be a good neighbour to the wider community, with considerate interfaces and welcoming entry features.



3.3 Theme: Healthy Habitats

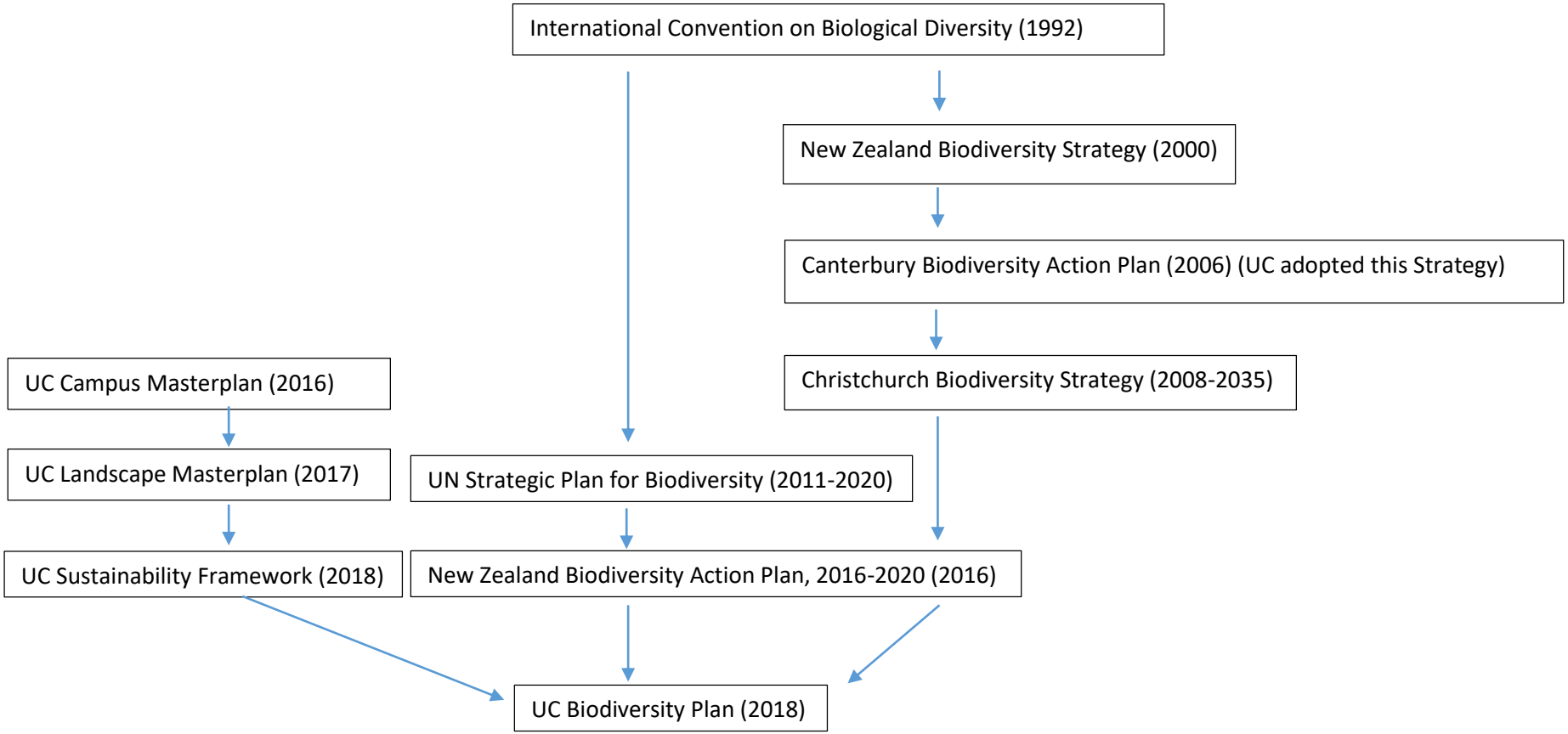
All landscape between buildings in the campus core is functional and expressed artistically, to invite continuing learning conversations and promote education on display with a focus on:

- **[Tohungatanga]** - Functional, attractive 'living laboratory landscape' for the movement and treatment of water
- **[Kaitiakitanga]** - Healthy waterways, habitat and mahinga kai
- **[Manaakitanga]** - Edible landscapes and mahinga kai visible within (or from) campus heart

Planning Context

New Zealand is a biodiversity hotspot, with a very high proportion of endemic species. These species are vulnerable to human impact, resulting in a significant decline in species numbers. In the Christchurch area, several important pockets of biodiversity exist, including the Estuary, Travis Wetland, the Christchurch Botanic Gardens, Riccarton Bush, Styx Mill Reserve, the Groynes, and parts of Banks Peninsula. The University of Canterbury's Ilam and Dovedale campuses, and Ilam Fields, constitute an important area of greenspace in the north east of the city and are recognised as a stepping stone for some fauna. The University has already implemented many measures which have had a positive effect on biodiversity. However, with a coordinated approach there is scope to improve this significantly.

This UC Biodiversity Plan relates to the Christchurch Biodiversity Strategy (2008), which gives effect to parts of the Canterbury Biodiversity Action Plan (2006), which in turn helps give effect to the New Zealand Biodiversity Strategy (2000). This is the New Zealand Government's response to the international Convention on Biological Diversity (1992). A later international Strategic Plan for Biodiversity (2011) follows on from the earlier Convention, and in response the New Zealand Government has since adopted the New Zealand Biodiversity Action Plan (2016), which has also been taken into account in preparing this current plan. The Plan also builds on the UC Sustainability Framework and a number of UC planning documents.



The New Zealand Biodiversity Strategy (2000) noted that the decline in our indigenous biodiversity was our "most pervasive environmental issue", and that "Our indigenous biodiversity… is of huge value to New Zealand and its citizens; to our economy, our quality of life, and our sense of identity as a nation." The five goals of the New Zealand Biodiversity Action Plan (2016-2020) are:

- Mainstreaming biodiversity across government and society
- Reduce pressure on biodiversity and promote sustainable use
- Safeguarding ecosystems, species and genetic diversity
- Enhance the benefits to all
- Enhance implementation

The United Nations Strategic Plan for Biodiversity (from which the New Zealand Biodiversity Action Plan takes its lead) relates directly to the UN Sustainable Development Goals.

Reporting Framework

This Biodiversity Plan sets out identified targets and actions against the areas identified. This work supports the UC Sustainability Framework and the UC Landscape Master Plan. Reporting against this Biodiversity Plan will be contained in annual UC Sustainability Reports, using the Learning in Future Environments matrix and including the UN Sustainable Development Goals.

Graduate Profile

This Biodiversity Plan supports the UC Graduate Profile in many ways, including but not limited to those listed below:

Graduate Profile	**Biodiversity Plan**
Critically competent in core academic discipline	Courses such as BIOL 273 using UC as Living Laboratory
Employable, innovative and enterprising	Almost all roles for graduates will have environmental responsibilities
Biculturally competent and confident	Eg. awareness of taonga species, soaking of harakeke. Knowledge of indigenous plant and animal communities on campus
Engaged with the community	Understanding the ecological connections from the headwaters to Riccarton Bush and beyond, SVA planting on Port Hills, connections with local groups focused on ecological restoration
Globally aware	Awareness of a warming climate and how this impacts biodiversity

Working Group

This plan was developed with input from a number of academic staff, along with staff from Engineering Services tasked with delivery of different elements. Staff include:

Prof. Jim Briskie
Prof. Tom Cochrane
Darryl Cone
Prof. Jon Harding
Prof. Dave Kelly
Prof. Angus McIntosh
Dr Justin Morgenroth
Dr Matt Morris
Dr Tara Murray
Dr Pieter Pelser

Biodiversity Framework and Principles

The underlying principle of this new approach is that the more diverse the biological life is on campus, the more ecologically healthy it will be. This not only helps UC to meet its obligations with regards to the environment, but also helps deliver core research and teaching opportunities. It recognises that biodiversity adds to the wellbeing of staff and students and the ability to be more connected to our biological heritage. More native biodiversity on campus makes people happy and allows everyone to learn about and understand our New Zealand landscape/biota even when living in the middle of a city and studying a range of quite unrelated degree programmes.

The key areas this strategy deals with are:

Waterways
Plants
Vertebrate animals
Microbes, fungi and invertebrates

In order to achieve positive outcomes for these areas, the following approaches are recommended:

Improve plant diversity: include a diverse range of plants in new plantings
Improve bird populations: focus on planting bird-friendly plants and predator control
Improve stream life: focus is on stormwater treatment to benefit invertebrates and fish
Improve cryptic biodiversity: microbes, fungi and invertebrates will benefit from unmanaged areas of native planting

Ecological restoration is usually measured in terms of the changing populations of individual species, and assumes that as an ecosystem heals, numbers of marker or 'desirable' species will increase until they reach a point of equilibrium. The return of an animal or plant that has long been absent is normally heralded as a sign of a successful programme. An example of this in the UC context is the bellbird, which has begun to colonise campus in the years after an important 1990 bird count and a large programme of native plantings throughout campus in the intervening twenty years.

This strategy does not rely on a pre-European benchmark of ecological richness and health, but it does acknowledge the importance of native species as markers of ecological wellbeing.

The approach proposed is to develop three high-profile pilot sites based on the Landscape Master Plan, and to implement these over the following three years.

Current Situation

Staff from the School of Biological Sciences have monitored a range of species at varying frequencies and for varying lengths of time. Some of this monitoring has been previously reported in the annual UC Sustainability Reports. However, in general it may be said that despite a somewhat ad hoc approach to ecological restoration at UC, there has been good (if inconsistent) progress around birds and plants since the mid-1990s. Despite some important work to improve stream health (especially on the Okeover/Waiutuutu Stream), it is still regarded as being moderately polluted.

Opportunities Timeline

2018: focus on the Wellness Precinct
2019: focus on the Wellness Precinct
2019: landscape around Beatrice Tinsley
2022: Ephemerals stretch of the Okeover

Targets and Actions

Education and Research

Target: UC will continue to act as knowledge producers and brokers on topics pertaining to ecology and biodiversity.
Action 1: Undertake a stocktake of teaching and research relevant to UC's biodiversity.
Action 2: Develop a central repository for relevant research pertaining to this plan.
Action 3: Seek to secure baseline research funding to undertake on-going monitoring.

Waterways

Most of UC's existing planning relates to the ecological health of the three streams that run through campus. This work is summarised and augmented in the Waterways Plan. A Waterways Monitoring Framework is being developed by an on campus Waterscape Action Group.

Target: Monitor UC's waterways systematically
Action: Confirm and implement Waterways Monitoring Framework

Target: increase in-stream MCI value – shift it from moderately polluted to, eg, mild pollution
Action: Introduce species.

Target: promote native fish in Okeover/ Wai-utuutu rather than introduced species
Action 1: Investigate opportunities to successfully support further native fish species (possibly through Masters and/or PhD projects)
Action 2: Reduce migratory barriers on streams for fish downstream of UC by working with Christchurch City Council and other stakeholders.

Target: Decrease stormwater contaminants (individual targets)
Action 1: Review UC owned infrastructure for contamination sources (including heavy metals, hydrocarbons and sediment) (eg copper downpipes, carpark filtering). Aim to include priorities in the Asset Management Plan.
Action 2: Identify maintenance requirements for stormwater filters at these sites
Action 3: Assess which discharge points are the worst, and begin by targeting these
Action 4: Review and fit stormwater filters to outlets coming from off-site
Action 5: Remediate the Ephemerals stretch of Okeover Stream/ Wai-utuutu at Ilam Fields using 2008 plan as the basis. Try to do this with support from CCC and Ecan.
Action 6: Establish management protocol for sedimentation traps, identifying resources to do this
Action 7: Ensure maintenance of sedimentation traps according to the management protocol

Target: Increase species richness of stream insects to 2010 levels.
Action 1: "Daylight" stream crossings by replacing culverts with bridges as resources allow (at Forestry, Engineering Link and Engineering Rd).
Action 2: Proceed with planned daylighting of boxed drain on Ilam Fields.

Target: Understand the impact of UC discharges of cooling water from legacy buildings into streams on the ecosystem.
Action: Undertake monitoring to determine this.

Plants

Biodiversity

Target: increase diversity of native plants on campus
Action 1: review tree list and identify 'missing' native species, and prioritise these for planting
Action 2: Focus attention for this on planting plans for new landscape areas, particularly along waterways, and especially in the Wellness Precinct and around Beatrice Tinsley.

Target: increase plant biomass on campus to absorb more CO2 and reduce ground-level temperature extremes
Action: Plant more trees (including exotic deciduous species) in areas of bare lawn

Target: maintain accurate tree register
Action: Continue the Fulcrum tree database project, expanding focus from hazard management to all trees. This needs to be included in operational plan for Grounds.

Target: establish a campus-wide arboretum.
Action 1: Establish the teaching and research demand
Action 2: Plant and manage a large number of tree species that can be used as a teaching resource as required and as resources allow.

Target: Develop campus site as a link in the ecological corridor of the north west of the city, and act as a reservoir of biodiversity.
Action:

Canopy cover

Target: increase canopy cover to 35% of campus by 2035
Action: Target areas that are easier to plant in, for example along the stream margins, large carpark areas like Arts carpark, and the edges of open spaces. In these spaces, could use some deciduous species (natives and exotics) to match garden themes in each area. Focus especially on areas with higher human interaction. The 2035 target will allow time for slow-growing natives. This needs to be balanced with the safety of staff and students.

Maintenance

Target: Continue to decrease use of herbicides as resources allow
Action: Establish a baseline for herbicide use and report against this

Target: increase areas of leaf litter.
Action: Enhance low maintenance areas and leave as undisturbed as possible. These include along streams and in part of Ilam Gardens

Animals

Bird numbers

Target: Resident population of keruru colonising on campus. (While visiting keruru have occasionally been observed on campus, they have not been recorded during bird counts)
Action: Increase plantings of native fruiting trees attractive to kereru, eg. miro, kahikatea, totara, matai by including these in the tree replacement programme.

Target: Increase number of bellbirds on campus by 100%.
Action: Increase plantings of bellbird attracting species, eg. native tree fuchsia, rewarewa, harakeke, kowhai; exotic Eucalyptus, Banksia.

Target: The native shining cuckoo appearing on campus.
Action: Increase plantings favourable to grey warblers (the shining cuckoo's host).

Target: Increase numbers of native birds overall by 100% within 5 years, with a particular focus on at least a 50% survival rate of nests.
Action: Monitor nests to gain an understanding of current survival rates.

Target: undertake an annual bird count
Action: Bird count to continue as component of BIOL273.

Insects

Target: Develop knowledge base about terrestrial insect life on campus
Action: Insect survey undertaken.

Target: Areas established to showcase insects of interest (eg giant stick insects, tree weta)
Action: establish specific gardens along streams.

Native reptiles

Target: Determine the status of native reptiles on campus (skinks and geckos)
Action: Initiate survey for reptiles

Target: Establish habitat for skinks and geckos to encourage recovery of any remnant populations
Action: Place rocks in a strategic area; increase plantings of native shrubs. (NB rock garden is being placed outside Ernest Rutherford, north entrance)

Target: Re-establish species of reptiles on campus that are currently locally extinct
Action: determine which species would have been present in past, and requirements needed for their reintroduction.

Predator control

A significant amount of rodent control is already undertaken on campus, but this Plan flags a need to enhance control of all predators. We also have an absence of reporting on the effectiveness of current control methods. The approach proposed is to undertake research to establish the scale of the issues, prior to expanding the control programme.

Target: Understand impact of predators on campus – with a focus on rodents, possums, hedgehogs and feral cats
Action: Summer scholarship to establish presence of these predators on campus.

Target: Reduce impact of predators on bird life, insects and reptiles on campus
Action: follow evidence-based approaches to achieve this, as resources permit.

Target: Decrease impact of cats on birdlife
Action: Neighbourhood awareness-raising campaign (including importance of neutering, micro-chipping)

Target: Develop business case for a Mainland Urban Island or predator-proof fenced area in a part of the campus.
Action: Band trees where practicable and investigate further opportunities, particularly for protecting keruru nests.

Longer Term

Target: Establish a garden for the endangered Canterbury knobbled weevil
Action 1: Plant aciphyllas in an appropriate location. (Explore if this could be at Mt John)
Action 2: Review opportunities to expand biodiversity planning to other UC sites, for example Mt John and Cass Field Stations.

Native mammals

Target: research potential for establishing long-tailed bats.
Action: contact bat researchers for advice on surveying for presence of bats on campus

Review and Reporting

Target: transparent reporting on progress against these targets is undertaken.
Action: include these reporting against these targets in the annual UC Sustainability Report.

Target: ensure these targets remain relevant.
Action: Biodiversity Reference Group is supported by the Sustainability Office and reviews targets annually.

Target: Five yearly reviews of this Plan
Action: Revise plan in 2024

BIODIVERSITY FRAMEWORK – Provisional LiFE Reporting on Biodiversity

Policy and Strategy	Action-Planning	Stakeholder Engagement	Measurement
Landscape Master Plan (2017) UC Sustainability Framework (2018) New Zealand Biodiversity Action Plan (2016)	Landscape Concept (2014-2022) Waterways Issues and Options Waterways Monitoring Framework Biodiversity Plan (2018)	Biodiversity Working Group advising on what should be contained in the Biodiversity Plan.	Biodiversity Surveys Waterways Monitoring Framework (under development)
Communication	**Training and Support**	**Implementation**	**Links to the Curriculum**
Information about bird counts publicised through UC staff comms. Streams Website		Landscaping between new Ernest Rutherford building and Natural	Bird Counts Native Plant Counts compared with

		Resources Engineering reflects LMP intent.	Landscape Master Plan Waterways monitoring

Key reference documents:

UC Sustainability Framework (2018)
Campus Master Plan (2016)
UC Landscape Master Plan (2017)
UC Waterways Issues and Options (2015)
UC Landscape Concept (2014)
UC Landscape Strategy (2013)

Relevant Courses Currently Taught:

The following courses relate to this Biodiversity Plan and Sustainable Development Goal 14: Life Below Water:

BIOL384
BIOL427
ANTA201
BIOL212
ENCN445
GEOL115
GEOL243
ANTA102
ANTA103
BIOL211
BIOL215
BIOL270

BIOL273
BIOL378
BIOL424
BIOL426
BIOL428
BSNS201
CRJU101
CULT206
ENCN304
ENCN342
ENGL243
ENGL349
ENME405
FORE111
FORE447
GEOG106
LAWS319
LAWS326
LAWS658
MAOR172
MAOR285
PSYC341
SCIM101

The following courses relate to this Biodiversity Plan and Sustainable Development Goal 14: Life Below Water:

FORE111
FORE447
BIOL273
BIOL270

BIOL384
BIOL427
FORE316
LAWS319
BIOL213
BIOL426
BIOL456
FORE141
FORE218
FORE616
GEOL115
BIOL112
BIOL215
BIOL420
CULT418
ENFO204
ENFO327
ENGL411
ENNR405
FORE131
FORE219
FORE327
FORE419
FORE436
FORE642
ANTA103
BIOL113
BIOL211
BIOL254
BIOL271

BIOL305
BIOL313
BIOL334
BIOL371
BIOL375
BIOL377
BIOL378
BIOL423
BIOL424
BIOL425
BIOL429
CULT132
CULT302
CULT335
ENGL132
ENGL318
FORE215
FORE307
FORE422
FORE423
FORE435
FORE618
FORE641
HSRV204
MAOR107
MAOR172
MAOR270
MAOR317
PSYC341
SCIM101

SOIL203
WATR201
ANTH388
BCHM111
BIOL111
BIOL210
BIOL212
BIOL250
BIOL332
BIOL352
BIOL354
BIOL355
BIOL481
BIOL496
COSC367
CULT114
CULT206
CULT319
CULT420
ECON105
EDEM685
ENCI313
ENCI675
ENCN253
ENCN353
ENCN452
ENEL667
ENFE614
ENFO410
ENGE411

ENGE415
ENGL243
ENGR405
ENGR621
ENME418
ENNR313
ENNR322
EURO458
FORE151
FORE205
FORE342
FORE426
FORE619
FORE643
GEOG106
GEOG311
GEOL113
HIST262
HIST268
HIST270
HIST379
HIST398
HLTH101
HSRV103
HSRV201
ILAP608
ILAP641
LAWS205
LAWS326
LAWS358

MAOR108
MAOR212
MAOR219
MAOR282
MAOR373
MAOR401
PHIL240
PHIL324
PHYS101
POLS319
PSYC333
PSYC415
SOWK201
TREO282
WATR401
WATR402
WATR404

Review of Existing UC Planning Documents

The following is a review by student intern Eden Long of UC planning documents that relate to ecosystem health and biodiversity.