

Tuvalu R2R Biorap Field Guide



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Purpose

The Global Environment Facility (GEF) embarked on the “R2R- Pacific Islands Ridge-to-Reef National Priorities – Integrated Water, Land, Forest and Coastal Management to Preserve Biodiversity, Ecosystem Services, Store Carbon, Improve Climate Resilience and Sustain Livelihoods” in the last decade to provide an opportunity for Small Island Developing States (SIDS) in the Pacific to ensure the sustainable development of island economies and communities. For Tuvalu, a sub-component of the larger Pacific R2R programme was initiated in 2015, the “Implementing ‘Ridge to Reef’ approach to protect biodiversity and ecosystem functions in Tuvalu (Tuvalu R2R Project)” which has the main aim “to preserve ecosystem services, sustain livelihoods and improve resilience in Tuvalu using a ‘ridge-to-reef’ approach”.

To achieve this objective, the Tuvalu R2R programme has four components: “enhancing and strengthening conservation and protected areas (Component 1); rehabilitating degraded coastal and inland forests and landscapes and supporting the delivery of integrated water resource management (IWRM) and integrated coastal management (ICM) at a national scale whilst piloting hands-on approaches at the island scale (on three selected pilot islands) (Component 2); enhancing governance and institutional capacities at the national, island, and community levels for enhanced inland and coastal natural resource management (Component 3); and improving data and information systems that would enable improve evidence-based planning, decision-making, and management of natural resources in Tuvalu (Component 4)”.

There are multiple outcomes projected with the most relevant to the Biorap survey being the establishment of formal community management systems of conservation sites across the archipelago, each with functional management plans, sustainable land management and agroforestry interventions; and enhanced awareness and capacity building on the Ridge to Reef approach.

Overview of BIORAP Approach

“RAP methods are designed to rapidly assess the biodiversity of highly diverse areas, identify the threats to this biodiversity, identify priority areas for conservation, strengthen community involvement and participation in conservation management, train local scientists in biodiversity survey techniques, and to develop management policies and sustainability options.” SPREP (2014)

The biodiversity rapid assessment (BioRAP) approach was initially established in the 1990s when Conservation International undertook a large scale programme to collect biodiversity data to direct conservation efforts and decision-making at global, regional and local scales (Alonso *et al.* 2011). The BioRAP approach evolved over the twenty plus years of the programme implementation at approximately 80 sites all over the world.

A BioRAP is designed to produce the following baseline information for consequent conservation planning and management:

- overall species richness
- presence of local endemics
- rare species
- threatened species; and,
- habitat condition.

The application of the BioRAP approach in the Pacific Islands (PIs) has enabled stakeholders within the Pacific Island (PI) conservation sector to focus attention on local hotspots of biodiversity and the devastating effects of habitat loss in these and related sites. Published accounts of completed BioRAPs have been useful tools for decision-makers and wider PI community.

BioRAPs in the PIs are a generally baseline species inventories, species-specific assessment, change assessment, biological indicator species assessment, and/or resource assessment. Although each class of BioRAP ideally should be determined and applied separately as required, the reality is that many BioRAP surveys are a combination of more than one type.

BioRAP Components

There are important elements to consider when designing a specific BioRAP strategy:

- Timelines (for preparation, implementation and reporting);

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- Spatial scale;
 - Records of historical data;
 - Resources available such as time, money and expertise;
 - Scope, including taxonomic and geographic scope and site selection;
 - Sampling data and analyses (what data are required, how to collect it, how to analyze it)
 - Stakeholder involvement such as government, NGO, and community groups

Target Guilds

As time is restrictive for more complex species-specific evaluations, target floral and faunal guilds are preselected for focused surveys. These targeted groups tend to be indicators of biological system health. Birds are pollinators and are therefore useful for monitoring over time to determine if there are changes to species composition, which could consequently affect ecosystem function. Amphibians are vulnerable to vegetation changes and are thus useful for monitoring the state of the canopy cover. Reptiles, although less vulnerable, tend to be also useful indicators and often display high biodiversity at local scales. In marine habitats, the state of the coral reef can be evaluated using coral-eating species (corallivores) and algal grazers. Pest or invasive species can be identified, and prevalence can be summarily assessed to indicate threats to biodiversity because of human (or natural) introductions.

The purpose of this guide is to describe feasible, repeatable methods for gathering species and habitat information on chosen elements of the biodiversity including target species on the four islands / islets: Vaitupu, Funafuti, Nukulaelae and Niutao. These methods will be used to conduct baseline field ecological surveys of plants (vegetation), avifauna (birds), mammals (native and/or introduced/invasive), reptiles, and marine species, with a particular focus on species of cultural significance and unique to Tuvalu. Survey methodologies utilized in the BioRAP are compatible to and build on experiences of similar ecological surveys conducted in other Pacific Islands but have been adapted to the specific focus of the Tuvalu R2R Project and site limitations.

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Alonso L.E., Deichmann J.L., McKenna S.A., Naskrecki P., and Richards S.J. (2011). *Still Counting. Biodiversity Exploration for Conservation. The First 20 Years of Rapid Assessment Program*. Conservation International, Arlington, Virginia, United States. Pp. 315.

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Flora and Vegetation Surveys

Flora

Flora refers to the plant species composition of an area. This section of the guide describes methods to use for the flora survey of the four Tuvalu R2R sites.

The aims are to produce a checklist of each of the four groups of islands – Niutao, Vaitupu, Funafuti and Nukulaelae. A checklist of plant species found in each of the main vegetation types present on each of these island groups should be generated in tandem.

To achieve this, the team will carry out the following steps:

1. For the flora survey, a copy of Thaman (2016) checklist of Tuvalu plants, summarized in Appendix 1 and Appendix 2, will be used as a reference. A copy of Appendix 2 (Tuvalu plant names) will be used in the field as the datasheet for the flora surveys.
2. The flora survey will be conducted in an opportunistic manner. The team will need to sit down and discuss with the local guide of an ideal route to follow by foot through the island where all the different vegetation can be assessed. In each island group, the team will need to spend a day (first day) doing the flora survey, familiarizing themselves with the plants and vegetation types on the island before conducting the vegetation survey.
3. Using Tuvaluan plant names cross or tick off the names of plants that are present on the island. A checklist for each vegetation type would be required. Moreover, if there are multiple islands/islets try to do checklist for each individual islands. Use of a local guide from the island who is familiar with Tuvaluan plant names and knows the layout of the island especially trying to access all the different vegetation types of present would be recommended.
4. Using Thaman (2016) Tuvaluan names and vegetation classification, prepare a record sheet like the one below (Figure 1). The vegetation codes are based on Thaman (2016) vegetation classification: 1. Inland broadleaf forest and woodland; 2. Coastal littoral forest and scrub; 3. Mangroves and wetlands; 4. Coconut woodland and agroforest; 5. Disturbed – gardens, village houseyards, and disturbed ruderal vegetation and recently reclaimed un-vegetated area.
5. To avoid paper wastage, it would be best to print two copies (one to use and the other as a back-up in case the working copy gets wet). The data sheet in Appendix 2 can be printed on waterproof paper or normal copy paper. It is recommended for a pencil instead of an ink pen to be used for recording in the field, and the same sheet can be re-used in different islands.
6. If plants present within the sampled area do not have a Tuvaluan name, take good pictures, and give it a name or number. Label and save the pictures for future identification. When taking pictures, take good quality images, showing different parts of the plants – flower, fruits, leaf structure, and habit or growth form). There will be plants that have no Tuvaluan names and are unidentifiable on site; this is to be expected.

Tuvaluan	Latin Name	Family	Island	Vegetation				
			Vaitupu	1	2	3	4	5
Aka ta	<i>Abutilon indicum</i>	Malvaceae						
Akanita	<i>Bougainvillea glabra</i>	Nyctaginaceae	x					x
Akata	<i>Sida fallax</i>	Malvaceae	x					x
Akata	<i>Sida rhombifolia</i>	Malvaceae	x					x
Aloalo	<i>Premna serratifolia</i>	Verbenaceae	x	x			x	
Aluna	<i>Laportea interrupta</i>	Urticaceae						
Ateate	<i>Wollastonia biflora</i>	Asteraceae	x			x		
Aute	<i>Hibiscus rosa-sinesis</i>	Malvaceae	x					x
Aute kula	<i>Hibiscus rosa-sinesis</i>	Malvaceae	x					x

Figure 1. Floral checklist record sheet sample, which will be used for the botanical survey.

7. After each island, transfer the data from field sheets onto a laptop or computer. The recommended field guides are shown below in Figures 2, 3 and 4.
8. Equipment list: Notebook, data/record sheet (Appendix 2), clipboard, pencil, camera.

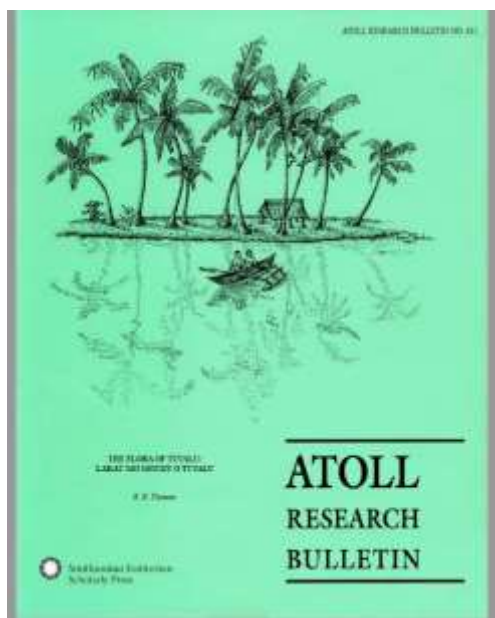


Figure 2. Thaman 2016 Flora of Tuvalu

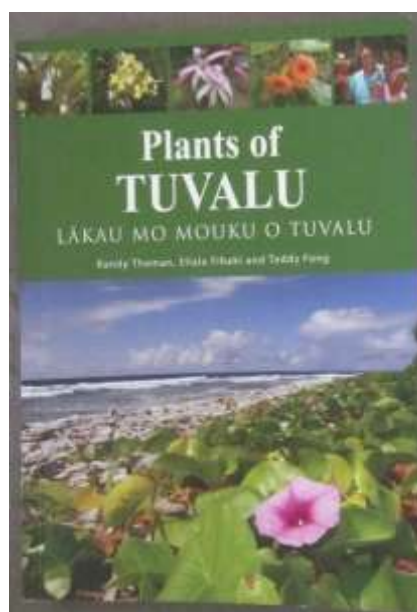


Figure 3. Thaman 2012 Flora of Tuvalu



Figure 4. Whistler 1992 Coastal plants

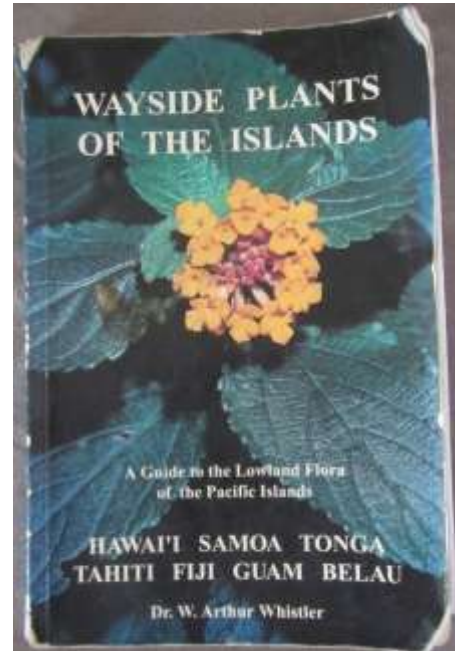


Figure 5. Whistler 19945 Wayside plants

VEGETATION SURVEYS

Vegetation refers to the plant cover occupying or covering a particular area of land. This section of the guide looks at the different steps to follow when conducting the vegetation survey of the four Tuvalu R2R sites.

The aims are to produce a vegetation checklist, description, and map of each of the four groups of islands – Niutao, Vaitupu, Funafuti and Nukulaelae. To achieve this, the vegetation survey team will carry out the following steps:

1. The team will need the following equipment: A diameter at breast height (dbh) tape (Figure 6), a 50 m measuring tape, flagging tape/ribbons, clipboard, data record sheet (Appendix 3), pencil, a GPS, a camera, a compass.
2. A minimum of three personnel – a recorder (records the tree measurement being called out), a tree spotter (measures DBH and identifies the trees), a tape person (runs the 50 m tape), are required on a survey team.
3. The survey team will use the Gentry Transect Technique (Gentry 1982) to sample quantitatively the vegetation of the four targeted islands. Each transect will be 50 m long by 2 m wide, covering an area of 100 m². The transects will be replicated as many times as possible during the time spent on each island to collect representative data of the different vegetation types. The target will be to replicate 10 – 15 transects per island group.



Figure 6. A commonly used dbh tape, which can be used as a meter tape and diameter tape.

4. For each island group, the targeted area to lay out the transects has been pre-selected based on perceived land cover (Appendix 4). The locations have been pre-selected based on the analysis of vegetation from the aerial images. During the survey, depending on access, weather and other factors it will be up to the survey team where the transects are placed as long as they are representative of the different habitats present on the island.
5. Some transects will start from the coast (where the vegetation cover starts) and proceed inland. Other transects should be located inland to gather information about inland vegetation systems.
6. At the beginning of each transect the GPS reading and compass direction will be recorded, then the 50 m tape will be laid out heading out in the predetermined direction. Using a flagging tape/ribbon or any marker, the transect will be marked at 10 m intervals. The tape will act as the center line of the transect, and all plants with dbh reading of 1 cm and above (≥ 1 cm) within 1 m perpendicular distance on either side of the center line (tape) will be recorded (Figure 7). A 1 m straight stick can be measured and cut to length to assist in measuring the 1 m distance on either side of the center line.

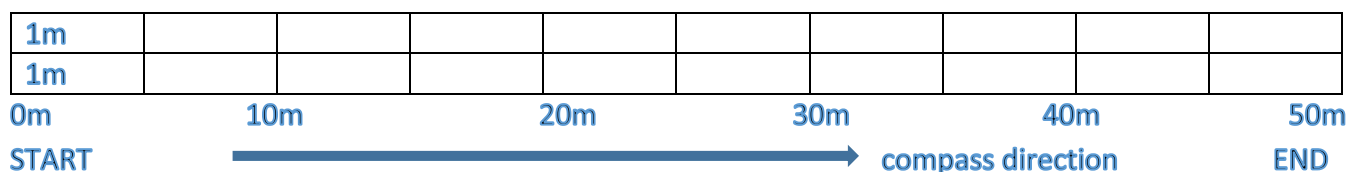


Figure 7. Gentry Transect layout.

7. A dbh reading will be taken at the breast height which is about ~ 1.3 m above the ground (Figure 8a). Trees with multi-stems will have the dbh of each stem measured separately (Figure 8b).

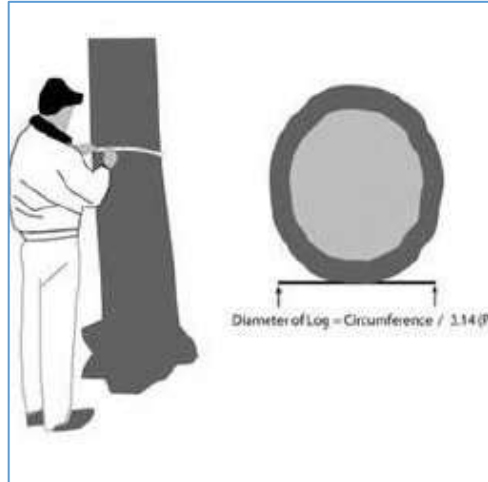


Figure 8a

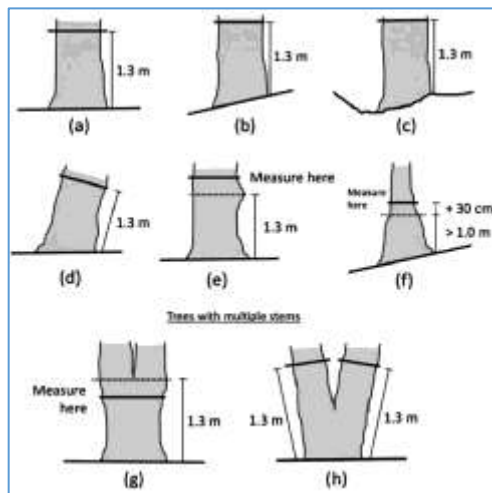


Figure 8b

8. In addition to the dbh measurement, the spotter will also estimate the height of the tree in meters. A 1 m stick can be used as a ruler/guide to assist in the height estimation. Two height readings will be estimated: a) Height 1: the bole or trunk height, which is the height from ground to the base of the crown or the first branch and b) Height 2: the crown height, from the first branch to the top of the tree (Figure 9).
9. For each tree that has a dbh ≥ 1 cm, the recorder will have to record in the record sheet the species (Tuvalu name), dbh, and the bole/trunk height and crown height. For each transect the recorder will also need to record the vegetation type(s) that the transect runs through. A record sheet sample is summarized below (Figure 10).

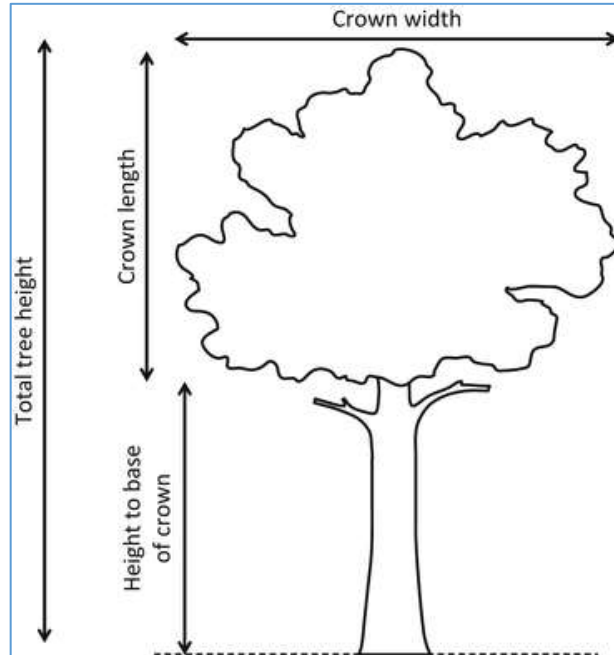


Figure 9. Two height measurements recorded: height to the base of crown and crown height.

VEGETATION SURVEY RECORD SHEET

Date	12-Apr-21	GPS Reading		
Island	Vaitupu	7°28'58.85"S		
Transect	4	178°40'36.38"E		
Vegetation	1	Compass	125°N	
Distance	Species	DBH (m)	H1(m)	H2(m)
0	Fou	21	10	2
	Fou	12	4	1
	Pua	14+4+6	3	3
	Futu	21+20	2	5
10m	Futu	12	2	3
	Futu	6	1	3
	Pua	8	4	4
20m	Niu	16	10	2
	Niu	12	8	1
	Niu	20	10	2
	Niu	14	8	2
	Niu	12	6	2
30m	Niu	10	6	2

Figure 10. A sample of a vegetation record sheet.

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10. A ruler (30 cm and 100 cm) can also be used to measure the diameter if there is no dbh tape. The dbh tape measures around the tree (Figure 11a) whereas the ruler just does a cross-section measure (Figure 11b) to measure diameter of tree/plant.
11. Basal Area (m^2) calculation – from the dbh measurement, you can calculate the basal area section for each tree. To calculate the basal area from the dbh, use this formula (McCarthy and Murillo 2014) :

$$BA = (\pi [(dbh)]^2) / 40000$$

Where: BA = basal area (m^2), $\pi = 3.14$, dbh = diameter at breast height (cm)

12. Volume (m^3) calculation – from the basal area, and estimated H1 (height to crown), you can do a calculation of the estimated merchantable volume of the tree using this simple formula by McCarthy and Murillo (2014):

$$V = 0.42 * BA * H1$$

Where: V = volume (m^3), BA = basal area, H1 = height of tree to the base of the crown. 0.42 is a constant used to take into account all the different trunk shapes e.g. cylindrical, parabolic, cone).



Figure 11a. Measuring diameter using a dbh tape.



Figure 11b. Measuring diameter using a ruler

REFERENCES

Gentry, A. H., 1982. Patterns of neotropical plant species diversity. *Evolutionary Biology*, pp. 1-84.

McCarthy, D. N. D. and Murillo, R. D.R., 2014. *The effects of tree spacing on DBH and Volume for a particular site with Douglas fir specie*. Waterford Institute of Technology, Waterford, Ireland. 28/November/2014.

Thaman, R. R. 2016. The flora of Tuvalu. *Atoll Research Bulletin* No. 611. 17 October 2016.

TERRESTRIAL FAUNA: VERTEBRATES

Terrestrial vertebrates refer to all land animals with backbones or vertebrate. In Tuvalu, land vertebrate animals would include birds, reptiles, and mammals. This section of the guide describes the methods to use for the vertebrate survey of the four Tuvalu R2R sites.

The aims are to review the checklist of vertebrate land fauna on each of the four islands – Niutao, Vaitupu, Funafuti and Nukulaelae; to gather quantitative data on vertebrate groups which can be used for monitoring in the future (especially the land birds and the endemic reptile species); and, to produce a checklist of introduced vertebrate species on each of the island groups. To achieve this, the team will have to survey each vertebrate group separately.

BIRDS

The bird fauna will be divided into three separate groups and surveyed separately: Sea birds, Shore birds and Land birds. A checklist of the birds recorded from Tuvalu in the ‘Tuvalu Marine Life Project (2009)’ report is summarized in Appendix 5. The report checklist will be used as the reference list during the survey along with Watling (2001) and Pratt *et al.* (1987). For the bird survey the team will need to use Binoculars (10 x 42 magnification preferably), GPS to record location of survey sites, field note books, field data sheets, pencil and a camera take field pictures.

SEA BIRDS

To carry out the survey of the sea birds, the following steps for each of the islands are recommended:

- i. Map sea bird colonies in each of the four island groups. This should be done using the GPS; record the location and name of site. However, due to time, access, and travel logistics the team might not be able to access all the sites. Under such circumstances, the team can gather information from the locals and mark the colony site on a map or satellite image.
- ii. Identify the different species of sea birds present in each colony using the Tuvaluan names and a pair of binoculars.
- iii. Using a pair of binoculars, estimate the population size of each species in a colony. The data can be entered in the sea-bird colony record sheet (Appendix 6) and a sample of the record sheet is shown in the figure overleaf.

On islands where sea birds are breeding and nesting, the team should carry out a nest count wherever possible. Using a 50 m tape, the searchers lay out a 50 m transect across the colony area, walk along the transect and record the species of sea birds and all the Apparently Occupied Nests (AON) found within 1m of either side of the transect. For any trees within the transect, the surveyors should identify

the trees species and count the number of AON on the tree that is visible from the ground. Watling (1998) has previously used this method on Funafuti. The record sheet is shown in Appendix 7.

SEA BIRD RECORD SHEET

Date	Island	Colony Name	X Coordinate E	Y Coordinate S	Species	Population estimate
14/04/2021	Funafuti	Fuagea 1	179°06'22.65"	8°30'26.68"	Katafa	23
			broadleaf forest		Kanapu (Brown)	100
					Kanapu (Red)	14
		Fuagea 2	179°06'22.12"	8°30'25.2"	Matapula	10
			rock outcrop		Kanapu (Red)	4

Figure 12. Sea bird colony record sheet sample.

SEA BIRD NEST COUNT DATA SHEET

Date	12/04/2021	GPS	179°06'22.65"E 8°30'26.68"S		
Island	Funafuti	Transect	1		
Colony	Fuagea	Notes	Picture ref 211		
Distance (m)	Substrate	Tree species	Sea-bird species	AON	Notes
5	Ground	na	Katafa	2	
11	Ground	na	Katafa	1	
15	Tree	Pukavai	Lakia	5	
18	Ground	na	Katafa	1	
23	Tree	Pukavai	Lakia	7	
36	Ground	na	Kanapu (red)	1	
Population Status (0 none 1 observed 2 many 3 majority)			Species 1 Katafa	Species 2 Lakia	Species 3 Kanapu (red)
Nest building - adults with building material in beak			0	2	1
Sitting adults - includes adjacent adults			1	3	1
Young visible - at any stage, nestling, fledgling			1	1	0
Empty nests			0	1	1
COMMENTS AND OTHER OBSERVATIONS					
Lakia most common sea bird, mostly roosting on trees species: Pukavai and Niu					

Figure 13. A sample of the sea bird nest count data sheet.

After the transect has been surveyed, a summary of the general overview of the population status of the colony can be made by carrying out a qualitative assessment (Appendix 7) of the nests. A sample of the data sheet is shown in Figure 13. An AON transect covers an area 100 m² (50 x 2 m), so the number of nesting birds per transect gives an estimation of the density per 100 m² area. This number can be used to calculate the density in one hectare (ha) of area (1 ha = 10 000 m²). Extrapolating the density is best done if enough transects are surveyed and the area of land occupied by the seabird colony is known.

SHORE BIRDS

To carry out the survey of the shore birds, the following steps for each of the islands are recommended:

1. The team will compile a checklist of shorebird species on each island group. The Tuvaluan names of the shore-bird species is listed in Appendix 5.
2. The main roosting or foraging areas on the island and the population count will be carried out during the high tide when these shore birds are more stationary.
3. Estimate the population of each species. To do this a good pair of binoculars is needed and a good vantage point from the beach/coast where the wading shore birds are clearly visible. Population censuses should be repeated at least one or two times and the average can then be calculated and recorded.
4. All the field data will be recorded in the provided record sheet (Appendix 8) and an example of a record sheet is summarised in Figure 14.

SHORE BIRD RECORD SHEET							
Date	Island	Site Name	X Coordinate E	Y Coordinate S	Species	Number	
14/04/2021	Funafuti	Fuagea West Beach	179°06'22.65"	8°30'26.68"	Tuli	10	
					Kolili	4	
		Fuages North Beach	179°06'22.12"	8°30'25.2"	Tuli	20	
					rock outcrop	Kolili	15
						Kilikilitai	2
		Tefala	179°06'22.12"	8°30'25.2"	Kilikiliati	6	
					Tuli	4	
					Kolili	1	

Figure 14. A sample of the shore-bird record data sheet.

LAND BIRDS

To carry out the survey of the land birds, the following steps for each of the islands are recommended:

1. A checklist of the land birds present will be compiled for each of the four islands, using the Tuvaluan names in Appendix 5.
2. Carry out a quantitative survey using the VCP (Variable Circular Plot) count method to have an idea of the density of land birds on each of the island groups. For this method, a minimum of two people is needed to carry out the survey – a recorder and a spotter. The spotter will call out the bird species, the estimated distance in meters from him/her to the bird, and whether he saw it or heard it or both (saw and heard it). You can read more about the VCP method from Reynolds *et al.* (1980) and Skirvin (1981).
3. Upon selecting a survey point, the GPS reading, and vegetation type will be recorded before bird count begins. The bird counts will be timed at 5-minute count session per point/station. All the birds heard and seen during the 5 minutes will be recorded and their distance will be estimated. The bird counts will be recorded in the provided record sheet (Appendix 9). A sample of the record sheet is shown below (Figure 15).

LAND BIRD RECORD SHEET

Date	Island	Veg	Point ID	Time	X Coordinate	Y Coordinate	Species	dist (m)	h/s	No.
12/04/2021	Funafuti	1	F1	7.00am	179°06'22.65"E	8°30'26.68"S	Lupe	5	h+s	2
		1	F1				Lupe	20	h	1
		1	F1				Lupe	35	h	3
		1	F1				Lupe	3	s	1
		3	F2	7.20am	179°06'23.15"E	8°30'27.32"S	Pisini	15	h	1
		3	F2				Manukiki	10	s	1
		3	F2				Manukiki	20	h+s	2

Figure 15. A sample of the land bird record sheet.

4. The target is to survey at least 10 - 15 survey points per island group representing the different vegetation types, Each point/site should be separated by a distance of 150 – 200 m to avoid counting/recording the same bird twice.
5. The survey should be conducted in the early morning (7am to 10am) and/or late afternoon (3pm-5pm).
6. Bird density calculation – the land bird survey data can be used to calculate the density of a species of interest using the following these steps:

Step1: The circular plot is divided into 10 m concentric circular bands with their different area coverage. For instance, if you keep your survey to a 50 m radius, then you will have five concentric bands with increasing area (see overleaf).

Band	Radius(m)	Area (m ²)
1	0 to 10	314
2	10 to 20	943
3	20 to 30	1570
4	30 to 40	2200
5	40 to 50	2827

For example, if the data summarised in the table below is collected:

Station	Species	Distance (m)
1	Lupe	5
2	Lupe	12
2	Lupe	40
2	Lupe	25
3	Lupe	7
3	Lupe	14

Step 2: List the number of birds in each concentric band:

- Band 1 – 2 birds
- Band 2 – 2 birds
- Band 3 – 1 bird
- Band 4 – 1 bird

Step 3: Calculate the density for each concentric band:

- 0-10m = 2 birds/ 314 m²
- 0-20m = 2 birds/943 m²
- 20-30m = 1 bird/1570 m²
- 30-40m = 1 bird/2200 m²

Step 4: Sum the number of birds and area of each concentric band:

$$= 2/314 + 2/943 + 1/1570 + 1/ 2200 = 6 \text{ birds/ } 5026 \text{ m}^2 = 0.001194 \text{ birds/ m}^2$$

Step 5: Convert birds/ m² to birds/ ha (10 000 m² = 1 ha):

$$= 0.001194 \times 10\ 000 = 12 \text{ birds/ ha}$$

Step 6: Divide the density estimate by the number of stations surveyed:

$$= 12/ 3 \text{ stations}$$

$$= 4 \text{ birds/ ha}$$

REPTILES

Lizards (skinks and geckoes) are often locally abundant in the Pacific Islands. On some small islands, reptiles are the largest vertebrates, aside from the avifauna. The largest representatives of the terrestrial reptiles are snakes and iguanids, of which the latter group – the iguanids, are not reported as occurring in Tuvalu. In the central Pacific and outwards to the Eastern Pacific, there are few taxa of terrestrial snakes and the most common is the Pacific boa, a harmless constrictor of moderate size.



Figure 16. Examples of reptile species that are generally common in the Pacific region. A. the Pacific boa (*Candoia bibroni*); B. the Oceanic gecko (*Gehyra oceanica*); and C. the Blue tailed copper striped skink (*Eomoia impar*). All images courtesy of the Reptile Database (<https://reptile-database.reptarium.cz/>).

Reptiles therefore represent an important taxon for vertebrate sampling, particularly on low lying coralline islands/ islets/ atolls in the Pacific. Cryptic variation and genetic diversity in many of the large common genera, such as *Eomoia* and *Lepidodactylus* has become better understood in recent years (Zug, 2013). As a result of minute differences, the larger genera are becoming increasingly split into more species and sub-species.

The following method is recommended for surveying diurnal reptiles and is best performed during the morning sun-basking hours (10am to 12pm), when lizards sit out in the open to warm up with the sun's energy.

1. Lay out a unidirectional non-linear belt transect of 2 m x 50 m (Figure 17) using a tape measure and brightly coloured ribbons to mark intervals of five (5) m along the transect.
2. After a brief period of rest to allow the animals to return to normal activity (after the human disturbance), follow the ribbons searching for reptiles within one (1) m on either side of the transect. A stick cut to the length of one (1) m could be used to provide a visual reminder of the distance from the transect required to search within. Look for lizards and snakes in the vegetation, on the ground surface and/or up on rocks/ boulders.
3. A checklist of the reptiles present has been compiled and is provided in Appendix 5. Wherever possible, any species observed should be checked off the list as present and an estimate of prevalence be made (rare, common, abundant).

4. Enter in counts of occurrence into the provided datasheet (Figure 18; Appendix 10) on the transect surveys will produce a baseline species inventory and estimates of abundance for each species observed.

The following method is recommended for surveying nocturnal reptiles and is best performed during the early hours of the night after sunset (6pm to 8pm):

1. During the diurnal surveys identify and select potential sites for the nocturnal surveys. The marked transect for diurnal surveys can be used where possible. Otherwise opportunistically searching within the vicinity of human habitation will yield records of common species that inhabit disturbed habitats. To record species that prefer undisturbed habitat, search further away from human habitation, in more primary sites (such as forested areas).
2. Quietly search within the pre-selected area for nocturnal lizards (geckos) using a strong torch (such as a diving torch) to highlight the eye shine of the lizards. Target fruiting trees and plants as these perch sites are often favoured by geckos that feed on the fruit (e.g. bananas or plaintain) or on the flying insects that are attracted to the fruit and flowers (such as moths) of such plants.
3. A checklist and identification chart of the terrestrial reptiles previously reported as occurring in Tuvalu is provided in Appendix 5. Wherever possible, any species observed should be checked off the list as present and an estimate of prevalence be made (rare, common, abundant).
4. Enter in counts of occurrence into the provided datasheet (Figure 18; Appendix 10) on the transect surveys will produce a baseline species inventory and estimates of abundance for each species observed.

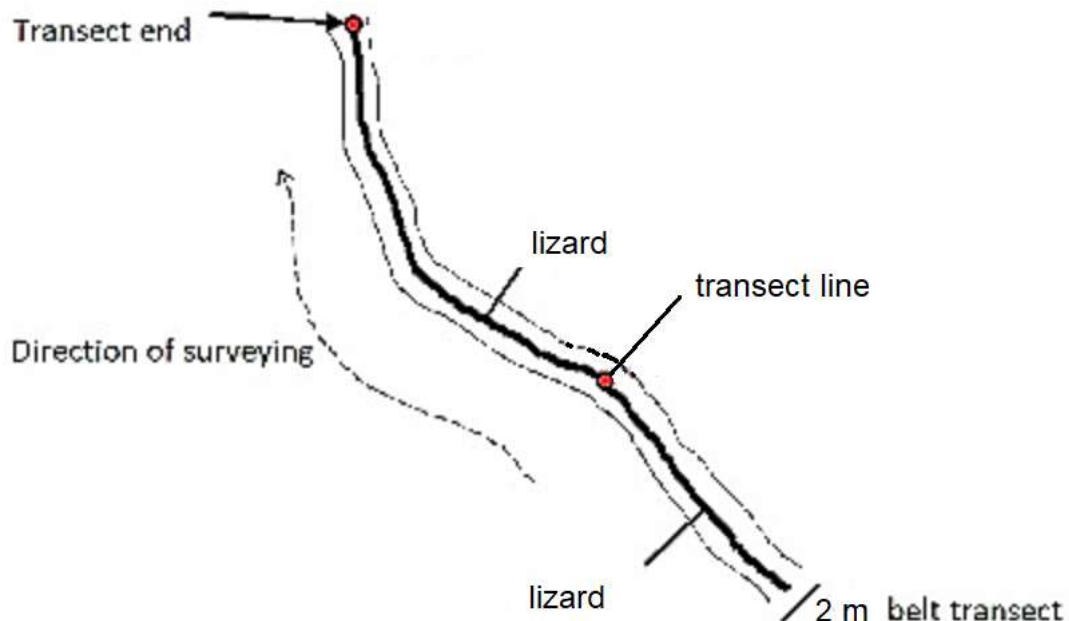


Figure 17. Schematic diagram of a unidirectional non-linear belt transect.

There are other methods for surveying reptiles, however, these methods require the use of special sampling equipment (such as sticky traps and hip tape measures), costly reagents (such as the ethanol in pitfall traps), and skill borne from experience (such as distance sampling). The recommended method described above is simple and requires little to no specialized equipment, making it ideal for the BioRAP approach.

REPTILE DATASHEET

Island: <u>Funafuti</u>		Site: <u>Fogafale</u>	
Date: <u>16-04-21</u>		Transect ID: <u>FA1</u>	
Search team members: <u>xxx</u>			
DISTANCE FROM (0 m)	SPECIES CODE	HEIGHT ABOVE GROUND (cm)	PERCH SITE
0.5	Crpo	0	Rocks near stream
1	Emim	25	Small shrub near stream
1.5	Lino	300	Tree trunk
5	Emim	0	Ground
9.5	Lino	160	Banana tree trunk
CODE	COMMON NAME	SPECIES	TOTAL COUNT ALONG TRANSECT
<i>Rhma</i>	Cane Toad	<i>Rhinella marina</i>	
<i>Crex</i>	Pygmy Snake-eyed Skink	<i>Cryptoblepharus eximius</i>	0
<i>Lino</i>	Pacific Moth Skink	<i>Lipinia noctua</i>	2
<i>Crpo</i>	Oceania Snake-eye Skink	<i>Cryptoblepharus poecilopleurus</i>	1
<i>Emoads</i>	Striped Small-scaled Skink	<i>Emoia adspersa</i>	
<i>Emoimp</i>	Dark-bellied Copper-striped Skink	<i>Emoia impar</i>	2
<i>Emocya</i>	White-bellied Copper-triped Skink	<i>Emoia cyanura</i>	
<i>Gehoce</i>	Oceanic Gecko	<i>Gehyra oceanica</i>	
<i>Leplug</i>	Mourning Gecko	<i>Lepidodactylus lugubris</i>	
<i>Leptep</i>	Tuvaluan Forest Gecko	<i>Lepidodactylus tepukapili</i>	
<i>Nacpel</i>	Pacific Slender-roed Gecko	<i>Nactus pelagicus</i>	

Figure 18. A sample of the reptile datasheet

The data collected can be analysed in the same way as for birds – using the total or average number of a species encountered over the transects surveyed. For example, if an average of five lizards are encountered per transect on an island then the density of that lizard is five per 100 m² or 0.05 per m². To determine density per hectare (a better measure of area for small islands than square kilometre) multiply the number per square metre by 10,000. For this example, 0.05 x 10,000 = 500 lizards per hectare (ha).

MAMMALS

The main objective will be to compile a checklist of mammal species present on each of the four islands in the Tuvalu archipelago. Special focus will be on the introduced rodents/rats. There are no native land mammals in Tuvalu. All the different land mammal species present on the different islands have been introduced. A checklist of the land-mammals species present is listed in Appendix 5. The different rat species can be identified using the rodent guide by Cunningham and Moore (1996) which is attached to this guide.

A checklist of all the introduced mammals present on each of the four islands will be compiled during the surveys. The survey should be carried out qualitatively in an opportunistic manner based on both observation and information gathered from the local people.



Figure 19. Dorsal identification guide for the four common Pacific Island rodents; from left; *Rattus norvegicus*, *R. rattus*, *R. exulans* and *Mus musculus*. Source: NCPA, (2014).

However, for the introduced rodents, rodent/rat traps will be used to identify species present and produce baseline prevalence estimates. A total of 10 – 20 rat traps should be set along a uni-directional transect at least 20 m apart, preferably in broadleaf and coconut vegetation types. Houses, villages, coastal areas should be avoided because pets or domesticated animals and hermit crabs can trigger the traps, affecting the results. Wherever possible use roasted coconut as the bait as it is a low cost option. The traps should be baited and set just before sunset and checked early the next morning. Each trap should be secured using a string tied to a stem, root or branch to avoid it being moved by trapped

rodent or other animals. Results should be recorded, and rats identified following the method Cunningham and Moore (1996). It is important to confirm the identification of the rat species (see Figure 16), and good photographic images may be very useful where identification in the field is difficult. Wherever possible, rattraps are to be placed above the ground.

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TERRESTRIAL FAUNA SURVEY: INVERTEBRATES

Terrestrial invertebrate fauna includes all animals that do not have a backbone. In Tuvalu, terrestrial invertebrate animals would mainly include insects and other arthropods. This section of the guide describes recommended sampling methods for invertebrate surveys of the four Tuvalu R2R sites.

The aims are to produce a baseline checklist of native and/or endemic terrestrial invertebrate fauna on each of the four islands – Niutao, Vaitupu, Funafuti and Nukulaelae; and, to produce a baseline checklist of introduced invertebrate species on each of the islands.

INSECTS

There are many techniques that can be followed or employed to target specific insect groups and most of these require technical expertise, skill and experience, and/or special equipment. The recommended methods that will be used for the survey of invertebrates on the four islands:

1. ACTIVE SEARCH/ SWEEP NETTING

Butterflies, ants, dragonflies, grasshoppers, and beetles can be sampled actively in open grassland using handheld nets and sweep netting through the vegetation/ grassland. Active searches are usually timed within 1 or 2 hours and it is important that the number of people doing the search must be recorded. Equipment like sweep nets or butterfly nets are used for this method (Figure 20). For each island, searches can be conducted for one hour in the morning and one hour in the late afternoon.



Figure 20. A team of two entomologist prepare their sweep nets for a butterfly survey.

2. OPPORTUNISTIC SURVEYS

Opportunistic surveys of insects should be carried on each island for approximately one hour each day and during the evening whilst present on an island. These surveys require searchers to observe any insects present from a short distance away, whilst remaining quiet and motionless. Opportunistic surveys can be conducted whilst tracking through the different habitats (vegetation types). The main

targets are easily identifiable groups such the beetles, butterflies and moths, stick insects, and dragonflies and grasshoppers. Wherever possible a list of any insect taxa (groups) should be recorded, along with habitat information and prevalence estimates (categories of rare, common, abundant).

A good camera would be useful to capture as many invertebrate pictures as possible while in the field. The pictures can be used to identify species or taxa groups that cannot be identified in the field. The invertebrate surveys should prioritise less disturbed habitats like the ‘Broadleaf forest and Littoral forest’; disturbed habitats need only be surveyed if there is enough time to do so. Available invertebrate guidebooks for the identification of insect groups like the “Butterfly guide for the South Pacific” by Patrick and Patrick (2012), could be consulted if available locally.

FRESHWATER INVERTEBRATES

On three of the four islands targeted in the BioRAP, there are the distinctive and threatened habitats – the anchialine pools in the interior of each island. These freshwater ecosystems are composed of brackish groundwater connected to the ocean through porous bedrock on the floor of the pool. These pools support unique endemic biota. In particular and of considerable note is the anchialine shrimp, *Calliasmata pholidota* (Figure 21), which has been recorded in only four localities (Egypt, Hawaii, Tuvalu and Japan; Anker 2014).



Figure 21. *Calliasmata pholidota* female from Japan (Source: Anker, 2014)

It is a point of interest that an attempt to survey fauna in these pools, be made during the BioRAP. A future outcome of predicted sea level rise (SLR) will be the eventual loss or degradation of coastal anchialine pool habitats, particularly on low-lying coral atolls (Marrack *et al.*, 2021). It is therefore imperative that baseline species checklists be developed during the BioRAP. As species identifications

of invertebrates from these habitats may be difficult in the field, photographic records will be very important for later identification. The recommended methodology is similar to the underwater visual census (UVC) for marine habitats. Given that visibility would be a major issue in recording occurrence, it is recommended that belt transects (20 m x 2 m) be conducted from the pools edge angling towards the centre of the pool. If possible, a total of three belt transects would provide sufficient data to develop a baseline checklist of the invertebrate taxa found in these pools. Small nets can be used to sample from the floor and water column of the freshwater pool.

Records or observations of freshwater flora should also be made during these surveys. A particular focus could be made on the types of macroalgae that inhabit the surface of the ponds, and/or freshwater floating plants.

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MARINE SURVEYS

The marine surveys will target marine benthic communities and fish populations in the coral reef (coastal foreshore habitats). This section of the guide describes recommended sampling methods for marine surveys of the four Tuvalu R2R sites.

The aims are to produce a baseline checklist of native and/or endemic marine fauna and flora on each of the four islands – Niutao, Vaitupu, Funafuti and Nukulaelae. In addition, the recommended methods will also provide information on the marine benthic habitat structure and health.

There are many techniques that could provide baseline species inventories and habitat information for marine habitats and some techniques are specific to certain habitats. However trade-offs are made in the quality of data collected and the resource needs of the method (summarized in Table 1 below). For the purposes of a BioRAP, which focuses largely on the nearshore habitats (coastal lagoon) the choice of which method is obviously non-capture. In addition, three major marine habitats are targeted in the BioRAP as a result of sampling limitations: namely the coastal lagoon, coral reef flat, and seagrass beds.

Table 1. Marine sampling methods used in biodiversity and stock assessments.

Sampling techniques	Quality of data				Needs	
	Comprehensiveness	Accuracy	Coverage	Bias linked to life cycle	Staff training	Costs
Capture	Low*	Low to moderate	High	Yes	Low	Low
Mixed (combined)	Low	Moderate	Moderate	Yes	High	High
Non-capture	High	High	Low	No	High	Moderate

* except for explosives and poisons

Source: Labrosse *et al.*, 2002.

For the coastal lagoon and coral reef flat, the recommended method to use in a BioRAP is the Underwater Visual Census (UVC). Seagrass monitoring around the Pacific is based on the common method of line transects with quadrat sampling. Both methods are fairly simple and require minimal and non-costly equipment.

UNDERWATER VISUAL CENSUS (UVC) SURVEYS

Underwater visual census methods are based on visual counts of organisms, usually conducted whilst snorkeling in clear, calm and shallow water (generally between the surface and a depth of 20 m) (Labrosse *et al.*, 2002). Advantages of the method include replicability, low cost, and data quality.

The following procedure is one of the two most common UVC approaches, and can generate both quantitative and qualitative information:

1. Identify and select potential sites for the UVC surveys based on habitats present in the coastal lagoon. For representation it is best that a UVC is replicated three times at each coastal site selected. If time is a limiting factor, then select one site with representative biodiverse habitat along the windward coast, and similarly one site along the leeward coast. The leeward coast is often the prograding coastline (extending) and the windward side is the retrograding coastline (eroding).
2. A UVC requires a team of three participants. The first participant snorkels out towards the reef crest rolling out the plastic tape measure. A UVC is essentially a belt transect of 2 x 50 m dimensions (Figure 22). The tape measure acts as the reference middle line and enables records of occurrence by distance (from the start). As the first searcher, he/she will report all of the fish species on the datasheet, noting taxa presence and prevalence (through a tally of occurrence) within a 10 m segment. The second participant records the occurrences on the datasheet as they are called out by the first participant. The third participant follows the first, snorkeling and reporting on the benthic habitat (substrate cover) and providing additional records of sedentary/ sessile organisms. Every effort must be made not to count an organism twice.
3. Use of the provided datasheets (Appendix 11) in the UVC surveys will produce a baseline species inventory and estimates of abundance for each species observed within generic size/age classes. In addition, the data on substrate cover will produce valuable information on the health of coastal lagoon, as the habitat supporting the recorded species.
4. Equipment required for the UVC are: snorkeling gear, clipboard, pencils, waterproof datasheets, and 50 m measuring tape.

An important issue for consideration is the level of taxonomic identification possible. If it is possible for organisms to be identified to species level that would be ideal, however the datasheet provided lists families or guilds. For the vertebrates (fish and sharks), the major groups of interest are the wrasses (as algal grazers), the parrotfish (as corallivores), the butterfly fish (also corallivores), and sharks. These taxa are often focused on in time-limited surveys as they are keystone species. In addition, butterfly fish are an attractive iconic group, whose diversity signifies the health of the coral reef system (Hourigan *et al.*, 1988) and whose visual appeal benefits marine tourism.

For the invertebrates, the molluscs and echinoderms are obvious choices as indicators, as sea urchins are important generators of coralline sediment (due to their bio-eroding capabilities) in a coastal lagoon. The presence/ prevalence of the Crown of thorns starfish (*Acanthaster planci*, COTS; Figure 23a) is another example, as COTS outbreaks have been linked to coral dieback and reef destabilization elsewhere in the tropical Pacific (CABI, 2021). Other marine invasives of interest are the Zebra mussel (*Dreissena polymorpha*; Figure 23b) and the European green crab (*Carcinus maenus*; Figure 23c).

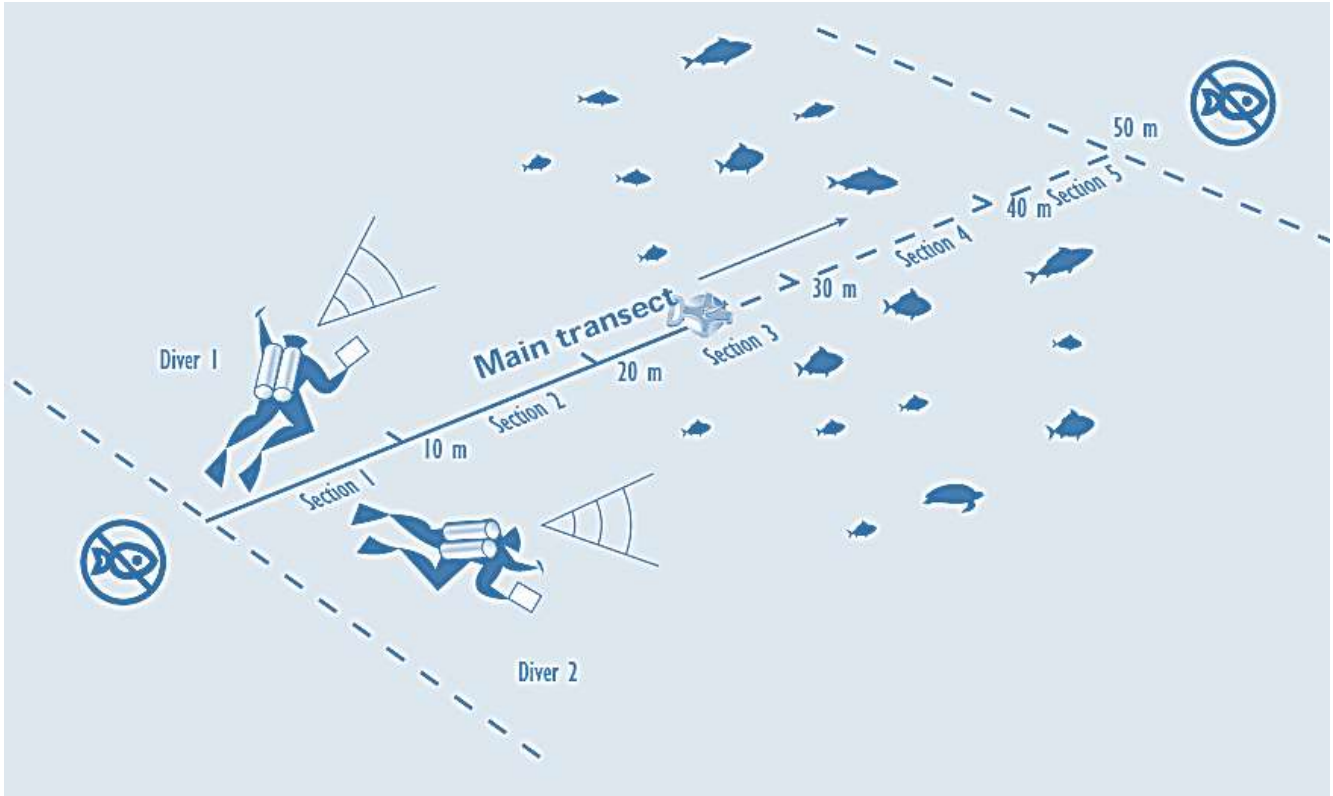


Figure 22. Diagrammatic representation of a UVC along a 2 x 50 m belt transect (Source: Labrosse et al., 2002).



Figure 23. Invasive marine species to look out for during marine surveys. A. Crown of thorns starfish (*Acanthaster planci*); B. Zebra mussels (*Dreissena polymorpha*); and, C. the European green crab (*Carcinus maenus*). Source: Smithsonian Institute (2021).

Addition information can be gleaned from artisanal market surveys on inhabited islands. Species sold at these markets, that are caught locally, can be identified using fisheries guides. In addition, anecdotal records from local fishermen can be used to generate information on species that are rarely encountered during a UVC but may occur in the coastal lagoon and in the open ocean adjacent to an island. These records will be useful for monitoring fisheries of socio-economic importance.

The benthic substrate data (Appendix 11d) is analysed using proportional (%) coverage as there are 100 substratum records per UVC transect. The proportional coverage can then be visualized using pie charts or bar graphs. Proportional coverage values can also be analyzed using standard ANOVA tests to compare between leeward and windward sites, non-protected vs MPA sites, sites, islands, etc. Statistical tests are best used where the survey effort is greater than the minimal replication level, i.e. there is a large enough dataset for parametric tests.

Species data can be analyzed to identify patterns in abundance and distribution, as well as community patterns (i.e. assemblage similarity, diversity and dominance). Species richness is simply the number of species in a sample. Species diversity can be measured using the Shannon-Weiner Index (see insert below for formula), and community dominance can be assessed using the simple Berger-Parker Index. These values are standard measures to describe the diversity of any biological community.

SHANNON-WEINER INDEX

$$H' = \left| \sum p(i) * \ln[p(i)] \right|$$

Where:

p(i) proportional abundance of each taxa collected in sample
 # individuals for any species / total # of individuals recorded for all taxa)

ln[p(i)] natural logarithm of p(i)

∑ sum of

| | absolute value of

Example:

For a simple community of three species, the following counts are made –

Species	Count (#)	p(i)	ln[p(i)]	p(i)* ln[p(i)]
A	12	12/93 = 0.308	ln(0.308) = -1.179	0.308* -1.179 = -0.363
B	6	6/93 = 0.154	ln(0.154) = -1.872	0.154* -1.872 = -0.288
C	21	21/93 = 0.538	ln(0.538) = -0.619	0.538* -0.619 = -0.333
Total	39			-0.984

Therefore $H' = |-0.984| \rightarrow 0.984$

General range for H' is 1.5-3.5 so values above or below indicate low or high biodiversity

To describe abundance and distribution, a common approach is to calculate density of a species in a given area. Count data recorded in a UVC can be analyzed using the total or average number of a species encountered over the transects surveyed. For example, if an average of 120 fish of a particular taxa (group) are encountered per UVC transect on a particular island, then the density of that fish for

that island is 120 per 100 m² (UVC area) or 1.2 fish per m². To determine density per hectare (a better measure of area for small islands than square kilometre) simply multiply the number per square metre by 10,000. For this example, 1.2 x 10,000 = 12,000 fish per hectare (ha).

SEAGRASS BED SURVEYS

The health and diversity of seagrass beds are vital for maintaining sea turtle feeding grounds and blue carbon storage, amongst many other ecosystem functions. Seagrass monitoring at many locations throughout the Pacific has been ongoing for decades since the inception of the Seagrass-Watch global seagrass observing network (in 1998). The network was established with the major aim of monitoring nearshore seagrass ecosystems, which provide an early warning signal of major coastal environment changes (Seagrass-Watch, 2021).

Seagrasses can be found in a variety of coastal habitats, typically occurring in shallow, sheltered, soft-bottomed coastal flats and estuaries. Seagrass beds or meadows may be monospecific or may consist of multispecies communities, sometimes with a good number of species present within one meadow (*ibid.*). Seagrass community surveys are simple scientific procedures that can be incorporated into a BioRAP framework due to the scale of the surveys and time required to complete the transects.

The following is a step-by-step description of the standard procedure used by Seagrass-Watch:

1. Identify and select potential sites for the seagrass meadow surveys, wherever this marine habitat occurs along the shoreline of an island.
2. A 50cm x 50 cm quadrat (Figure 25) can be made fairly cheaply before the surveys using PVC piping and PVC elbow joints glued together with PVC glue. The PVC piping once constructed should then have small holes drilled in to allow the pipes to fill with water so that the quadrat does not float in a tidal pool. A grid can be made by adding nylon rope grid lines (Figure 25) if enough preparation time permits and the materials are readily available.
3. Using a 50 m tape measure, set out a transect from the low tide line into the seagrass bed in the direction of the reef crest. This is best done the hour before low tide and will target shallow tidal pools, which contain stands of seagrass species.
4. It is important to stay on the right-hand side of the tape measure whilst moving around, as much as possible until a quadrat is surveyed.
5. Take a GPS reading at the start of the transect (and one at the end of the 50 m transect).
6. Place the bottom left-hand corner of the quadrat against the transect, with the corner at the first sampling interval (0 m; Figure 24). Estimate the following by eye: overall % seagrass coverage in the entire quadrat, % seagrass species coverage (separately for each species

present), % algal coverage present in the quadrat, % coverage of epiphytic algae on the seagrass plants, and canopy height (in cm) of the seagrass bed (measured using a standard ruler).



Figure 24. A seagrass bed survey along the Gold Coast, Australia. The quadrat in use is made from cheap PVC materials and is easy to transport. Source: SeagrassWatch (2021)



Figure 25. Plastic PVC piping quadrat with grid cells. Source: SeagrassWatch (2021)

7. After recording the data in the provided datasheet (Appendix 12), move forward along the transect placing the quadrat again using the bottom right corner as a reference point, at the next sampling interval (sampling is conducted at 5 m intervals to yield 10 samples per transect).
8. A minimum of three transects spread out across the tidal flat should provide sufficient data for assessing the status of the seagrass meadow (Figure 26).

9. Equipment and materials required: PVC piping and glue to make quadrat (nylon rope is optional), 50 m tape measure, clipboard, datasheets, pencils.

Seagrass identification can be made using the Seagrass-Watch identification tools available on their website: <https://www.seagrasswatch.org/idseagrass/>. There can be up to 15 species present in a seagrass bed in more biodiverse locations, however not all species are locally present.

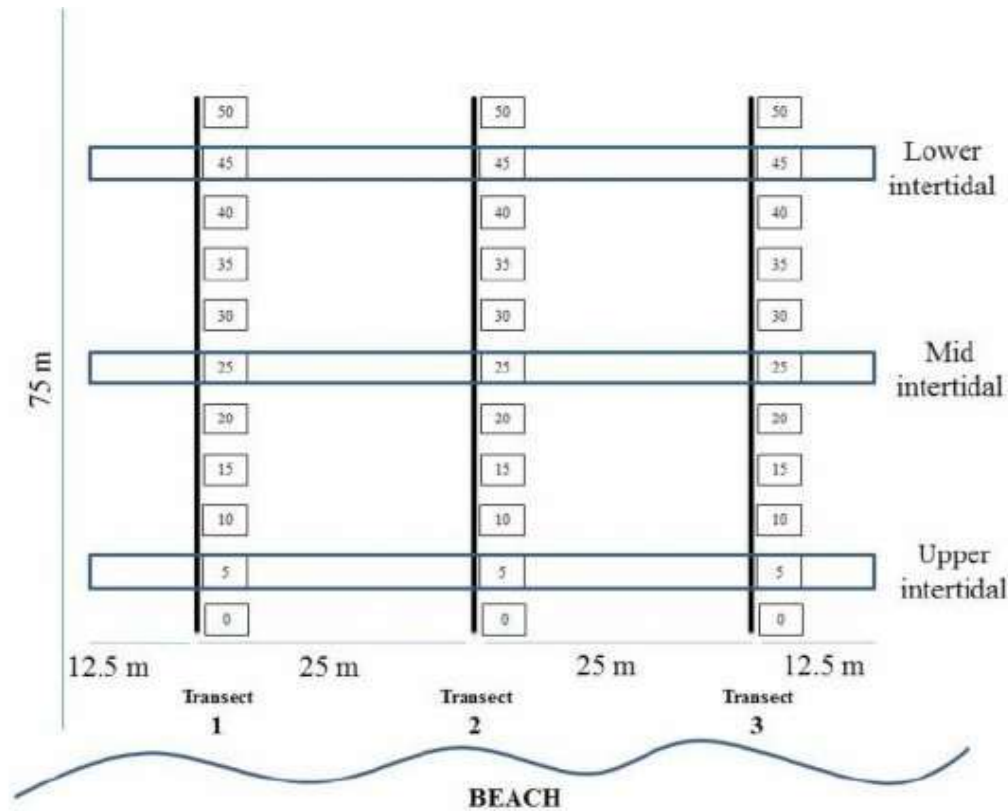


Figure 26. The layout of the three transects with quadrats for sampling a seagrass bed (Source: Aye *et al.* 2014).

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APPENDICES

Appendix 1: Thaman (2016) checklist of Tuvalu plants

(This checklist has been directly extracted from: 'Thaman,R.R. 2016. The flora of Tuvalu. Atoll Research Bulletin No. 611. 17 October 2016'. The main intention of creating this checklist is to be used by the Flora and Vegetation survey team for the 2021 Tuvalu R2R BioRAP Project).

PTERIDOPHYTA

(FERNS AND FERN ALLIES)

ASPLENIACEAE (SPLEENWORT FERN FAMILY)

Asplenium nidus L.

Common Name: bird's-nest fern

Tuvaluan Names: *katafa*, *laukatafa* (Ff, Nm; Tvd); *lailū* (name of the young leaves when cooked as a spinach) (Ff, Nm; Tvd); *laukatapa?* (Nui; Woodroffe 1991)

Status: Indigenous. Paleotropical.

AZOLLACEAE (WATER FERN FAMILY)

Azolla pinnata R. Br.

Common Names: ferny azolla, feathered waterfern

NEPHROLEPIDACEAE (SWORD FERN FAMILY)

Nephrolepis acutifolia (Desv.) Christ

Common Names: sword fern, fishtail fern

Tuvaluan Name: *sulufe* (Ff; Tvd); *hulufe*, *paka* (plant), *laukimoa* (fronds) (Nm; Tvd)

Nephrolepis exaltata(L.) Schott

Common Name: Boston fern

Nephrolepis hirsutula (Forst. f.) Presl

Common Names: sword fern, fishtail fern

Tuvaluan Names: *sulufe* (Ff; Tvd); *mutie?* (Nt)

POLYPODIACEAE (COMMON FERN FAMILY OR POLYPODY FERN FAMILY)

Microsorium grossum (Langsd. and Fisch.) S.B. Andrews

Common Names: scented fern, lawai fern

Tuvaluan Name: *maile* (Ff, Nm, Nt; Tvd)

PSILOACEAE (PSILOTUM FAMILY)

Psilotum nudum (L.) Beauv.

Common Names: psilotum, reed fern, wehisk fern

Tuvaluan Names: *sai* (Ff); *pōatua* (Nt); *silotau* (Seluka 1997); *fulukimoa* (Maiden 1904)

PTERIDACEAE (BRACKEN OR BRAKE FERN FAMILY)

Pteris tripartita Sw.

Common Names: lacy fern, giant bracken fern, sword brake

Tuvaluan Names: *laukisikisi* (Vt); *lautolo* (Seluka 1997); *lakau sauga?* (Maiden 1904)

THELYPTERIDACEAE (MARSH FERN FAMILY)

Sphaerostephanos invisus (Forst. F.) Holtt.

Tuvaluan Names: *sulufe* (Ff)

GYMNOSPERMAE

ARAUCARIACEAE (ARAUCARIA FAMILY)

Araucaria columnaris J.R. Forst.

Common Names: Cook pine, Cook araucaria, New Caledonia pine

Tuvaluan Name: *lakau Kilisimasi* ("Christmas tree"); *paina* ("pine tree"; Tvd)

CYCADACEAE (CYCAD FAMILY)

Cycas rumphii Miq.

Common Names: cycad, sago palm, king sago

Tuvaluan Name: *laupama* ("palm leaf"; Ff, Nm)

ANGIOSPERMAE

MONOCOTYLEDONAE

AGAVACEAE (AGAVE FAMILY)

Aloe vera (L.) Burm. f.

Common Name: aloe vera

Tuvaluan Name: *alovela* (Ff)

Cordyline fruticosa (L.) A Chev.

Common Names: cordyline, ti-plant

Tuvaluan Names: *ti* (Ff, Nm); *lauti* (Ff)

Dracaena angustifolia Roxburg

Common Name: narrow-leaved dracaena

Tuvaluan Name: *launiu*

Dracaena fragrans (L.) Ker-Gawl.

Common Names: dracaena, dragon flower, pleomele

Dracaena sanderiana Sander ex Mast.

Common Names: ribbon dracaena, ribbon plant, lucky bamboo, Belgian evergreen

Tuvaluan Name: *talasina kena* (Seluka 1997)

Sansevieria trifasciata Prain

Common Names: bowstring hemp, mother-in-law's tongue

Tuvaluan Name: *tapua lau makaikai* (Seluka 1997)

ALLIACEAE (ONION FAMILY)

Allium fistulosum L.

Common Names: green onion, spring onion, Welsh onion, Japanese bunching onion

Tuvaluan Name: *aniani* (Ff; Tvd)

Allium sativum L.

Common Name: garlic

Allium schoenoprasum L.

Common Name: chives

Allium tuberosum Rottler ex. Sprengle

Common Name: Chinese chives

AMARYLLIDACEAE (AMARYLLIS LILY FAMILY)

Crinum asiaticum L.

Common Names: false spider lily, crinum lily, grand crinum

Tuvaluan Names: *tapua* (Ff; TvD); *talotalo* (Nm, Nt; TvD)

Crinum augustum Roxb.

Common Names: crinum lily, Queen Emma lily

Tuvaluan Names: *tapua* (Ff; TvD); *talotalo* (Nm; TvD)

Crinum xanthophyllum Hannibal

Common Name: yellow crinum lily

Tuvaluan Names: *tapua palagi* (Ff); *talotalo palagi* (Nm)

Crinum zeylanicum L.

Common Name: milk-and-wine lily

Tuvaluan Names: *tapua* (Ff; TvD); *talotalo* (Nm; TvD)

Hippeastrum puniceum (Lam.) Urban

Common Names: Barbados lily, amaryllis

Tuvaluan Names: *lili* (Ff, Nm; TvD)

Hymenocallis pedalis (Jacq.) Herbert

Common Name: spider lily

Tuvaluan Name: *lili* (Ff, Nm; TvD)

Proiphys amboinensis (L.) Herbert

Common Names: Amazon lily, Brisbane lily, Cardwell lily

Status: Recent introduction. Malaysia and northern Australia.

Zephyranthes rosea (Lindl.) Green

Common Names: pink lady, pink star of Bethlehem, pink zephyr flower, rain lily

Tuvaluan Name: *sūsana* (Ff, Nm; TvD)

ARACEAE (ARUM OR TARO FAMILY)

Aglaonema commutatum Schott

Common Names: Chinese evergreen, aglaonema

Alocasia macrorrhizos (L.) G. Don

Common Names: giant taro, elephant ears

Tuvaluan Names: *tāmū* (Ff; TvD); *kape* (Nm, Nt)

Alocasia sanderiana Bull. x "Amazonica"

Common Names: alocasia, kris plant

Tuvaluan Name: *taliga lasi* (Seluka 1997)

Caladium bicolor (Ait.) Vent.

Common Names: artist's pallet, caladium

Tuvaluan Names: *talo palagi* (Ff; TvD?); *taliga kula* ("red ears"; Seluka 1997)

Colocasia esculenta L.

Common Names: taro

Tuvaluan Names: *talo* (Ff, Nm, Nt; TvD)

Cyrtosperma chamissonis (Schott) Merr.

Common Names: giant swamp taro

Tuvaluan Names: *pulaka* (Ff, Nm; TvD)

Dieffenbachia maculata (Lodd.) Bunt.

Common Name: spotted dumb cane

Epipremnum pinnatum (L.) Engler

Common Names: taro vine, pothos, pothos aureus

Tuvaluan Names: *tuuteu*, *tūteu* (Seluka 1997)

Philodendron sp.

Common Name: philodendron

Status: Recent introduction. Tropical America.

Philodendron scandens C. Koch & Sellow ssp. *oxicardium* (Schott) Bunt.

Common Name: philodendron

Spathiphyllum cv. *Clevelandii*

Common Names: spathiphyllum, white sails

Syngonium podophyllum Schott

Common Names: arrowhead vine, syngonium

Xanthosoma brasiliense (Desf.) Engler

Common Names: belembe, calalou, Tahitian spinach

Xanthosoma sagittifolium (L.) Schott

Common Names: tannia, yautia, cocoyam, American taro, elephant ears

Tuvaluan Names: *talo ni tana* (Ff, Nm); *talo palagi*? (Tvd)

Xanthosoma violaceum Schott

Common Name: purple cocoyam

Tuvaluan Name: *talo ni tana* (Ff, Nm)

ARECACEAE OR PALMAE (PALM FAMILY)

Chrysalidocarpus lutescens H. Wendl.

Common Names: golden cane palm, golden-fruited palm

Tuvaluan Name: *paama sama* (Seluka 1997)

Cocos nucifera L.

Common Name: coconut palm

Tuvaluan Name: *niu*

Pritchardia pacifica Seem. & Wendl.

Common Names: Pacific fan palm, Fiji fan palm

Tuvaluan Name: *niu piu* (Ff, Nm; Tvd)

Ptychosperma macarthurii (Wendl.) Nicholson

Common Names: MacArthur palm, hurricane palm

BROMELIACEAE (PINEAPPLE FAMILY)

Ananas comosus (L.) Merrill

Common Name: pineapple

Tuvaluan Names: *fala*, *painapolo* (Ff, Nm; TvD)

CANNACEAE (CANNA FAMILY)

Canna indica L.

Common Names: Indian shot, canna

Canna x generalis L.H. Bailey

Common Names: canna, canna lily

COMMELINACEAE (DAYFLOWER OR SPIDERWORT FAMILY)

Callisia fragrans (Lindl.) Woodson

Common Names: fragrant inch plant, basketplant

Commelina diffusa Burm f.

Common Names: commelina, dayflower

Tuvaluan Names: *mouku solo* (Ff); *mouku tolo* (Nm)

Tradescantia pallida (Rose) D. Hunt

Common Names: purple tradescantia, purple heart

Tuvaluan Name: *fatu piniki* ("pink heart"; Seluka 1997)

Tradescantia spathacea Swartz

Common Names: tradescantia, oyster plant, Moses-in-a-boat

Status: Recent introduction. Mexico and West Indies.

Tradescantia zebrina Bosse

Common Names: wandering Jew, silver inch plant

CYPERACEAE (SEDGE FAMILY)

Cyperus compressus L.

Common Names: compressed sedge, summer sedge

Tuvaluan Name: *mouku* (general term for grasses and weeds)

Cyperus involucratus Rottb.

Common Names: umbrella sedge, umbrella plant

Cyperus odoratus L.

Common Name: fragrant flat sedge

Tuvaluan Name: *mouku* (general term for grasses and weeds)

Cyperus rotundus L.

Common Names: nut sedge, nut grass

Tuvaluan Names: *muta* (Ff, Nm; TvD)

Eleocharis geniculata (L.) Roem. & Schultes

Common Names: spike sedge, Canada spikerush

Fimbristylis cymosa R. Br.

Common Name: beach sedge

Tuvaluan Name: *mouku milimili taliga* (Ff, Nm, Nt)

Fimbristylis dichotoma (L.) Vahl.

Common Name: tall fringe rush

Status: Recent introduction. Pantropical.

Kyllinga brevifolia Rottb.

Common Name: shortleaved spikesedge, green kyllinga

Kyllinga nemoralis (Forst.) Dandy ex Hutchinson and Dalziel
Common Name: white-flowered kyllinga
Tuvaluan Name: *mouku* (general term for grasses and weeds)

Mariscus javanicus (Houtt.) Merr.
Common Names: sedge, marsh cypress
Tuvaluan Names: *mouku filifou* (Ff); *mouku* (Nm); *lakau fai tika* (Ff?); *sika* (Seluka 1997)

Pycnus polystachyos (Rottb.) P. Baeuv.
Common Name: sedge
Tuvaluan Name: *mouku* (general term for grasses and weeds)

DIOSCOREACEAE (YAM FAMILY)

Dioscorea alata L.
Common Names: yam, greater yam, winged yam
Tuvaluan Name: *ufi* (Ff, Nm; TvD)

Dioscorea nummularia Lam.
Common Name: thorny yam
Tuvaluan Name: *tivoli* (Ff)

HELICONIACEAE (HELICONIA FAMILY)

Heliconia collinsiana R.F. Griggs
Common Names: hanging heliconia, fish-pole heliconia

IRIDACEAE (IRIS FAMILY)

Trimezia martinicensis (Jacq.) Herbert
Common Name: walking iris

LILIACEAE (LILY FAMILY)

Asparagus officinalis L.
Common Name: asparagus

Chlorophytum comosum (Thunb.) Jacq.
Common Names: spider plant, ribbon plant, bracket plant

Gloriosa superba L.
Common Names: climbing lily, gloriosa lily, glory lily, fire lily
Tuvaluan Names: *lakau laupiki* (Ff); *nareau* (Seluka 1997)

MUSACEAE (BANANA FAMILY)

Musa (AAA Group) Simmonds
Common Names: Robusta banana, poyo, Mons Marie, Veimama
Tuvaluan Name: *fuamaoluga* ("high fruiting"; Ff, Nm)

Musa (AAA Group) Simmonds
Common Name: dwarf Cavendish banana
Tuvaluan Name: *fuamaulalo* ("low fruiting"; Ff, Nm)

Musa (AB Group) Simmonds
Common Names: lady's finger banana, pisang rajah (Indonesia)

Tuvaluan Name: *tamatama ai lima* (Ff); *misiluki* (Nm); *inisi* (Ff?)

Musa(ABB Group) Simmonds

Common Names: cooking banana, plantain, bluggoe

Tuvaluan Name: *pata* (Ff, Nm)

Musa(ABB Group) Simmonds

Common Names: cooking banana, ash plantain, blue Java

Tuvaluan Name: *kefu* (Ff, Nm)

Musa cultivars

Tuvaluan Name: *futi* (general name for banana)

ORCHIDACEAE (ORCHID FAMILY)

Papilionanthe "Agnes Joaquim"

Synonym: *Vanda* "Agnes Joaquim"

Common Name: Agnes Joaquim vanda orchid

Vanilla planifolia Jacks. Ex Andrews

Common Names: vanilla, flat-leaved vanilla

Tuvaluan Name: *vanila* (Ff; TvD)

PANDANACEAE (PANDANUS FAMILY)

Pandanus tectorius Warb.

Common Names: pandanus, screw pine

Tuvaluan Name: *fala*, *fala vao* ("wild pandanus"; Ff, Nm); *fala tinakaleve* (edible, planted; Ff, Nm); *kie* (Ff, Nm); *falaketi* (edible; Ff); *fala kai* (edible; Nm); *teou*, *te to* (Nui; Woodroffe 1991)

POACEAE OR GRAMINAE (GRASS FAMILY)

Axonopus compressus(Sw.) Beauv.

Common Name: carpet grass

Bothriochloa bladhii (Retz.) S.T. Blake

Common Names: blue grass, Australian beardgrass

Brachiaria subquadripata (Trin.) Hitchc.

Common Name: green summer grass, two-spiked panic, two-finger grass

Cenchrus echinatus L.

Common Names: burgrass, sand bur

Tuvaluan Name: *mouku talatala* (Ff); *mouku tapu* (Nm); *kateketeke* (Nui?; Seluka 1997)

Chloris barbata (L.) Sw.

Common Names: finger grass, swollen finger grass

Tuvaluan Name: *mouku* (general term for grasses and small weeds)

Cymbopogon citratus (DC. ex Nees) Staph

Common Name: lemongrass

Tuvaluan Name: *moegalō* (Nm)

Cynodon dactylon (L.) Pers.

Common Name: Bermuda grass

Tuvaluan Name: *mouku* (general term for grass or small weeds; Ff, Nm); *mutia* (name from Samoa; Ff)

Dactyloctenium aegyptium (L.) Beauv.

Common Names: four-finger grass, beach wire grass, crowfoot grass

Tuvaluan Name: *mouku* (general term for grasses and small weeds)

Digitaria ciliaris (Retz.) Koel.

Common Names: crab grass, large crab grass

Digitaria radicata (J.S. Presl) Miq.

Common Name: trailing crabgrass

Digitaria setigera Rot

Common Names: crab grass, slender crab grass

Tuvaluan Name: *mouku* (general term for grasses and small weeds)

Echinochloa colona (L.) Link.

Common Name: jungle rice

Tuvaluan Name: *mouku* (general term for grasses and small weeds)

Eleusine indica (L.) Gaertn.

Common Names: wiregrass, goosegrass

Tuvaluan Name: *mouku* (general term for grasses, sedges and small weeds; Ff, Nm); *mouku uaea* (“wiregrass”; Seluka 1997)

Eragrostis tenella (L.) Beauv. ex Roem. & Schult.

Common Names: lovegrass, Japanese lovegrass

Tuvaluan Name: *mouku* (general term for grasses, sedges and small weeds; Ff, Nm)

Ischaemum murinum G. Forst.

Common Name: ribbed muraina grass

Tuvaluan Name: *mouku* (general term for grasses, sedges and small weeds; Ff, Nm)

Lepturopetium kuniense Morat.

Lepturus repens (Forst. f.) R. Br.

Common Names: bunchgrass, beach bunchgrass

Tuvaluan Name: *mouku* (general term for grasses, sedges and small weeds; Ff, Nm); *mouku lauliliki te titi o Kulu* (Nt; Koch 2002); *mutia* (Seluka 1997)

Paspalum setaceum Michx.

Common Names: thin paspalum, sand paspalum

Paspalum vaginatum Sw.

Common Names: knot grass, salt grass, knotweed, swamp couch grass

Tuvaluan Name: *mouku* (general term for grasses, sedges and small weeds; Ff, Nm)

Saccharum officinarum L.

Common Name: sugar cane

Tuvaluan Name: *tolo* (Ff; TvD); *kaleve*, *kaleve gau* (Nm; TvD)

Schizostachym glaucifolium (Rupr.) Munro

Common Names: Polynesian bamboo, Pacific bamboo

Tuvaluan Name: *kofo* (Nm); *tikopia*, *pamipu* (Ff)

Sporobolus fertilis (Steud.) Clayton

Common Name: rat-tail dropseed

Stenotaphrum micranthum (Desv.) Hubb.

Tuvaluan Name: *mouku* (general term for grasses, sedges and small weeds; Ff, Nm); *mouku lauliliki te titi o Kulu* (Nt; Koch 2002)

Thuarea involuta (Forst. f.) R. Br. ex R. & S.

Common Names: tropical beachgrass, Kuroiwa grass, thuarea

Tuvaluan Names: *mouku solo* (Ff); *mouku tolo* (Nm); *mouku fau* (Seluka 1997)

Zea mays L.

Common Names: maize, corn

TACCACEAE (POLYNESIAN ARROWROOT FAMILY)

Tacca leontopetaloides (L.) O. Kuntze

Common Name: Polynesian arrowroot

Tuvaluan Names: *vatia* (plant); *masoā* (flour/starch; Ff; TvD); *niu 'a Naleau* (Nm)

ZINGIBERACEAE (GINGER FAMILY)

Alpinia purpurata (Vieill.) K. Schum.

Common Name: red ginger

Tuvaluan Name: *tinitia* ("ginger"; Seluka 1997)

Alpinia vittata Bull

Common Name: variegated ginger

Status: Recent introduction. Indonesia to Pacific Islands.

Costus malortianus H. Wend.

Common Name: stepladder plant

Costus speciosus (Koen.) Sm.

Common Names: crepe ginger, Malay ginger, spiral flag

Costus woodsonii Maas

Common Names: scarlet spiral flag, red button ginger

Zingiber officinale Roscoe

Common Names: ginger, common ginger

DICOTYLEDONAE

ACANTHACEAE (ACANTHUS FAMILY)

Asystasia salicifolia Craib

Common Name: willow-leaved asystasia

Hemigraphis alternata (Burm. f.) T. Anders.

Common Name: cemetery plant

Odontonema tubiforme (Bertol.) O. Ktze.

Common Names: odonotema, red justicia, fire spike

Pseuderanthemum carruthersii (Seem.) Guill. var. *atropurpureum* (Bull) Fosb.

Common Names: purple false eranthemum, false face

Tuvaluan Name: *lakau 'uli* (Ff); *lautagitagi* (Nm); *suipi kula* (Seluka 1997)

Pseuderanthemum carruthersii (Seem.) Guill. var. *carruthersii*

Common Name: false eranthemum

Tuvaluan Name: *lakau kena*, *lakau pula kena* (Ff); *lau tagitagi* (Nm)

Pseuderanthemum carruthersii (Seem.) Guill. var. *reticulatum* (Bull) Fosb.

Common Names: yellow-veined pseuderanthemum, El Dorado

Tuvaluan Name: *lakau kena* (Ff); *lau tagitagi* (Nm)

Ruellia prostrata Poiret

Common Name: prostrate ruellia

Thunbergia erecta (Benth.) T. Anders.

Common Name: bush thunbergia

AMARANTHACEAE (AMARANTH FAMILY)

Achyranthes aspera L.

Common Name: prickly chaff flower

Tuvaluan Name: *tamatama* (Ff, Nm; Tvd); *titi vau* (Seluka 1997); *sisi vau* (Nt, Nui; Koch 2002, Woodroffe1991)

Achyranthes canescens R. Br.

Common Name: native prickly chaff-flower

Tuvaluan Name: *tamatama* (Ff, Nm; Tvd); *lautamatama* (Seluka 1997); *sisi vau*, *matamata?* (Nt; Koch2002)

Alternanthera brasiliana (L.) Kuntze

Common Name: purple alternanthera

Alternanthera sessilis (L.) R. Br. ex R. & S.

Common Name: joyweed

*Alternanthera sissoo*Hort.

Common Names: Brazilian spinach, samba spinach, sissoo spinach

*Alternanthera tenella*Colla

Common Names: joyweed, alternanthera, calico plant

Amaranthus hypochondriacus L.

Common Name: prince's feather

Amaranthus tricolor L.

Common Names: Joseph's coat, Chinese spinach. amaranth, pigweed

Tuvaluan Names: *mōta*, *moota* (from *moca* in Fijian; Ff)

Amaranthus viridis L.

Common Names: slender amaranth, green amaranth, pigweed

Celosia argentea L. var. *cristata* (L.) Ktze.

Common Name: cock's comb

Gomphrena globosa L.

Common Names: globe amaranth, pearly everlasting

ANACARDIACEAE (CASHEW OR RHUS FAMILY)

Mangifera indica L.

Common Name: mango

Tuvaluan Name: *mago* (Ff, Nm)

ANNONNACEAE (CUSTARD APPLE FAMILY)

Annona muricata L.

Common Name: soursop

Tuvaluan Name: *saosopu* (Seluka 1997)

Annona squamosa L.

Common Name: sweetsop, sugar apple

Tuvaluan Name: *nameana, kasitati apolo* (Seluka 1997)

APIACEAE (CELERY/CARROT FAMILY)

Apium graveolens L.

Common Name: celery

Tuvaluan Name: *silalii, silali* (Seluka 1997)

Centella asiatica (L.) Urban

Common Name: Asiatic pennywort

Coriandrum sativum L.

Common Names: coriander, cilantro, Chinese parsley

Daucus carota L.

Common Name: carrot

Tuvaluan Name: *keloti* (Seluka 1997)

APOCYNACEAE (DOG-BANE FAMILY)

Catharanthus roseus (L.) G. Don

Common Names: periwinkle, Madagascar periwinkle

Tuvaluan Name: *peteli, peteli kula* (Ff, Nm; Tvd); *peteli kena* (Ff); *peteli tea* (Nm); *losa, losa kula, losapiniki* (Ff, Nm); *losa kena* (Ff); *losa tea* (Nm); *loosi tai* (Seluka 1997)

Nerium oleander L.

Common Name: oleander

Ochrosia oppositifolia (Lam.) K. Schum.

Tuvaluan Names: *fao* (Ff, Nm; Tvd); *paopao, paupau* (Nui; Woodroffe 1991)

Plumeria obtusa L.

Common Names: white frangipani, plumeria

Tuvaluan Names: *pua Fiti Solomona* (Ff); *melia Solomona* ("frangipani from Solomon Islands"; Nm)

Plumeria rubra L.

Common Names: frangipani, plumeria, temple tree, graveyard tree

Tuvaluan Names: *pua Fiti* ("Fiji"; Ff; Tvd); *melia* (Nm; Tvd); *pua Fiti Nalu* ("Nauru"; Ff); *melia Nalu* (Nm); *pua Fiti Tuvalu* (Ff); *pua Fiti kula* (Ff); *melia kula* (Nm)

Tabernaemontana divaricata (L.) R. Br.

Common Names: false gardenia, paper gardenia, crepe jasmine, scentless gardenia

ARALIACEAE (PANAX FAMILY)

Polyscias filicifolia (C. Moore ex. Fourn.) L. H. Bailey

Common Names: golden prince panax, fern-leaf aralia, angelica
Tuvaluan Name: *lautagatagi?* (Ff)

Polyscias fruticosa (L.) Harms

Common Names: parsley panax, hedge panax

Tuvaluan Names: *lautagitagi* (Ff, Nm); *lautagitagi laulikiliki* (“very small-leaved”; Ff); *kai mamara* (Seluka1997)

Polyscias guilfoylei (Cogn. & March.) Bailey

Common Names: panax, hedge panax

Tuvaluan Name: *lautagitagi* (Ff, Nm)

Polyscias scutellaria (Burm. f.) Fosb.

Common Names: panax, hedge panax

Tuvaluan Name: *lautagitagi* (Ff, Nm)

ASCLEPIADACEAE (MILKWEED FAMILY)

Asclepias curassavica L.

Common Names: milkweed, butterfly weed, red cotton bush, bloodflower

ASTERACEAE (ASTER, SUNFLOWER OR DAISY FAMILY)

Adenostemma lanceolatum Miq.

Common Name: adenostema

Tuvaluan Names: *mili*; *lipilipi* (Koch 2002); *kisikisi?* (Maiden 1904)

Bidens alba (L.) DC.

Common Names: cobbler's peg, Spanish needle

Status: Recent introduction. Tropical America.

Cyanthillium cinereum (L.) H. Rob.

Common Name: iron weed, little iron weed

Tuvaluan Name: *mouku fai pula* (Ff, Nm)

Eclipta prostrata (L.) L.

Common Name: false daisy

Emilia fosbergii Nicholson

Common Names: red sow thistle, Fosberg's sow thistle, Fosberg's red paintbrush

Gynura bicolor (Roxb. ex Willd.) DC

Common Names: Okinawan spinach, gynura

Lactuca sativa L. vars.

Common Name: lettuce

Tuvaluan Name: *letisi* (Ff)

Mikania micrantha Kunth

Common Name: mile-a-minute, mile-a-minute vine

Tuvaluan Names: *saketa lauliki* (Ff); *mouku Amelika* (“American weed”; Nm)

Pluchea carolinensis (Jacq.) G. Don

Common Name: pluchea, shrubby fleabane, sourbush

Tuvaluan Names: *mili*; *lakau Amelika* (“American plant”; Seluka 1997)

Pluchea indica (L.) Less.

Common Name: Indian pluchea

Tuvaluan Name: *mili*

Senecio chenopodioides HBK

Common Names: Mexican flame vine, orange-flowered senecio

Sphagneticola trilobata (L. C. Rich) Pruski.

Common Names: Creeping daisy, wedelia, trailing daisy, water zinnia, Bay Biscayne creeping ox-eye, Singapore daisy

Synedrella nodiflora (L.) Gaertn.

Common Name: synedrella, nodeweed

Tuvaluan Name: *mouku* (general term for grasses and small weeds)

Tagetes erecta L.

Common Names: marigold, Aztec marigold, African marigold

Tridax procumbens L.

Common Names: wild daisy, coat buttons

Tuvaluan Name: *mouku fai pula* (Ff, Nm)

Wollastonia biflora (L.) DC.

Common Name: beach sunflower

Tuvaluan Names: *ateate* (Seluka, 1997); *lakau o galiga* (Koch 2002) ; *lakau manogi* (*lakou monogi* in Maiden 1904)

Zinnia elegans Jacq.

Common Name: zinnia

BALSAMINACEAE (BALSAM FAMILY)

Impatiens balsamina L.

Common Names: balsam, garden balsam

BARRINGTONIACEAE OR LECYTHIDACEAE (BRAZILNUT FAMILY)

Barringtonia asiatica (L.) Kurz.

Common Names: fish-poison tree, barringtonia

Tuvaluan Names: *futu* (Ff, Nm; Tvd); *kafutu* (Ng; Tvd; Seluka 1997); *kafuti* (Ni; Koch 2002); *ulu* (Nui;

BASELLACEAE (BASELLA FAMILY)

Basella rubra L.

Common Names: Indian spinach, Ceylon spinach, Malabar nightshade

BEGONIACEAE (BEGONIA FAMILY)

*Begoni*asp.

Common Name: begonia cultivar

BIGNONIACEAE (BIGNONIA FAMILY)

Tecoma stans (L.) Juss. ex HBK.

Common Names: yellow elder, yellow bells, tecoma, ginger Thomas

Tuvaluan Names: *nikilailai* (from Kiribati *nei karairai*; Ff, Nm); *pele sama* (Seluka 1997)

BORAGINACEAE (HELIOTROPE FAMILY)

Cordia sebestena L.

Common Names: geiger tree, sebesten plum

Tuvaluan Name: *kānava pālagi* (Ff)

Cordia subcordata Lam.

Common Names: sea trumpet, kou (Hawaii)

Tuvaluan Name: *kānava* (Ff, Nm, Nt, Nui; Tvd)

Tournefortia argentea L. f.

Common Name: beach heliotrope

BRASSICACEAE OR CRUCIFERAE (CABBAGE OR MUSTARD FAMILY)

Brassica chinensis L. var. *chinensis*

Common Names: Chinese cabbage, Chinese white cabbage

Tuvaluan Name: *kapisi Saina* ("Chinese cabbage"; Ff, Nm)

Brassica chinensis L. var. *parachinensis* (Bailey) Tsen and Lee

Common Name: flowering white cabbage

Tuvaluan Name: *kapisi Saina* ("Chinese cabbage"; Ff, Nm)

Brassica juncea (L.) Czern.

Common Names: mustard cabbage, Indian mustard, Chinese mustard

Tuvaluan Name: *kapisi Saina* ("Chinese cabbage"; Ff, Nm)

Brassica oleracea L. *Acephala* Group

Common Name: kale

Tuvaluan Name: *kapisi Palagi*

Brassica oleracea L. var. *botrytis* L.

Common Name: cauliflower

Brassica oleracea L. var. *capitata* L.

Common Name: English cabbage

Tuvaluan Names: *kapisi pukupuku* ("round"; Ff, Nm); *kapisi palagi* (Seluka 1997)

Brassica x hybridus "Saladeer"

Common Name: Saladeer hybrid Chinese cabbage

Tuvaluan Name: *kapisi Saina* ("Chinese cabbage")

Eruca sativa Mill.

Common Names: rocket, rocket lettuce, arugula

Rorippa sarmentosa (G. Forst. Ex DC.) Macbride

Common Name: longrunner

Tuvaluan Names: *lita* (Ff); *mouku* (Seluka 1997); *ātasi* (Maiden 1904)

CACTACEAE (CACTUS FAMILY)

Hylocereus undatus (Haw.) Britt. and Rose

Common Names: night-blooming cereus, dragon fruit

Opuntia sp.

Common Name: prickly-pear cactus

CAPPARIDACEAE OR CAPPARACEAE (CAPER FAMILY)

Cleome rutidosperma DC.

Common Names: blue cleome, fringed spiderflower

Cleome viscosa L.

Common Name: yellow cleome

Crateva religiosa Forst. f.

Common Name: sacred garlic pear

CARICACEAE (PAPAYA FAMILY)

Carica papaya L.

Common Names: papaya, pawpaw

Tuvaluan Names: *olesi* (Ff, Nm; TvD); *olesi Tuvalu*, *olesi pālagi* (Ff)

CASUARINACEAE (CASUARINA FAMILY)

Casuarina equisetifolia L.

Common Names: casuarina, she oak, ironwood, beefwood

Tuvaluan Names: *lakau Kilisimasi* (“Christmas tree”); *pulukamu* (“blue gum”; Seluka 2010)

CLUSIACEAE (MANGOSTEEN FAMILY)

Calophyllum inophyllum L.

Common Names: Portia tree, Alexandrian laurel, beach mahogany, tomano (Hawaii)

Tuvaluan Names: *fetau* (Ff, Nm, Nt; Tvd); *itai* (Nui)

COMBRETACEAE (TERMINALIA FAMILY)

Lumnitzera littorea (Jack) Voigt

Common Name: red-flowered black mangrove

Tuvaluan Names: *sagale* (Vt, Nt; Tvd); *hagale* (Nm); *tokotū* (Ff, NI); *tangali* (Nui; Woodroffe 1991)

Terminalia catappa L.

Common Names: Indian almond, Malabar almond, tropical almond

Tuvaluan Name: *kunikuni* (from Kiribati *te kunikun*; Ff, Nm)

Terminalia samoensis Rech.

Common Name: beach almond

Tuvaluan Names: *talie* (Ff, Nm, Nt ; Tvd); *te ipe* (Nui)

CONVOLVULACEAE (MORNING-GLORY FAMILY)

Ipomoea aquatica Forsk.

Common Names: water spinach, swamp cabbage, water convolvulus, cangcong

Ipomoea batatas (L.) Lam.

Common Names: sweet potato, kumara

Tuvaluan Names: *kumala*, *pateta* (Ff, Nm; TvD); *pateta māgalo* (Seluka 1993)

Ipomoea macrantha R. & S.

Common Names: wild moon flower, night-blooming beach morning-glory

Tuvaluan Names: *fue*, *fue kena*, *fue pula kena* (Ff); *fue*, *fue tolo* (Nm)

Ipomoea pes-caprae (L.) Sweet

Common Names: beach morning-glory, goat-foot morning-glory

Tuvaluan Names: *fue*, *fue piniki*, *fue pula piniki* (“pink-flowered fue”; Ff, Nm)

Ipomoea triloba L.

Common Name: little bell

Tuvaluan Name: *fue* (general term for vines in the morning-glory family)

CUCURBITACEAE (MELON OR GOURD FAMILY)

Benicasa hispida (Thunb.) Cogn.

Common Names: wax gourd, ash pumpkin, winter melon, white gourd, tung kwa

Citrullus lanatus (Thunb.) Matsum. and Nakai

Common Name: watermelon

Tuvaluan Name: *meleni* (Ff, Nm; TvD)

Cucumis melo L. variety

Common Name: sweet melon

Tuvaluan Name: *meleni* (Ff)?

Cucumis melo L. var. *cantalupensis* Naud

Common Names: cantaloupe, rock melon

Tuvaluan Name: *meleni* (Ff, Nm; TvD)

Cucumis melo L. var. *conomon* Makino

Common Names: Oriental pickling melon, ts'it kwa

Tuvaluan Name: *kukampa?* (Ff)

Cucumis sativus L.

Common Name: cucumber

Tuvaluan Name: *kukama* (Ff, Nm; TvD)

Cucurbitacultivar

Common Name: squash

Tuvaluan Name: *panikeni* (Ff; TvD)

Cucurbita maxima Duch. variety

Common Name: zucchini squash

Cucurbita moschata Duchesne ex Poir.

Common Name: pumpkin

Tuvaluan Names: *panikeni* (Ff; TvD); *panikē* (from Kiribati *bangike*; Nm)

Lagenaria siceraria L.

Common Name: bottle gourd

Luffa acutangula (L.) Roxb.

Common Name: angled loofah

Luffa cylindrica (L.) Roem.

Common Names: smooth loofah, wild vegetable sponge, sponge gourd

Momordica charantia L.

Common Names: bitter gourd, bitter melon, balsam pear

EUPHORBIACEAE (SPURGE FAMILY)

Acalypha grandis Benth.

Common Name: acalypha

Tuvaluan Names: *ogoogo* (Ff; TvD); *kalakalāpuhi* (Nm); *kalakalāpuki?* (TvD); *kakarapus* (Nui; Woodroffe 1991)

Acalypha hispida Burm. f.

Common Names: cats's tail, chenille plant, red-hot poker

Tuvaluan Names: *ogoogo palagi* (Ff); *suisui pusi* (from Kiribati; Ff); *ogoogo pula kula* (Seluka 1997)

Acalypha wilkesiana Muell.-Arg. var. *wilkesiana*

Common Names: Joseph's coat, copper leaf, beefsteak plant

Tuvaluan Names: *ogoogo kula*, *lakau kula* (Ff); *kalakalāpuhi kula* (Nm); *ogoogo laukula* (Seluka 1997)

Acalypha wilkesiana Roxb. f. *circinata* Muell.-Arg.

Common Name: picottee acalypha

Status: Recent introduction. Pacific Islands.

Chamaesyce atoto (Forst. f) Croizat

Common Name: beach spurge

Tuvaluan Names: *mouku toto* (Ff, Nm); *eveeve* (Nt; Koch 2002); *pulutai* (Seluka 1997)

Chamaesyce hirta (L.) Millsp.

Common Names: garden spurge, asthma plant, hairy spurge, old blood

Tuvaluan Name: *mouku toto* (Ff, Nm)

Chamaesyce hypericifolia (L.) Millsp.

Common Name: graceful spurge

Tuvaluan Name: *mouku toto* (Ff, Nm)

Chamaesyce prostrata (Ait.) Small

Common Names: prostrate spurge, red caustic creeper

Chamaesyce thymifolia (L.) Millsp.

Common Name: thyme-leafed spurge

Tuvaluan Name: *mouku* (general term for grasses and small weeds; Seluka 1997)

Cnidoscolus chayamansa McVaugh

Common Names: chaya, tree spinach

Tuvaluan Names: *pele*, *bele* (from Fijian *bele*; Ff, Nm); *pele vao* ("bush pele"; Vt); *tiaia* (Seluka 1997)

Codiaeum variegatum (L.) Bl.

Common Name: croton

Tuvaluan Names: *lautagitagi fou* (Ff); *lanu uke* (Seluka 1997)

Euphorbia cyathophora Murr.

Common Names: Mexican fire plant, hypocrite plant, wild poinsettia, dwarf poinsettia

Euphorbia heterophylla L.

Common Name: wild spurge

Euphorbia milii Desmoulins

Common Name: crown of thorns

Status: Recent introduction. Madagascar.

Euphorbia sp.

Common Name: cactus spurge

Jatropha integerrima Jacq.

Common Name: rose-colored jatropha

Manihot esculenta Crantz

Common Names: cassava, manioc, tapioca

Tuvaluan Name: *tapioka* (Ff, Nm)

Pedilanthus tithymaloides (L.) Poit.

Common Names: slipper flower, slipper spurge, zigzag plant, redbird cactus, ribbon cactus

Tuvaluan Name: *lakau toto* (Seluka 1997)

Phyllanthus acidus (L.) Skeels

Common Name: Otahiti gooseberry

Phyllanthus amarus Sch. & Th.

Common Names: sleeping spurge, six-o'clock

Tuvaluan Name: *mouku laupukupuku* (Ff, Nm)

Phyllanthus debilis Klein ex Willd.

Synonym: *Phyllanthus niruri* L. var. *debilis* Klein ex Willd.

Common Name: spurge

Phyllanthus urinaria L.

Common Name: spurge

Ricinus communis L.

Common Names: castor bean, castor oil plant

Sauropus androgynus Merr.

Common Name: Borneo cabbage

FABACEAE OR LEGUMINOSAE (BEAN, PEA OR LEGUME FAMILY)

Acacia farnesiana (L.) Willd.

Common Names: sweet acacia, West Indian blackhorn, cassie flower

Tuvaluan Name: *kaipakoa* (from the Kiribati *te kai bakoa*, "shark tree")

Adenantha pavonina L.

Common Names: red-bead tree, false sandalwood

Tuvaluan Names: *lopaa*, *lopā* (from Samoan *lopā*)

Alysicarpus vaginalis (L.) DC.

Common Names: alysicarpus, one-leaved clover

Bauhinia sp.

Common Names: bauhinia, orchid tree

Caesalpinia bonduc (L.) Roxb.

Common Names: beach nicker, gray nicker, nicker bean

Tuvaluan Name: *talatalāmoa*? (Tvd)

Caesalpinia pulcherrima (L.) Swartz

Common Name: pride of Barbados, dwarf poinciana, Barbados flower fence

Cajanus scarabaeoides (L.) Thouars.

Common Name: peanut grass

Canavalia cathartica Thou.

Common Name: Mauna Loa bean (Hawaii)

Tuvaluan Name: *saketa* (Ff, Nm; Tvd)

Clitorea ternatea L.

Crotalaria pallida L.

Delonix regia (Bojer) Raf.

Common Name: poinciana, royal poinciana, flame tree, flamboyant

Tuvaluan Names: *fuatausaga* ("flowering at the beginning of the new year"; Ff); *fuatauhaga* (Nm)

Desmodium heterophyllum (Willd.) DC.

Common Name: tropical trefoil

Desmodium incanum DC.

Common Name: Spanish clover

Leucaena leucocephala (Lam.) de Wit

Common Names: leucaena, koa haole (Hawaii), lead tree, wild tamarind

Tuvaluan Name: *lakau fai fuaga* ("plant with seeds"; Ff)

Macroptilium atropurpureum(DC.) Urb.

Common Names: siratro, purple bushbean, phasely bean

Macroptilium lathyroides (L.) Urb.

Common Name: Phasey bean

Mimosa pudica L.

Common Name: sensitive plant

Tuvaluan Names: *mouku matiotio* (Ff); *kaimatuu* (Seluka 1997)

Mucuna gigantea (Willd.) DC.

Common Names: seabean, giant seabean, velvet bean

Tuvaluan Name: *saketa*

Phaseolus vulgaris L.

Common Names: string bean, French bean, haricot bean

Tuvaluan Names: *piini*, *pīni* (Tvd; Seluka 1997)

Samanea saman (Jacq.) Merr.

Common Names: rain tree, monkeypod tree

Senna occidentalis (L.) Link

Common Names: coffee senna, arsenic bean

Senna tora (L.) Roxb.

Common Name: peanut weed

Sesbania cannabina (Retz.) Pers.

Common Names: prickly sesban, sesbania pea, canicha

Sesbania grandiflora(L.) Pers.

Common Names: sesban, sesbania

Tuvaluan Name: *sesipania* (Seluka 1997)

Sophora tomentosa L.

Common Name: silverbush

Tamarindus indicus L.

Common Name: tamarind

Tuvaluan Name: *tamalini* (Seluka 1997)

Vigna marina (Burm.) Merr.

Common Name: beach pea

Tuvaluan Names: *saketa* (Ff, Nm; Tvd); *saketa sama* ("yellow"; Seluka 1997)

Vigna sesquipedalis (L.) Fruw.

Common Names: long bean, yard-long bean, snake bean, asparagus bean

Tuvaluan Names: *piini*, *pini* (Ff, Nm ; Tvd)

Vigna unguiculata (L.) Walp.

Common Name: cowpea

GESNERIACEAE (GLOXINIA FAMILY)

Chrysothemis pulchella (Donn ex Simms) Decaisne

Common Name: dozakie

GOODENIACEAE (NAUPAKA FAMILY)

Scaevola taccada (Gaertn.) Roxb.

Common Names: half-flower, beach saltbush

Tuvaluan Names: *gasu* (Ff, Nt; TvD); *gahu* (Nm, Nui; TvD)

HERNANDIACEAE (HERNANDIA FAMILY)

Hernandia nymphaeifolia (Presl.) Kubitzki

Common Names: hernandia, lantern tree

Tuvaluan Names: *puka* (Ff, Nm, Nt, Nui; Tvd); *puka vaka* (Ff, Nt); *puka vai*, *puka faivaka* (Nm)

LAMIACEAE (MINT FAMILY)

Mentha piperita L.

Common Names: mint, peppermint

Tuvaluan Name: *miniti?* (Seluka 1997)

Ocimum basilicum L.

Common Names: basil, sweet basil

Tuvaluan Name: *mili kai* (Ff, Nm)

Ocimum tenuiflorum L.

Common Names: sacred basil, holy basil, tulsi (Hindi)

Tuvaluan Name: *mili manogi* (Ff, Nm)

Plectranthus amboinicus (Lour.) Spreng.

Common Names: Indian borage, Spanish thyme, Mexican oregano

Plectranthus scutellarioides (L.) R. Br.

Tuvaluan Name: *mili* (Ff)

LAURACEAE (LAUREL FAMILY)

Cassytha filiformis L.

Common Names: beach dodder, giant dodder, devil's twine
Tuvaluan Name: *fetai* (Ff, Nm, Nt; Tvd)

Persea americana Mill.

Common Names: avocado, avocado pear, alligator pear

LYTHRACEAE (LOOSESTRIFE FAMILY)

Pemphis acidula J.R. & G. Forst

Common Names: pemphis, ironwood

Tuvaluan Names: *gie* (Ff, Nm; TvD); *giegie* (Nt; TvD; Koch 2002)

MALPIGHIACEAE (MALPHIGIA FAMILY)

Malpighia glabra L.

Common Names: Barbados cherry, escobillo

MALVACEAE (MALLOW FAMILY)

Abelmoschus esculentus (L.) Moench.

Common Names: okra, gumbo, lady's finger, bindi (Fiji Hindi)

Tuvaluan Name: *okala* (Seluka 1997)

Abelmoschus manihot (L.) Medik.

Common Names: bush spinach, edible hibiscus; bush hibiscus spinach, bele (Fiji)

Tuvaluan Name: *pele* (from the Fijian *bele*; Ff, Nm)

Abutilon indicum(L.) Sweet

Common Name: Indian mallow

Tuvaluan Name: *aka tā* (Nm)

Hibiscus rosa-sinensis L.

Common Names: hibiscus, red hibiscus, China rose

Tuvaluan Names: *'aute*, *'aute kula* ("red"; Ff, Nm; TvD); *'aute kena* ("white"; Ff); *'aute tea* ("white"; Nm); *'aute sega* ("yellow"; Ff); *'aute sama* ("yellow"; Nm)

Hibiscus tiliaceus L.

Common Names: beach hibiscus, hibiscus tree

Tuvaluan Names: *fou* (Tvd); *fou, fou fafine* (Ff); *fau, fau tuu* (Nm; Chambers 1984); *fau tuu, fau tū* (Seluka)

Malvastrum coromandelianum (L.) Garcke

Common Name: false mallow

Sida fallax Walp.

Common Names: *golden mallow*, *ilima* (Hawaii), *te kaura* (Kiribati)

Tuvaluan Names: *akatā* (Ff, Nm, Nt); *kai 'uli* (Nm); *kaula* (Seluka 1997)

Sida rhombifolia L.

Common Names: broomweed, Cuba jute, Paddy's lucerne

Tuvaluan Name: *akatā?*, *pula?* (Maiden 1904)

Thespesia populnea (L.) Sol. ex Correa

Common Names: Thespian's tree, milo (Hawaii, Polynesia)

Tuvaluan Name: *milo* (Ff, Nm; Tvd)

MELIACEAE (MAHOGANY FAMILY)

Melia azedarach L.

Common Names: Indian lilac, China berry, Persian lilac, pride of India

MORACEAE (MULBERRY FAMILY)

Artocarpus altilis (Park.) Fosb.

Common Name: breadfruit

Tuvaluan Name: *mei* (Ff, Nm, Nt, Nui; Tvd)

Artocarpus mariannensis Trec.

Common Name: Marianas breadfruit

Tuvaluan Names: *mei* (general term for all breadfruit species.); *pokēkē* (specific term for *A. mariannensis*; Ff,

Ficus carica L.

Common Name: common fig

Tuvaluan Name: *felo palagi* (Seluka 1997)

Ficus tinctoria Forst. f.

Common Names: Dyer's fig, native fig

Tuvaluan Names: *felo* (Ff, Nm, Nt; Tvd); *felo lasi* ("large fruit"; Ff), *felo fōliki* ("small fruit"; Ff); *felo*

MORINGACEAE (MORINGA FAMILY)

Moringa oleifera Lam.

Common Names: horseradish tree, drumstick tree

Tuvaluan Name: *saitiani* (from the Hindi *saijan*; Seluka 1997)

MYRTACEAE (MYRTLE FAMILY)

Eucalyptus sp.

Common Names: eucalyptus, gum tree

Tuvaluan Name: *iukalipi* (Seluka 1997)

Psidium guajava L.

Common Name: guava

Tuvaluan Name: *kuava* (Ff, Nm)

Syzygium malaccense (L.) Merr. and Perry

Common Names: Malay apple, mountain apple

NYCTAGINACEAE (FOUR-O'CLOCK FAMILY)

Boerhavia repens L.

Common Names: boerhavia, pigweed

Tuvaluan Names: *mouku solo* (Ff); *mouku tolo* (Nm); *kalisi-lisi, kisi* (Maiden 1904)

Boerhavia tetrandra G. Forst.

Tuvaluan Names: *kisikisi* (Ff); *kalihilihi* (Nm; Chambers 1984); *eveeve lauefa* (Nt; Koch 2002)

Bougainvillea glabra Choisy

Common Names: bougainvillea, lesser bougainvillea

Tuvaluan Names: *akanita* (Ff; Tvd); *akanta* (from Kiribati *te akanta*; Nm)

Bougainvillea x buttiana Holttum & Standley

Common Name: hybrid bougainvillea

Tuvaluan Names: *akanita* (Ff; Tvd); *akanta* (from Kiribati *te akanta*; Nm)

Mirabilis jalapa L.

Common Names: four-o'clock, marvel of Peru, false jalap

Tuvaluan Names: *teao'aua* (Ff, Nm); *peteli?* (Seluka 1997)

Pisonia grandis R. Brown

Common Names: pisonia, lettuce tree, bird-catcher tree

Tuvaluan Names: *puka*, *pukavai* (Ff, Nt, Nui); *puka fai kaiiao* (“make fertilizer”; Nm)

OLACACEAE (OLAX FAMILY)

Ximenia americana L.

Tuvaluan Names: *talatalāmoa* (Tvd; Woodroffe 1991); *kanana* (Nui; Woodroffe 1991)

OLEACEAE (OLIVE FAMILY)

Jasminum sambac (L.) Ait.

Common Names: Arabian jasmine, pikake (Hawaii)

Tuvaluan Name: *pitasi* (Ff, Nm)

ONAGRACEAE (EVENING PRIMROSE FAMILY)

Ludwigia octovalvis (Jacq.) Raven

Common Names: swamp primrose, willow primrose, Mexican primrose-willow

Tuvaluan Names: *lakau pula sega* (“yellow flower”; Ff); *lakau pula* (Nt; Koch 2002)

OXALIDACEAE (WOOD SORREL FAMILY)

Averrhoa carambola L.

Common Names: carambola

Tuvaluan Name: *kalampola* (Ff; Seluka 1997)

Oxalis corniculata L.

Common Name: yellow wood sorrel

Tuvaluan Name: *lau kāpa?* (Ff?; Seluka 1997)

PASSIFLORACEAE (PASSION FLOWER FAMILY)

Passiflora edulis Sims

Common Name: passionfruit

Tuvaluan Name: *pasinifuluti* (Seluka 1997)

PHYTOLACACEAE (POKEWEED FAMILY)

Rivina humilis L.

Common Names: coral berry, rouge plant

PIPERACEAE (PEPPER FAMILY)

Peperomia pellucida (L.) HBK.

Common Name: peperomia

Piper aduncum L.

Common Name: hooked pepper bush

Status: Recent introduction.

POLEMONIACEAE (PHLOX FAMILY)

Phlox x drummondii Hook.

Common Name: phlox

POLYGONACEAE (BUCKWHEAT FAMILY)

Coccoloba uvifera (L.) Jacq.

Common Name: sea grape

PORTULACACEAE (PURSLANE FAMILY)

Portulaca australis Endl.

Common Name: small-leaf portulaca

Tuvaluan Names: *katuli* (Ff, Nm; Tvd); *tuli* (Nt; Koch 2002)

Portulaca grandiflora Hook.

Common Names: portulaca, purslane, pigface

Portulaca lutea Solander ex Forst. f.

Common Name: purslane

Tuvaluan Name: *katuli* (Ff, Nm; Tvd)

Portulaca oleracea L.

Common Name: pigweed, common purslane, wild purslane

Tuvaluan Names: *katuli* (Ff, Nm; Tvd); *poipoi?* (Nm)

Portulaca umbraticola Kunth subsp. *umbraticola*

Common Names: purslane, wingpod purslane

Tuvaluan Name: *katuli pālagi* (Ff, Nm)

RHAMNACEAE (BUCKTHORN FAMILY)

Colubrina asiatica (L.) Brongn.

Common Names: soapbush, hoop withe

Tuvaluan Names: *lakau sopo* (Ff); *lakau hopu* ("soap bush"; Nm)

Zizyphus mauritiana Lam.

Common Name: Indian jujube

Tuvaluan Name: *tutupi* ("jujube"; Ff; Seluka 1997)

RHIZOPHORACEAE (MANGROVE FAMILY)

Rhizophora stylosa Griff.

Common Name: spotted mangrove

Tuvaluan Names: *togo* (Ff, Nm, Nt); *te tongo* (Nui); *pika* (term for fruit, Ff; Hedley 1896)

RUBIACEAE (COFFEE FAMILY)

Dentella repens J. & G. Forst.

Common Name: dentella

Gardenia augusta (L.) Merr.

Common Name: august gardenia

Tuvaluan Names: *tiale Fiti* ("gardenia from Fiji"; Ff)

Gardenia taitensis DC.

Common Names: Tahitian gardenia, tiare Tahiti (Tahiti)

Tuvaluan Names: *tiale* (Ff, Nm; TvD); *siale* (Nui; Woodroffe 1991)

Guettarda speciosa L.

Common Names: beach gardenia, sea randa, zebra wood

Tuvaluan Names: *pua* (Ff, Nm; Tvd); *pua vao* (Nt; Koch 2002); *uli* (Nui; Woodroffe 1991)

Hedyotis romanzoffiensis (C & S) Fosb.

Ixora casei Hance

Common Name: giant red ixora

Tuvaluan Names: *kasilu* (from *katiru* in Kiribati; Ff); *lakau pula kula* (“red-flowered shrub”; Ff, Nm); *kula*

Ixora chinensis Lam.

Common Name: Chinese ixora

Tuvaluan Name: *kasilu* (Ff)

Morinda citrifolia L.

Common Names: beach mulberry, Indian mulberry, noni (Hawai’i)

Tuvaluan Names: *nonu* (Ff, Nm, Nt; TvD); *nonu Kilipati* (variety with large fruit from Kiribati); *te non* (Nui)

Oldenlandia corymbosa L.

Common Name: old world diamond flower

Spermacoce assurgens R. & P.

Common Name: buttonweed

Timonius polygamus (Forst. f.) Robinson

RUTACEAE (RUE FAMILY)

Citrus aurantifolia (Christm.) Swingle

Common Name: lime

Tuvaluan Names: *laim* (Ff, Nm); *laimi* (Ff; Seluka 1997)

Citrus limon (L.) Burm. f.

Common Names: rough lemon, lemon

Tuvaluan Names: *moli* (Ff; Tvd); *lemoni* (Nm)

Citrus mitis Blanco

Common Names: calamondin orange, musk lime, calamansi

Tuvaluan Name: *laimi* (Ff; Seluka 1997)

Murray koenigii (L.) Spreng.

Common Names: curry leaf, Indian bay leaf, karipilai

SANTALACEAE (SANDALWOOD FAMILY)

Santalum yasi Seem x *S. album* L.

Common Name: hybrid sandalwood

SCROPHULARIACEAE (SNAPDRAGON FAMILY)

Russelia equisetiformis Schlect. and Cham.

Common Names: firecracker flower, firecracker plant, fountain bush

Tuvaluan Name: *kaipauni* (from Kiribati *te kaibaun*; Ff, Nm)

SIMAROUBACEAE (QUASSIA FAMILY)

Soulamea amara Lam.

Common Names: soulamea, bitter tree

Tuvaluan Name: *lakau kona* (Seluka 1997)

SOLANACEAE (NIGHTSHADE FAMILY)

Capsicum annuum L. vars.

Common Names: annual chili pepper, red pepper, habanero

Tuvaluan Names: *tili*, *polo feū* (Ff, Nm; Tvd); *polo feū lasi* (“large”; Ff)

Capsicum annuum L. var. *grossum* (L.) Sendtn.

Common Names: bell pepper, sweet pepper, sweet capsicum, paprika
Tuvaluan Names: *pepa* (Ff, Nm ; TvD); *pepa magalo* (Seluka 1997)

Capsicum frutescens L.

Common Names: tabasco, bird chilli, perennial chili
Tuvaluan Names: *tili*, *polo feū*, *polo feū fōliki* ("small"; Ff, Nm; TvD)

Cestrum nocturnum L.

Common Names: night-blooming cestrum, night-blooming jasmine, queen of the night
Tuvaluan Names: *fafine o te po* ("lady of the night"; Ff); *pula po* ("night flower"; Seluka 1997)

Petunia hybrida Vilm.

Common Name: petunia

Physalis angulata L.

Common Names: cape gooseberry, bladderberry, ground cherry

Solanum lycopersicum L.

Common Name: tomato
Tuvaluan Name: *tomato* (Ff, Nm; TvD)

Solanum melongena L.

Common Names: eggplant, aubergine, brinjal
Tuvaluan Name: *paigani* (from the Fijian *baigani*, which comes from the Hindi *baigan*; Ff)

STERCULIACEAE (COCOA FAMILY)

Waltheria indica L.

Common Name: waltheria

SURIANACEAE (SURIANA FAMILY)

Suriana maritima L.

Common Name: bay cedar
Tuvaluan Names: *gie*, *gie cool?* (Woodroffe 1991); *ngie* (Nui; Woodroffe 1991)

TILIACEAE (LINDEN FAMILY)

Triumfetta procumbens Forst. f.

Common Name: beach burr
Tuvaluan Names: *tolotolo* (Ff, Nm; TvD); *kiaou* (Nui)

TURNERACEAE (TURNERA FAMILY)

Turnera ulmifolia L.

Common Names: yellow alder, sage rose, Marilopez, West Indian holly
Tuvaluan Name: *lakau pula sega* ("yellow-flowered plant"; Ff)

URTICACEAE (NETTLE FAMILY)

Laportea interrupta (L.) Chew

Common Name: Hawai'i woodnettle
Tuvaluan Names: *aluna* (Nm; Chambers 1984); *luna* (Nui; Woodroffe 1991)

Laportea ruderalis (Forst. f.) Chew

Common Name: weedy woodnettle
Tuvaluan Names: *luna* (Ff, Nm, Nt; TvD); *luna lanu lau niu* ("green"; Ff, Nm); *luna lanu kula* ("red"; Ff, Nm); *aluna* (Nm; Chambers 1984; Seluka 1997); *pakisikisi*

Pilea microphylla (L.) Liebm.

Common Name: artillery plant

Tuvaluan Names: *mouku vao* (Ff); *lakau paula* (Seluka 1997)

Pipturus argenteus (Forst. f.) Wedd. var. *argenteus*

Common Names: false stinger, white nettle, native mulberry, white mulberry

Tuvaluan Names: *fou tagata* (Ff); *fau vau* (Nm); *te pau* (Nui; Woodroffe 1991); *fau* (Nm; Chambers 1984); *lafau* (Nt; Koch 2002); *fau pa* (Nt; Koch 2002)

Procris pedunculata (Forst.) Wedd.

Common Name: procris

VERBENACEAE (VERBENA FAMILY)

Clerodendrum inerme L.

Common Name: beach privet

Tuvaluan Name: *inato* (from the Kiribati *te inato*; Ff, Nm, Nui; TvD)

Duranta erecta L.

Common Names: golden dewdrops, golden eardrops

Lantana camara L.

Common Name: lantana

Tuvaluan Name: *kaipuaka* (from the Kiribati *te kai buaka*; Ff, Nm)

Premna serratifolia L.

Common Names: false elderberry, headache tree

Tuvaluan Names: *valovalalo* (Ff; TvD); *aloalo* (Nm, Vt; TvD); *te ango* (Nui)

Stachytarpheta cayennensis (Ruioz & Pavon) Vahl

Common Names: blue rat's tail, false verbena

Tuvaluan Name: *lakau pakēkē* (Ff)

Stachytarpheta jamaicensis (L.) Vahl

Common Name: Jamaica vervain

Tuvaluan Name: *lakau pakēkē* (Ff)

Vitex trifolia L. var. *bicolor* (Lam) Mold.

Common Name: blue vitex

Tuvaluan Names: *lakau tā namu* ("plant that kills mosquitos"; Ff); *kanamunamu* (from the Marshallese *wutkanamunam*; Ff)

VITACEAE (GRAPE FAMILY)

Vitis sp.

Common Name: grape

Tuvaluan Names: *vine*, *vine mata* (TvD)

Appendix 2: Checklist of Tuvalu Plant Species (Flora Data Sheet)

Appendix 2 Table 1 Ferns

Ferns			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Katafa	<i>Asplenium nidus</i>	Aspleniaceae						
Laukatafa	<i>Asplenium nidus</i>	Aspleniaceae						
Laukimoa	<i>Nephrolepis acutifolia</i>	Nephrolepidaceae						
Laukisikisi	<i>Pteris tripartita</i>	Pteridaceae						
Maile	<i>Microsorium grossum</i>	Polypodiaceae						
Maile	<i>Microsorium grossum</i>	Polypodiaceae						
Maile	<i>Microsorium grossum</i>	Polypodiaceae						
Mutie	<i>Nephrolepis hirsutula</i>	Nephrolepidaceae						
Paotua	<i>Psilotum nudum</i>	Psilotaceae						
Sai	<i>Psilotum nudum</i>	Psilotaceae						
Silotau	<i>Pteris tripartita</i>	Pteridaceae						
Sulufe	<i>Nephrolepis acutifolia</i>	Nephrolepidaceae						
Sulufe	<i>Nephrolepis hirsutula</i>	Nephrolepidaceae						
Sulufe	<i>Sphaerostephanos invisus</i>	Thelypteridaceae						
	<i>Azola pinnata</i>	Azollaceae						
	<i>Nephrolepis exaltata</i>	Nephrolepidaceae						

Appendix 2 Table 2 Gymnosperms

Gymnosperms			Island	Vegetation				
FAMILY	LATIN NAME	TUVALU NAME		1	2	3	4	5
Araucariaceae	<i>Araucaria columnaris</i>	Lakau Kilisimasi						
Cycadaceae	<i>Cycas rumphii</i>	Laupama						

Appendix 2 Table 3 Angiosperms – Monocotyledons

Angiosperms – Monocotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
alovela	<i>Aloe vera</i>	Agavaceae						
Aniani	<i>Allium fistulosum</i>	Alliaceae						
Chinese chives	<i>Allium tuberosum</i>	Alliaceae						
Chives	<i>Allium schoenoprasum</i>	Alliaceae						
Fala	<i>Ananas comosus</i>	Bromeliaceae						
Fala	<i>Pandanus tectorius</i>	Pandanceae						
Fala vao	<i>Pandanus tectorius</i>	Pandanceae						
Fatu piniki	<i>Tradesantia pallida</i>	Commelinaceae						
Fuamaoluga	<i>Musa AAA</i>	Musaceae						
Fuamaulalo	<i>Musa AAA</i>	Musaceae						
Futi	<i>Musa sp</i>	Musaceae						
Garlic	<i>Allium sativum</i>	Alliaceae						
Kaleve	<i>Saccharum officinarum</i>	Poaceae						
Kape	<i>Alocasia macrorrhizos</i>	Araceae						
Kateketeke	<i>Cenchrus echinatus</i>	Poaceae						

Angiosperms – Monocotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Kefu	Musa ABB	Musaceae						
Kofe	Shizostachym glaucifolium	Poaceae						
Lakau fai tika	Mariscus javanicus	Cyperaceae						
Lakau laupiki	Gloria superba	Liliaceae						
Launiu	Dracaena angustifolia	Agavaceae						
Lauti	Cordyline fruticosa	Agavaceae						
Lili	Hippeastrum puniceum	Amaryllidaceae						
Lili	Hymenocallis pedalis	Amaryllidaceae						
Lily	Proiphys amboinensis	Amaryllidaceae						
Misiluki	Musa AB	Musaceae						
Moegalo	Cymbopogon citratus	Poaceae						
Mouku	Chloris barbata	Poaceae						
Mouku	Cynodon dactylon	Poaceae						
Mouku	Cyperus compressus	Cyperaceae						
Mouku	Cyperus involucratus	Cyperaceae						
Mouku	Cyperus odoratus	Cyperaceae						
Mouku	Dactyloctenium aegyptium	Poaceae						
Mouku	Digitaria setigera	Poaceae						
Mouku	Echinochloa colona	Poaceae						
Mouku	Eleusine indica	Poaceae						
Mouku	Ischaemum murinum	Poaceae						
Mouku	Kyllinga nemoralis	Cyperaceae						
Mouku	Leturus repens	Poaceae						
Mouku	Paspalum vaginatum	Poaceae						
Mouku	Pycreus polystachyos	Cyperaceae						
Mouku	Stenotaphrum micranthum	Poaceae						
Mouku	Tradesantia zebrina	Commelinaceae						
Mouku filifou	Mariscus javanicus	Cyperaceae						
Mouku milimili taliga	Fimbristylis cymosa	Cyperaceae						
Mouku solo	Commelina diffusa	Commelinaceae						
Mouku solo	Thuarea involuta	Poaceae						
Mouku talatala	Cenchrus echinatus	Poaceae						
Mouku Tapu	Cenchrus echinatus	Poaceae						
Mouku tolo	Commelina diffusa	Commelinaceae						
Muta	Cyperus rotundus	Cyperaceae						
Nareau	Gloria superba	Liliaceae						
Niu	Cocos nucifera	Arecaceae						
Niu piu	Pritchardia pacifica	Arecaceae						
Paama sama	Chrysalidocarpus lutescens	Arecaceae						
Painapolo	Ananas comosus	Bromeliaceae						
Pata	Musa ABB	Musaceae						
Pulaka	Cyrtosperma chamissonis	Araceae						

Angiosperms – Monocotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Sika	Mariscus javanicus	Cyperaceae						
Susana	Zephyranthes rosea	Amaryllidaceae						
Talasiba kena	Dracaena sanderiana	Agavaceae						
Taliga kula	Caladium bicolor	Araceae						
Taliga lasi	Alocasia sanderiana	Araceae						
Talo	Colocasia esculenta	Araceae						
Talo ni tana	Xanthosoma sagittifolium	Araceae						
Talo ni tana	Xanthosoma violeceum	Araceae						
Talo palagi	Caladium bicolor	Araceae						
Talotalo	Crinum asiaticum	Amaryllidaceae						
Talotalo	Crinum augustum	Amaryllidaceae						
Talotalo	Crinum zeylanicum	Amaryllidaceae						
Talotalo palagi	Crinum xanthophyllum	Amaryllidaceae						
Tamtama ai lima	Musa AB	Musaceae						
Tamu	Alocasia macrorrhizos	Araceae						
Tapua	Crinum asiaticum	Amaryllidaceae						
Tapua	Crinum augustum	Amaryllidaceae						
Tapua	Crinum zeylanicum	Amaryllidaceae						
Tapua lau makaikai	Sansevieria trifasciata	Agavaceae						
Tapua palagi	Crinum xanthophyllum	Amaryllidaceae						
Ti	Cordyline fruticosa	Agavaceae						
Ti	Cordyline fruticosa	Agavaceae						
Tikopia	Shizostachym glaucifolium	Poaceae						
Tinitia	Alpinia purpurata	Zingiberaceae						
Tivoli	Dioscorea nummularia	Dioscoreaceae						
Tolo	Saccharum officinarum	Poaceae						
Tuuteu	Epipremnum pinnatum	Araceae						
Ufi	Dioscorea alata	Dioscoreaceae						
Vanila	Vanilla planifolia	Orchidaceae						
Vatia	Tacca leontopetaloides	Taccaceae						
	Aglaonema commutatum	Araceae						
	Alpinia vittata	Zingiberaceae						
	Asparagus officinalis	Liliaceae						
	Axonopus compressus	Poaceae						
	Bothriochloa bladhii	Poaceae						
	Brachiara bladhii	Poaceae						
	Brachiara subquadripara	Poaceae						
	Callisia fragrans	Commelinaceae						
	Canna generalis	Cannaceae						
	Canna indica	Cannaceae						
	Chlorophytum comosum	Liliaceae						
	Costus malortianus	Zingiberaceae						

Angiosperms – Monocotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
	<i>Costus speciosus</i>	Zingiberaceae						
	<i>Costus woodsonii</i>	Zingiberaceae						
	<i>Dieffenbachia maculata</i>	Araceae						
	<i>Digitaria ciliaris</i>	Poaceae						
	<i>Digitaria radicata</i>	Poaceae						
	<i>Eleocharis geniculata</i>	Cyperaceae						
	<i>Fimbristylis dichotoma</i>	Cyperaceae						
	<i>Heliconia collinsiana</i>	Heliconiaceae						
	<i>Kyllinga brevifolia</i>	Cyperaceae						
	<i>Lepturopetium kuniense</i>	Poaceae						
	<i>Papilionanthe</i>	Orchidaceae						
	<i>Philodendron scandens</i>	Araceae						
	<i>Ptychosperma macarthuri</i>	Arecaceae						
	<i>Spathiphyllum</i> sp	Araceae						
	<i>Sporobolus fertilis</i>	Poaceae						
	<i>Syngonium podophyllum</i>	Araceae						
	<i>Tradesantia spathacea</i>	Commelinaceae						
	<i>Trimezia martinicensis</i>	Iridaceae						
	<i>Xanthosoma brasilense</i>	Araceae						
	<i>Zea mays</i>	Poaceae						
	<i>Zingiber officinale</i>	Zingiberaceae						

Appendix 2 Table 4 Angiosperms – Dicotyledons

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Aka ta	<i>Abutilon indicum</i>	Malvaceae						
Akanita	<i>Bougainvillea glabra</i>	Nyctaginaceae						
Akata	<i>Sida fallax</i>	Malvaceae						
Akata	<i>Sida rhombifolia</i>	Malvaceae						
Aloalo	<i>Premna serratifolia</i>	Verbenaceae						
Aluna	<i>Laportea interrupta</i>	Urticaceae						
Ateate	<i>Wollastonia biflora</i>	Asteraceae						
Aute	<i>Hibiscus rosa-sinesis</i>	Malvaceae						
Aute kula	<i>Hibiscus rosa-sinesis</i>	Malvaceae						
Avocado	<i>Persea americana</i>	Lauraceae						
Bele sama	<i>Tecoma stans</i>	Bignoniaceae						
Carrot	<i>Daucus carota</i>	Apiaceae						
Coriander	<i>Coriandrum sativum</i>	Apiaceae						
Eveeve	<i>Chamaesyce atoto</i>	Euphorbiaceae						
Eveeve lauefa	<i>Boerhavia tetrandra</i>	Nyctaginaceae						
Fafine o te po	<i>Cestrum nocturnum</i>	Solanaceae						
Fao	<i>Ochrosia oppositifolium</i>	Apocynaceae						

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Felo palagi	<i>Ficus carica</i>	Moraceae						
Felo palagi	<i>Ficus tinctoria</i>	Moraceae						
Fetai	<i>Cassytha filiformis</i>	Lauraceae						
Fetau	<i>Calophyllum inophyllum</i>	Clusiaceae						
Fou	<i>Hibiscus tiliaceus</i>	Malvaceae						
Fou tagata	<i>Pipturus argenteus</i>	Urticaceae						
Fuatausaga	<i>Delonix regia</i>	Fabaceae						
Fue	<i>Ipomoea macrantha</i>	Convolvulaceae						
Fue	<i>Ipomoea pes-caprae</i>	Convolvulaceae						
Fue	<i>Ipomoea triloba</i>	Convolvulaceae						
Fue kena	<i>Ipomoea macrantha</i>	Convolvulaceae						
Fue piniki	<i>Ipomoea pes-caprae</i>	Convolvulaceae						
Futu	<i>Barringtonia asiatica</i>	Barringtoniaceae						
Gasu	<i>Scaevola taccada</i>	Goodeniaceae						
Gie	<i>Pemphis acidula</i>	Lythraceae						
Gie	<i>Suriana maritima</i>	Surianaceae						
Inato	<i>Clerodendrum inerme</i>	Verbenaceae						
Iukalipi	<i>Eucalyptus sp</i>	Myrtaceae						
Kafutu	<i>Barringtonia asiatica</i>	Barringtoniaceae						
Kaipakoa	<i>Acacia farnesiana</i>	Fabaceae						
Kaipauuni	<i>Russelia equisetiformis</i>	Scrophulariaceae						
Kaipuaka	<i>Lantana camara</i>	Verbenaceae						
Kalakalapuhi kula	<i>Acalypha hispida</i>	Euphorbiaceae						
Kalakalapuki	<i>Acalypha grandis</i>	Euphorbiaceae						
Kalampola	<i>Averrhoa carambola</i>	Oxalidaceae						
Kalihilihi	<i>Boerhavia tetrandra</i>	Nyctaginaceae						
Kalisi lisi	<i>Boerhavia repens</i>	Nyctaginaceae						
Kanana	<i>Ximenia americana</i>	Olacaceae						
Kanava	<i>Cordia subcordata</i>	Boraginaceae						
Kanava palagi	<i>Cordia sebestena</i>	Boraginaceae						
Kapisi pukupuku	<i>Brassica oleracea</i>	Brassicaceae						
Kapisi saina	<i>Brassica chinensis</i>	Brassicaceae						
Kapisi saina	<i>Brassica juncea</i>	Brassicaceae						
Kapisi saina	<i>Brassica x hybridus</i>	Brassicaceae						
Kasilu	<i>Ixora casei</i>	Rubiaceae						
Kasilu	<i>Ixora chinensis</i>	Rubiaceae						
Kasitati apolo	<i>Annona squamosa</i>	Annonaceae						
Katuli	<i>Portulaca australis</i>	Portulacaceae						
Katuli	<i>Portulaca lutea</i>	Portulacaceae						
Katuli	<i>Portulaca oleracea</i>	Portulacaceae						
Katuli palagi	<i>Portulaca umbraticola</i>	Portulacaceae						
Kisikisi	<i>Boerhavia tetrandra</i>	Nyctaginaceae						

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Kuava	<i>Psidium guajava</i>	Myrtaceae						
Kukama	<i>Cucumis sativa</i>	Cucurbitaceae						
Kumala	<i>Ipomoea batatas</i>	Convolvulaceae						
Kunikuni	<i>Terminalia catappa</i>	Combretaceae						
Laimi	<i>Citrus aurantifolia</i>	Rutaceae						
Laimi	<i>Citrus mitis</i>	Rutaceae						
Lakau Amelika	<i>Pluchea carolinensis</i>	Asteraceae						
Lakau fai fuaga	<i>Leucaena leucocephala</i>	Fabaceae						
Lakau kena	<i>Pseuderanthemum carruthersii</i> <i>var. carruthersii</i>	Acanthaceae						
Lakau kena	<i>Pseuderanthemum carruthersii</i> <i>var. reticulatum</i>	Acanthaceae						
Lakau Kilisimasi	<i>Casuarina equisetifolia</i>	Casuarinaceae						
Lakau kona	<i>Soulamea amara</i>	Simaroubaceae						
Lakau o galiga	<i>Wollastonia biflora</i>	Asteraceae						
Lakau pakeke	<i>Stachytarpheta cayennensis</i>	Verbenaceae						
Lakau pakeke	<i>Stachytarpheta jamaicensis</i>	Verbenaceae						
Lakau pula kena	<i>Pseuderanthemum carruthersii</i> <i>var. carruthersii</i>	Acanthaceae						
Lakau pula sega	<i>Ludeigia octovalvis</i>	Onagraceae						
Lakau pula sega	<i>Turnera ulmifolia</i>	Turneraceae						
Lakau sopu	<i>Colubrina asiatica</i>	Rhamnaceae						
Lakau ta namu	<i>Vitex trifoliata</i>	Verbenaceae						
Lakau toto	<i>Pedilanthus titymaloides</i>	Euphorbiaceae						
Lakau uli	<i>Pseuderanthemum carruthersii</i> <i>var. atropurpureum</i>	Acanthaceae						
Lau kapa	<i>Oxalis corniculata</i>	Oxalidaceae						
Lautagitagi	<i>Polyscias filicifolia</i>	Araliaceae						
Lautagitagi	<i>Polyscias fruticosa</i>	Araliaceae						
Lautagitagi	<i>Polyscias guifoylei</i>	Araliaceae						
Lautagitagi	<i>Polyscias scutellaria</i>	Araliaceae						
Lautagitagi	<i>Pseuderanthemum carruthersii</i> <i>var. atropurpureum</i>	Acanthaceae						
Lautagitagi fou	<i>Codiaeum variegatum</i>	Euphorbiaceae						
Lautagitagi laukilikili	<i>Polyscias fruticosa</i>	Araliaceae						
Lautamatama	<i>Achyranthes canescens</i>	Amaranthaceae						
Letisi	<i>Lactuca sativa</i>	Asteraceae						
Lipilipi	<i>Adenostemma lanceolatum</i>	Asteraceae						
Lita	<i>Rorippa sarmentosa</i>	Brassicaceae						
Lopaa	<i>Adenantha pavonina</i>	Fabaceae						
Luna	<i>Laportea interrupta</i>	Urticaceae						
Luna	<i>Laportea ruderalis</i>	Urticaceae						

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Maqo	<i>Mangifera indica</i>	Anacardiaceae						
Mei	<i>Artocarpus altilis</i>	Moraceae						
Meleni	<i>Citrullus lanatus</i>	Cucurbitaceae						
Meleni	<i>Cucumis melo</i>	Cucurbitaceae						
Melia	<i>Plumeria rubra</i>	Apocynaceae						
Melia Solomona	<i>Plumeria obtusa</i>	Apocynaceae						
Mili	<i>Adenostemma lanceolatum</i>	Asteraceae						
Mili	<i>Pluchea carolinensis</i>	Asteraceae						
Mili	<i>Pluchea indica</i>	Asteraceae						
Mili kai	<i>Ocimum basilicum</i>	Lamiaceae						
Mili manogi	<i>Ocimum tenuiflorum</i>	Lamiaceae						
Milo	<i>Thespesia populnea</i>	Malvaceae						
Miniti	<i>Mentha pipeaita</i>	Lamiaceae						
Moli	<i>Citrus limon</i>	Rutaceae						
Mouku	<i>Chamaesyce thymifolia</i>	Euphorbiaceae						
Mouku	<i>Synedrella nodiflora</i>	Asteraceae						
Mouku Amelika	<i>Mikania micrantha</i>	Asteraceae						
Mouku fai pula	<i>Cyanthillium cinereum</i>	Asteraceae						
Mouku fai pula	<i>Tridax procumbens</i>	Asteraceae						
Mouku laupukupuku	<i>Phyllanthus amarus</i>	Euphorbiaceae						
Mouku matiotio	<i>Mimosa pudica</i>	Fabaceae						
Mouku solo	<i>Boerhavia repens</i>	Nyctaginaceae						
Mouku toto	<i>Chamaesyce atoto</i>	Euphorbiaceae						
Mouku toto	<i>Chamaesyce hirta</i>	Euphorbiaceae						
Mouku toto	<i>Chamaesyce hypericifolia</i>	Euphorbiaceae						
Mouku vao	<i>Pilea microphylla</i>	Urticaceae						
Nameana	<i>Annona squamosa</i>	Annonaceae						
Nikilailai	<i>Tecoma stans</i>	Bignoniaceae						
Nonu	<i>Morinda citrifolia</i>	Rubiaceae						
Nui	<i>Hernandia nymphaefolia</i>	Hernandiaceae						
Ogoogo	<i>Acalypha grandis</i>	Euphorbiaceae						
Ogoogo kula	<i>Acalypha hispida</i>	Euphorbiaceae						
Ogoogo kula	<i>Acalypha wilkesiana</i>	Euphorbiaceae						
Okala	<i>Abelmoschus esculentus</i>	Malvaceae						
Olesi	<i>Carica papaya</i>	Caricaceae						
Paigani	<i>Solanum melongena</i>	Solanaceae						
Panikeni	<i>Cucurbita moschata</i>	Cucurbitaceae						
Panikeni	<i>Cucurbita sp</i>	Cucurbitaceae						
Paopao	<i>Ochrosia oppositifolium</i>	Apocynaceae						
Pasinifuluti	<i>Passiflora edulis</i>	Passifloraceae						
Pateta	<i>Ipomoea batatas</i>	Convolvulaceae						
Pele	<i>Abelmoschus manihot</i>	Malvaceae						

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
pele	<i>Cnidocolus chayamansa</i>	Euphorbiaceae						
Peteli	<i>Catharanthus roseus</i>	Apocynaceae						
Peteli Kena	<i>Catharanthus roseus</i>	Apocynaceae						
Peteli Kula	<i>Catharanthus roseus</i>	Apocynaceae						
Piini	<i>Phaseolus vulgaris</i>	Fabaceae						
Piini	<i>Vigna sesquipadalia</i>	Fabaceae						
Polo feu	<i>Capsicum annum</i>	Solanaceae						
Polo feu	<i>Capsicum frutescens</i>	Solanaceae						
Pua	<i>Guettarda speciosa</i>	Rubiaceae						
Pua Fiti	<i>Plumeria rubra</i>	Apocynaceae						
Pua Fiti Solomona	<i>Plumeria obtusa</i>	Apocynaceae						
Pua vao	<i>Guettarda speciosa</i>	Rubiaceae						
Puka	<i>Hernandia nymphaefolia</i>	Hernandiaceae						
Puka	<i>Pisonia grandis</i>	Nyctaginaceae						
Pukavai	<i>Pisonia grandis</i>	Nyctaginaceae						
Pulukamu	<i>Casuarina equisetifolia</i>	Casuarinaceae						
Raintree	<i>Samanea saman</i>	Fabaceae						
Sagale	<i>Lumnitzera littorea</i>	Combretaceae						
Saitiani	<i>Moringa oleifera</i>	Moringaceae						
Saketa	<i>Canavalia cathartica</i>	Fabaceae						
Saketa	<i>Mucuna gigantea</i>	Fabaceae						
Saketa	<i>Vigna marina</i>	Fabaceae						
Saketa laukili	<i>Mikania micrantha</i>	Asteraceae						
Saosopu	<i>Annona muricata</i>	Annonaceae						
sesipania	<i>Senbania grandiflora</i>	Fabaceae						
Siale	<i>Gardenia taitensis</i>	Rubiaceae						
Silalii	<i>Apium graveolens</i>	Apiaceae						
Sisi vau	<i>Achyranthes aspera</i>	Amaranthaceae						
Suipi Kula	<i>Pseuderanthemum carruthersii</i> <i>var. atropurpureum</i>	Acanthaceae						
Talatalamoa	<i>Caesalpinia bonduc</i>	Fabaceae						
Talatalamoa	<i>Ximenia americana</i>	Olacaceae						
Talie	<i>Terminalia samoensis</i>	Combretaceae						
Tamalini	<i>Tamarindus indicus</i>	Fabaceae						
Tamatama	<i>Achyranthes aspera</i>	Amaranthaceae						
Tamatama	<i>Achyranthes canescens</i>	Amaranthaceae						
Tapioka	<i>Manihot esculenta</i>	Euphorbiaceae						
Te kunikuni	<i>Terminalia catappa</i>	Combretaceae						
Te toga	<i>Rhizophora stylosa</i>	Rhizophoraceae						
Teao'aua	<i>Mirabilis jalapa</i>	Nyctaginaceae						
Tiale	<i>Gardenia taitensis</i>	Rubiaceae						
Tiale fiti	<i>Gardenia augusta</i>	Rubiaceae						

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
Tili	<i>Capsicum annuum</i>	Solanaceae						
Tili	<i>Capsicum frutescens</i>	Solanaceae						
Titi vau	<i>Achyranthes aspera</i>	Amaranthaceae						
Togo	<i>Rhizophora stylosa</i>	Rhizophoraceae						
Tokotu	<i>Lumnitzera littorea</i>	Combretaceae						
Tolotolo	<i>Triumfetta procumbens</i>	Tiliaceae						
Tomato	<i>Solanum lycopersicum</i>	Solanaceae						
Tutupi	<i>Zizyphus mauritiana</i>	Rhamnaceae						
Valovalo	<i>Premna serratifolia</i>	Verbenaceae						
	<i>Alternanthera brasiliana</i>	Amaranthaceae						
	<i>Alternanthera sessilis</i>	Amaranthaceae						
	<i>Alternanthera sissoo</i>	Amaranthaceae						
	<i>Alternanthera tenella</i>	Amaranthaceae						
	<i>Alysicarpus vaginalis</i>	Fabaceae						
	<i>Amaranthus argentea</i>	Amaranthaceae						
	<i>Amaranthus hypochondriacus</i>	Amaranthaceae						
	<i>Amaranthus tricolor</i>	Amaranthaceae						
	<i>Asclepias curassavica</i>	Asclepiadaceae						
	<i>Asystasia salicifolia</i>	Acanthaceae						
	<i>Basella rubra</i>	Basellaceae						
	<i>Bauhinia sp</i>	Fabaceae						
	<i>Begonia sp</i>	Begoniaceae						
	<i>Benicasa hispida</i>	Cucurbitaceae						
	<i>Bidens pilosa</i>	Asteraceae						
	<i>Caesalpinia pulcherrima</i>	Fabaceae						
	<i>Cajanus scarabaeoides</i>	Fabaceae						
	<i>Celosia argentea</i>	Amaranthaceae						
	<i>Centella asistica</i>	Apiaceae						
	<i>Chamaesyce prostrata</i>	Euphorbiaceae						
	<i>Chrysothemis pulchella</i>	Gesneriaceae						
	<i>Cleome rutidosperma</i>	Capparidaceae						
	<i>Cleome viscosa</i>	Capparidaceae						
	<i>Clitorea ternatea</i>	Fabaceae						
	<i>Coccoloba uvifera</i>	Polygonaceae						
	<i>Crateva religiosa</i>	Capparidaceae						
	<i>Crotalaria pallida</i>	Fabaceae						
	<i>Cucurbita maxima</i>	Cucurbitaceae						
	<i>Dentella repens</i>	Rubiaceae						
	<i>Desmodium heterophyllum</i>	Fabaceae						
	<i>Desmodium incanum</i>	Fabaceae						
	<i>Duranta erecta</i>	Verbenaceae						
	<i>Eclipta prostrata</i>	Asteraceae						

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
	<i>Emilia fosbergii</i>	Asteraceae						
	<i>Eruca sativa</i>	Brassicaceae						
	<i>Euphorbia cyathophora</i>	Euphorbiaceae						
	<i>Euphorbia heterophylla</i>	Euphorbiaceae						
	<i>Euphorbia milii</i>	Euphorbiaceae						
	<i>Euphorbia sp.</i>	Euphorbiaceae						
	<i>Gomphrena globosa</i>	Amaranthaceae						
	<i>Hedyotis romanzoffiensis</i>	Rubiaceae						
	<i>Hemigraphis alternata</i>	Acanthaceae						
	<i>Hylocereus undatus</i>	Cactaceae						
	<i>Impatiens balsamina</i>	Balasaminaceae						
	<i>Ipomoea aquatica</i>	Convolvulaceae						
	<i>Jatropha integerrima</i>	Euphorbiaceae						
	<i>Lagenaria siceraria</i>	Cucurbitaceae						
	<i>Luffa acutangula</i>	Cucurbitaceae						
	<i>Luffa cylindrica</i>	Cucurbitaceae						
	<i>Macroptilium atropurpureum</i>	Fabaceae						
	<i>Macroptilium lathyroides</i>	Fabaceae						
	<i>Malpighia glabra</i>	Malpighiaceae						
	<i>Malvastrum coromandelianum</i>	Malvaceae						
	<i>Melia azedarach</i>	Meliaceae						
	<i>Momordica charantha</i>	Cucurbitaceae						
	<i>Murray koenigii</i>	Rutaceae						
	<i>Nerium oleander</i>	Apocynaceae						
	<i>Odontonema tubiforme</i>	Acanthaceae						
	<i>Oldenlandia corymbosa</i>	Rubiaceae						
	<i>Opuntia sp.</i>	Cactaceae						
	<i>Peperomia pellucida</i>	Piperaceae						
	<i>Petunia hybrida</i>	Solanaceae						
	<i>Phlox x drummondii</i>	Polemoniaceae						
	<i>Phyllanthus acidus</i>	Euphorbiaceae						
	<i>Phyllanthus acidus</i>	Euphorbiaceae						
	<i>Phyllanthus urinaria</i>	Euphorbiaceae						
	<i>Physalis angulata</i>	Solanaceae						
	<i>Piper aduncum</i>	Piperaceae						
	<i>Plectranthus amboinicus</i>	Lamiaceae						
	<i>Plectranthus scutellarioides</i>	Lamiaceae						
	<i>Portulaca grandiflora</i>	Portulacaceae						
	<i>Procris pedunculata</i>	Urticaceae						
	<i>Ricinus communis</i>	Euphorbiaceae						
	<i>Rivina humilis</i>	Phytolacaceae						
	<i>Ruellia prostrata</i>	Acanthaceae						

Angiosperms – Dicotyledons			Island	Vegetation				
Tuvalu Name	Latin Name	Family		1	2	3	4	5
	<i>Santalum yasi</i>	Santalaceae						
	<i>Sauropus androgynus</i>	Euphorbiaceae						
	<i>Senecio chenopodioides</i>	Asteraceae						
	<i>Senna occidentalis</i>	Fabaceae						
	<i>Senna tora</i>	Fabaceae						
	<i>Sesbania cannabina</i>	Fabaceae						
	<i>Sophora tomentosa</i>	Fabaceae						
	<i>Spermococe assurgens</i>	Rubiaceae						
	<i>Sphagneticola trilobata</i>	Asteraceae						
	<i>Syzygium malaccense</i>	Myrtaceae						
	<i>Tabermontana divaricata</i>	Apocynaceae						
	<i>Tagetes erecta</i>	Asteraceae						
	<i>Thunbergia erecta</i>	Acanthaceae						
	<i>Timonius polygamus</i>	Rubiaceae						
	<i>Tournefortia argentea</i>	Boraginaceae						
	<i>Vigna unguiculata</i>	Fabaceae						
	<i>Vitis sp</i>	Vitaceae						
	<i>Waltheria indica</i>	Sterculiaceae						
	<i>Zinnia elegans</i>	Asteraceae						

Appendix 3: Vegetation Survey Data Sheets

APPENDIX 3. Vegetation Survey Record Sheet

The vegetation codes are: 1. Inland broadleaf forest and woodland; 2. Coastal littoral forest and scrub; 3. Mangroves and wetlands; 4. Coconut woodland and agroforest; 5. Disturbed – gardens, village houseyards, disturbed ruderal vegetation and recently reclaimed unvegetated area.

VEGETATION SURVEY RECORD SHEET

Date		GPS Reading		
Island				
Transect				
Vegetation		Compass		
Distance	Species	DBH (cm)	H1(m)	H2(m)

Appendix 4: Aerial images used for proposed vegetation survey sites

APPENDIX 4. VEGETATION SURVEY POINTS

The points have been selected based on google earth map. There was no ground truthing done. This is only to act as a guide to give ideas of where you can place the transects. The target is to place the transects so that it is representative of the different habitats present on these island groups. Our aim is to survey 10 – 15 transects per island group.

Appendix 4a Niuatou



Appendix 4b Vaitupu



Appendix 4c Funafuti 1



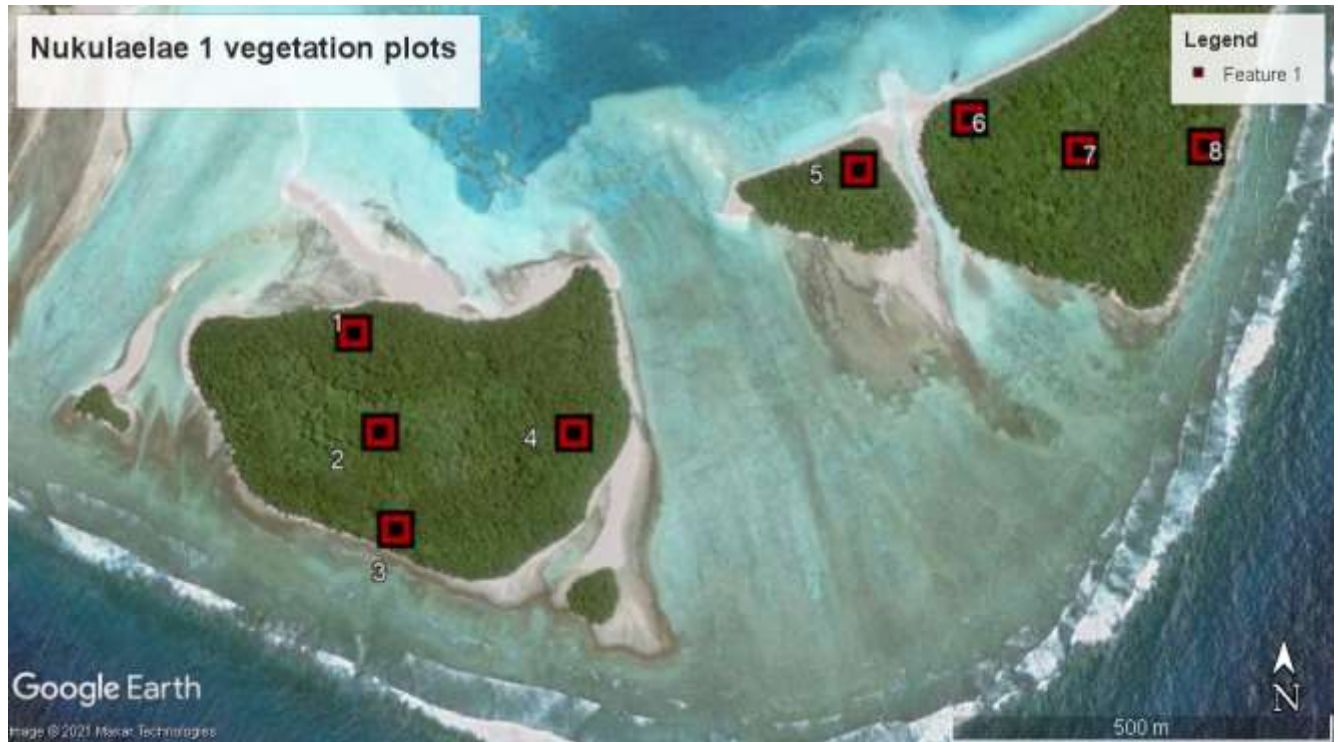
Appendix 4c Funafuti 2



Appendix 4c. Funafuti Option 2.



Appendix 4d Nukulaelae 1



Appendix 4d Nukulaelae 2



Appendix 5: Terrestrial Vertebrate Checklist & ID Chart

Appendix 5a – Vertebrate Species Checklist (based on Tuvalu Marine Marine Life Project - 2009)

TUVALUAN NAME	COMMON NAME	SPECIES	FAMILY
Land birds			
Manukiki	Buff-banded Rail	<i>Gallirallus philippensis</i>	Rallidae
Pisini	Feral Pigeon	<i>Columba livia Feral</i>	Columbidae
Lupe	Pacific pigeon	<i>Ducula pacifica</i>	Columbidae
Lupe palangi	Ground dove	<i>Gallicolumba erythroptera</i>	Columbidae
Moa	Red junglefowl/Domestic fowl	<i>Gallus gallus</i>	Phasianidae
Kaleva	Long tailed cuckoo	<i>Eudynamis taitensis</i>	Anatidae
Taki	Muscovy Duck	<i>Cairina moschata</i>	Cuculidae
Wetland & shore birds			
Fouga	Whimbrel	<i>Numenius phaeopus</i>	Scolopacidae
Kaka/Kotau	Pacific or Bar-tailed godwit	<i>Limosa lapponica</i>	Scolopacidae
Kilikilitai	Wandering Tattler	<i>Heteroscelus incanus</i>	Scolopacidae
Kolili	Ruddy Turnstone	<i>Arenaria interpres</i>	Charadriidae
Kolili	Sanderling	<i>Calidris alba</i>	Scolopacidae
Matuku	Pacific reef heron	<i>Egretta sacra</i>	Ardeidae
Fouga	Bristle-thighed curlew	<i>Numenius tahitensis</i>	Scolopacidae
Tola	Northern shoveller	<i>Anas clypeata</i>	Anatidae
Tola	Mallard	<i>Anas platyrhynchos</i>	Anatidae
Tuli	Pacific golden plover	<i>Pluvialis dominica</i>	Charadiidae
Vivitai	Eurasian golden plover	<i>Pluvialis apricaria</i>	Charadiidae
	Ringed plover	<i>Charadrius hiaticula</i>	Charadiidae
	Grey-tailed Tattler	<i>Heteroscelus brevipes</i>	Scolopacida
Sea birds			
Kalakala	Grey-backed tern	<i>Sterna lunata</i>	Sternidae
Katafa	Lesser frigatebird	<i>Fregata ariel</i>	Fregatidae
Matapula	Black napped tern	<i>Sterna sumatrana</i>	Sternidae
Te-Kena	Red footed booby	<i>Sula sula</i>	Sulidae
Akiaki	White tern	<i>Gygis alba</i>	Sternidae
Gogo	Brown noddy	<i>Anous stolidus</i>	Sternidae
Katafa	Great frigatebird	<i>Fregata minor</i>	Fregatidae
Kotaa	Masked booby	<i>Sula dactylatra</i>	Sulidae s
Kotaa	Brown booby	<i>Sula leucogaster</i>	Sulidae
Lakia	Black noddy	<i>Anous minutus</i>	Sternidae
Lulu	Phoenix petrel	<i>Petrodoma alba</i>	Procellariidae
Lulu	Wedge-tailed shearwater	<i>Puffinus pacificus</i>	Procellariidae
Takupu	Little or Dusky shearwater	<i>Puffinus assimilis</i>	Procellariidae
Takupu	Audubon's shearwater	<i>Puffinus lherminieri</i>	Procellariidae
Talaliki	Sooty tern	<i>Sterna fuscata</i>	Sternidae
Talaliki	Grey-headed gull	<i>Larus cirrocephalus</i>	Laridae
Tavake	White tailed tropic bird	<i>Phaethon lepturus</i>	Phaetontidae
Tavaketoto	Red tailed tropic bird	<i>Phaethon rubricauda</i>	Phaetontidae

TUVALUAN NAME	COMMON NAME	SPECIES	FAMILY
Sea birds			
	Blue Noddy	<i>Procelsterna cerulea</i>	Sternidae
	Great crested tern	<i>Sterna bergii</i>	Sternidae
	Christmas Island shearwater	<i>Puffinus nativitatis</i>	Procellariidae
Land Reptiles			
	Cane Toad	<i>Rhinella marina</i>	Bufoidea
	Pygmy Snake-eyed Skink	<i>Cryptoblepharus eximius</i>	Scincidae
	Pacific Moth Skink	<i>Lipinia noctua</i>	Scincidae
	Oceania Snake-eye Skink	<i>Cryptoblepharus poecilopleurus</i>	Scincidae
	Striped Small-scaled Skink	<i>Emoia adspersa</i>	Scincidae
	Dark-bellied Copper-striped Skink	<i>Emoia impar</i>	Scincidae
	White-bellied Copper-triped Skink	<i>Emoia cyanura</i>	Scincidae
	Oceanic Gecko	<i>Gehyra oceanica</i>	Gekkonidae
	Mourning Gecko	<i>Lepidodactylus lugubris</i>	Gekkonidae
	Tuvaluan Forest Gecko	<i>Lepidodactylus tepukapili</i>	Gekkonidae
	Pacific Slender-roed Gecko	<i>Nactus pelagicus</i>	Gekkonidae
Mammals			
	Polynesian Rat	<i>Rattus exulans</i>	Muridae
	Norway Rat	<i>Rattus norvegicus</i>	Muridae
	Black/Ship Rat	<i>Rattus rattus</i>	Muridae
	House Mouse	<i>Mus musculus</i>	Muridae
	Cattle	<i>Bos taurus</i>	Bovidae
	Goat	<i>Capra hircus</i>	Bovidae
	Dog	<i>Canis familiaris</i>	Canidae
	Cat	<i>Felis catus</i>	Felidae
	Horse	<i>Equus ferus</i>	Equidae
	Pig	<i>Sus scrofa</i>	Suidae

Appendix 5b – Tuvalu Bird Identification Chart

LAND BIRDS



Manukiki, Buff-banded Rail



Pisini, Feral Pigeon



Lupe, Pacifica Pacific pigeon



Lupe palangi, Ground dove



Moa, Red junglefowl/Domestic fowl



Kaleva, Long tailed cuckoo



Taki, Muscovy Duck

WETLAND & SHORE BIRDS



Fouga, Whimbrel



Kaka/Kotau, Pacific or Bar-tailed godwit



Kilikilitai, Wandering Tattler



Kolili, Ruddy Turnstone



Kolili, Sanderling



Matuku, Pacific reef heron



Ouga, Bristle-thighed curlew



Tola, Northern shoveller



Tola, Mallard



Tuli, Pacific golden plover



Vivitai, Eurasian golden plover



Ringed plover

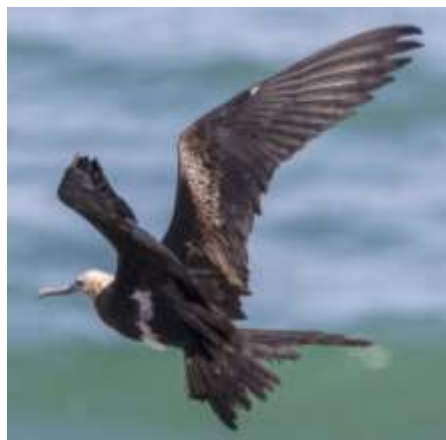


Grey-tailed Tattler

SEA BIRDS



Kalakala, Grey-backed tern



Katafa, Lesser frigatebird



Matapula, Black naped tern



Te-Kena, Red footed booby



Akiaki, White tern



Gogo, Brown noddy



Katafa, Great frigatebird



Kotaa, Masked booby



Kotaa, Brown booby



Lakia, Black noddy



Lulu, Phoenix petrel



Lulu, Wedge-tailed shearwater



Takupu, Little or Dusky shearwater



Takupu, Audubon's shearwater



Talaliki, Sooty tern



Talaliki, Grey-headed gull



Tavake, White tailed tropic bird



Tavaketoto, Red tailed tropic bird



Blue-Grey Noddy



Great crested tern



Christmas shearwater

Appendix 6: Sea-bird colony datasheet





Appendix 7: Sea-bird nest count datasheet





Appendix 8: Shore bird record datasheet




Appendix 9: Land bird record datasheet

Appendix 10: Reptile survey datasheet & ID Chart




APPENDIX 10b Reptile Identification Chart

TERRESTRIAL REPTILES			
CODE	COMMON NAME	SPECIES	PHOTO ID
Rhma	Cane Toad	<i>Rhinella marina</i>	
Crex	Pygmy Snake-eyed Skink	<i>Cryptoblepharus eximius</i>	
Lino	Pacific Moth Skink	<i>Lipinia noctua</i>	
Crpo	Oceania Snake-eye Skink	<i>Cryptoblepharus poecilopleurus</i>	

Emoads	Striped Small-scaled Skink	<i>Emoia adspersa</i>	
Emoimp	Dark-bellied Copper-striped Skink	<i>Emoia impar</i>	
Emocya	White-bellied Copper-triped Skink	<i>Emoia cyanura</i>	
Gehoce	Oceanic Gecko	<i>Gehyra oceanica</i>	

Leplug	Mourning Gecko	<i>Lepidodactylus lugubris</i>	
Hefre	Asian house gecko	<i>Hemidactylus frenatus</i>	
Leptep	Tuvaluan Forest Gecko	<i>Lepidodactylus tepukapili</i>	N/A
Nacpel	Pacific Slender-roed Gecko	<i>Nactus pelagicus</i>	

MARINE REPTILES

CODE	COMMON NAME	SPECIES	PHOTO ID
Cabi	Pacific Boa	<i>Candoia bibroni</i>	
Laco	Blue-lipped sea krait	<i>Laticauda laticauda</i>	
Rhma	Yellow bellied sea snake	<i>Hydrophis platurus</i>	

Appendix 11: UVC survey datasheets

Reef Check Belt Transect - Fish

Site Name: _____ **Country/Island:** _____

Transect Depth: _____ **Team Leader:** _____

Date: _____ **Start Time:** _____

Data recorded by (full names): _____

	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m
Butterflyfish Family Chaetodontidae					
Grunts/Sweetlips/Margates Family Haemulidae					
Snapper Family Lutjanidae					
Barramundi cod <i>Cromileptes altivelis</i>					
Humphead (Napoleon) wrasse <i>Cheilinus undulatus</i>					
Bumphead parrotfish <i>Bulbometopon muricatum</i>					
Other Parrotfish Family Scaridae					
Other Wrasse Family Labridae					
Damselfish & Clownfish Family Pomacentridae					
Moray Eel Family Muraenidae					
Groupers only >30cm Family Serranidae	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m
30-40 cm					
40-50 cm					
50-60 cm					
> 60 cm					
Rare animals sighted (#/type/size)	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m
Sharks					
Turtles					
Mantas					
Others					

Comments:

Reef Check Belt Transect - Butterflyfishes

Site Name: _____ **Country/Island:** _____
Transect Depth: _____ **Team Leader:** _____
Date: _____ **Start Time:** _____
Data recorded by (full names): _____

	Butterflyfish species	Transect no. _____				
		Segment	Segment	Segment	Segment	Segment
		1	2	3	4	5
1	<i>Chaetodon vagabundus</i> Vagabond					
2	<i>Chaetodon auriga</i> Threadfin					
3	<i>Chaetodon trifascialis</i> Chevroned					
4	<i>Chaetodon linoelatus</i> Lined					
5	<i>Chaetodon oxycephalus</i> Spot-nape					
6	<i>Chaetodon melannotus</i> Blackbacked					
7	<i>Chaetodon ulietensis</i> Double-saddled					
8	<i>Chaetodon unimaculatus</i> Teardrop					
9	<i>Chaetodon pelewensis</i> Dot and dash					
10	<i>Chaetodon baronessa</i> Triangle					
11	<i>Chaetodon mertensii</i> Merten's					
12	<i>Chaetodon ornatissimus</i> Ornate					
13	<i>Chaetodon bennetti</i> Bennett's					
14	<i>Chaetodon plebius</i> Bluespot					
15	<i>Chaetodon lunulatus</i> Redfin					
16	<i>Chaetodon rafflessi</i> Latticed					
17	<i>Chaetodon semeion</i> Dotted					
18	<i>Chaetodon citrinellus</i> Speckled					
19	<i>Forcipiger flavissimus</i> Forceps					
20	<i>Forcipiger longirostris</i> Long-nose					
21	<i>Chaetodon ephippium</i> Saddled					
22	<i>Chaetodon lunula</i> Racoon					
23	<i>Chaetodon quadrimaculatus</i> Fourspot					
24	<i>Chaetodon kleinii</i> Klein's					
25	<i>Chaetodon reticulatus</i> Reticulated					
26	<i>Chaetodon flavirostris</i> Black					
27	<i>Hemitaenichthys polyepsis</i> Pyramid					

Reef Check Belt Transect - Invertebrates

Site Name: _____ Country/Island: _____
 Transect Depth: _____ Team Leader: _____
 Date: _____ Start Time: _____
 Data recorded by (full names): _____

Invertebrates	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m
Banded Coral Shrimp <i>Stenopus hispidus</i>					
Long-spined Black Sea Urchin <i>Diadema & Echinothrix spp.</i>					
Pencil Urchin <i>Heterocentrotus mammillatus</i>					
Collector Urchin <i>Tripneustes spp.</i>					
Sea Cucumber Family Holothuriidae					
Crown-of-thorns Starfish <i>Acanthaster planci</i>					
Triton <i>Charonia tritonis</i>					
Lobsters (spiny and slipper) Malacostraca (Decapoda)					

Giant Clam (<i>Tridacna spp.</i>)	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m
<10cm					
10-20cm					
20-30cm					
40-50cm					
30-40cm					
> 50 cm					

Impacts: Coral Damage/Disease/ Bleaching/Trash	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m
Coral damage: Boat/Anchor					
Coral damage: Dynamite					
Coral damage: Other					
Trash: Fish Nets					
Trash: General					
Bleaching (% of coral population)*					
Bleaching (% of coral colony)					
Coral Disease (estimate % of colonies affected)	Black Band				
	White Band				
Rare animals sighted (#/type/size)	0-10 m	10-20 m	20-30 m	30-40 m	40-50 m
Sharks					
Turtles					
Mantas					
Others					

Comments:

*If you have counted the number of bleached HC on your substrate sheet, the percentages generated by the substrate DATA sheet (LINE 39) can be used to fill in the Bleaching (% of coral population) field.

Reef Check Line Transect - Substrate

Site name: _____
 Depth: _____
 Date: _____
 Time: _____

Country/Island: _____
 Team: _____
 Data recorded by: _____

Substrate Code:

HC - hard coral
 NIA - nutrient indicator algae
 RB - rubble
 OT - other

SC - soft coral
 SP - sponge
 SD - sand

RKC - recently killed coral
 RC - rock
 SI - silt/clay

OT - other

(For first segment, if start point is 0 m, last point is 9.5 m)

SEGMENT 1		SEGMENT 2		SEGMENT 3		SEGMENT 4		SEGMENT 5	
0 - 9.5m		10-19.5m		20-29.5m		30-39.5		40-49.5	
0		10		20		30		40	
0.5		10.5		20.5		30.5		40.5	
1		11		21		31		41	
1.5		11.5		21.5		31.5		41.5	
2		12		22		32		42	
2.5		12.5		22.5		32.5		42.5	
3		13		23		33		43	
3.5		13.5		23.5		33.5		43.5	
4		14		24		34		44	
4.5		14.5		24.5		34.5		44.5	
5		15		25		35		45	
5.5		15.5		25.5		35.5		45.5	
6		16		26		36		46	
6.5		16.5		26.5		36.5		46.5	
7		17		27		37		47	
7.5		17.5		27.5		37.5		47.5	
8		18		28		38		48	
8.5		18.5		28.5		38.5		48.5	
9		19		29		39		49	
9.5		19.5		29.5		39.5		49.5	

HC: All living coral including bleached coral; includes fire, blue and organ pipe corals

SC: Include zoanthids but not anemones (OT)

RKC: Coral that has died within the past year; appears fresh and white or with corallite structures still recognizable

NIA: All macro-algae except coralline, calcareous and turf (record the substrate beneath for these); Halimeda is recorded as OT; turf is shorter than 3cm

SP: All erect and encrusting sponges (but no tunicates)

RC: Any hard substrate; includes dead coral more than 1 yr old and may be covered by turf or encrusting coralline algae, barnacles, etc.

RB: Reef rocks between 0.5 and 15cm in diameter

SD: Sediment less than 0.5cm in diameter; in water, falls quickly to the bottom when dropped

SI: Sediment that remains in suspension if disturbed; recorded if color of the underlying surface is obscured by silt

OT: Any other sessile organism including sea anemones, tunicates, gorgonians or non-living Substrate

S1	S2	S3	S4	S5

of HC with bleaching: Count number of HC/B entered overleaf

of HC with disease: Count number of HC/D entered overleaf

If RKC is > 10%, is the primary cause:

Bleaching	
Storm	
COTS	
Other	

Comments:

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Appendix 12: Seagrass Meadow Datasheet

SEAGRASS-WATCH MONITORING


ONE OF THESE SHEETS IS TO BE FILLED OUT FOR EACH TRANSECT YOU SURVEY



OBSERVER: _____ DATE: ____/____/____
 LOCATION: _____
 SITE code: _____ TRANSECT no.: _____
 START TIME: _____ END TIME: _____

START of transect (GPS reading)

Latitude: _____° _____' _____" Longitude: _____° _____' _____"

Quadrat <i>(metres from transect origin)</i>	Sediment <i>(eg. mud/sand/shell)</i>	Comments <i>(eg 10x gastropods, 4x crab holes, dugong feeding trails, herbarium specimen taken)</i>	 (✓)	% Seagrass coverage	% Seagrass species composition					Canopy height (cm)	% Algae cover	% Epi-cover
1 (0m)												
2 (5m)												
3 (10m)												
4 (15m)												
5 (20m)												
6 (25m)												
7 (30m)												
8 (35m)												
9 (40m)												
10 (45m)												
11 (50m)												

END of transect (GPS reading)

Latitude: _____° _____' _____" Longitude: _____° _____' _____"

