



## Darwin Initiative Annual Report



### Darwin Project Information

Project Ref Number	15-007
Project Title	Focus for Fiji: Insect Inventories for Biodiversity Assessment
Country(ies)	Fiji
UK Contract Holder Institution	University of Sussex
Host country Partner Institution(s)	National Museums & Galleries of Wales
Other Partner Institution(s)	University of the South Pacific
Darwin Grant Value	£203,780
Start/End dates of Project	1 October 2006 – 30 September 2010 *
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1 April 2009 – 30 March 2010. Annual Report number 4
Project Leader Name	Dr Alan J A Stewart
Project website	<a href="http://www.usp.ac.fj/index.php?id=7040">http://www.usp.ac.fj/index.php?id=7040</a>
Author(s) and main contributors, date	Alan Stewart, Hilda Waqa; 28 April 2010

\* Extended from 30 September 2009.

## 1. Project Background

Due to their remote location and unique geological history, the Fiji Islands contain a high proportion of endemic species, especially amongst invertebrates. Knowledge of the insect fauna is extremely patchy, mainly due to an almost complete lack of within-country expertise in entomology, resulting in poor integration of insects into national conservation strategies. In conjunction with the University of the South Pacific, this project aims to build capacity for insect diversity survey work by establishing and training a team of senior curators, technicians and parataxonomists. The team is conducting multiple insect diversity surveys across the Fiji Islands, establishing a national insect collection and raising general awareness of environmental and biodiversity issues. Team members are receiving training from visiting UK experts running intensive courses in Fiji and through visits to key institutions in the UK. The team is housed within the Institute of Applied Sciences (IAS) based at the University of the South Pacific (USP) in Suva.

## 2. Project Partnerships

### Partnership between UK lead institution (University of Sussex (US)) and host country partner (University of the South Pacific (USP)):

The collaboration between US and USP continues to work well. As the UK partner, Alan Stewart has concentrated on project management, developing links with taxonomic experts who are assisting with specimen identification and maintaining links with previous Darwin project partners in Papua New Guinea. Although these Darwin projects (EIDP 09/10-030 and 14/054) have now finished, Alan Stewart retains good working relations with the partners in PNG (e.g. through co-supervision of new projects and continued publishing of material arising from the DI work). The Fiji project is using similar insect survey techniques and protocols to those in PNG so there is considerable synergy between the two projects. The timber-bait experiment (see below) has been designed to be directly comparable with parallel experiments in Papua New Guinea, Panama and Europe. Overall management of the project at USP continues to be the responsibility of Professor Bill Aalbersberg at the Institute of Applied Sciences (IAS), with Hilda Waqa (Senior Curator) taking progressively more responsibility for day-to-day management of the project and the project team. Dr Simon Hodge has recently been appointed as Lecturer in Ecology at USP and is assisting Hilda Waqa with various aspects of her PhD studies and the DI project. The project remains housed within the South Pacific Regional Herbarium at IAS and continues to benefit from close collaboration with Mr Marika Tuiwawa, Curator of the Herbarium, especially in relation to knowledge of

potential survey sites, background information on vegetation and contacts for gaining permission for fieldwork. Most communication is via e-mail.

**Partnership with other UK partners:**

The project continues to benefit from collaboration with the National Museums & Galleries of Wales (NMGW), Cardiff, primarily through Dr Mike Wilson. Since his training visit to Fiji in 2007, Dr Wilson has continued to provide taxonomic and curatorial advice and an identification service for the Hemiptera-Auchenorrhyncha from the project surveys. He has since published a complete review and checklist of the Auchenorrhyncha of the Fiji Islands resulting largely from his visit. Dr Chris Hodgson (also NMGW) ran a very successful training course in the identification of scale insects at USP in June 2009.

**Collaborations with other similar projects:**

Fiji (and Suva in particular) is the focus of considerable activity in biodiversity conservation. USP in particular provides a nexus for a great many projects and international collaborations focused on the south Pacific region. This Darwin project is fortunate in being able to tap into this extensive network of contacts, through our partners at USP, especially Professor Bill Aalbersberg. Previous annual reports have described these links in some detail. Good working relationships continue with the Fiji programme of the Wildlife Conservation Society (WCS), BioNet, The Ministry of Agriculture's Koronivia Research Station, the Forestry Department at Colo-i-Suva and the Fiji Museum in Suva, all of which are based either on the USP campus or in/near Suva.

### 3. Project progress

#### 3.1 Progress in carrying out project activities

##### (a) Development and training of the Darwin project team in Fiji

Ms Hilda Waqa continues as Senior Curator and project team leader at USP. She is responsible for organising and leading the field surveys, organising the processing of specimens and training the technicians and parataxonomists in essential entomological skills. Ms. Waqa is also concurrently pursuing a PhD in entomology at USP. Regrettably, we have been unable to find a replacement for Mr. Sunil Prasad (the other senior curator) who left the project in September 2007. The team currently comprises Ms Waqa plus technicians, graduate assistants and parataxonomists, contributing varying amounts of time to the project (see Annex 3, Table 1).

The following training was achieved:

- Scale Insect Taxonomy Workshop held at USP, Fiji, 13<sup>th</sup>-15<sup>th</sup> July, 2009 and lead by UK expert Dr. Chris Hodgson (National Museums & Galleries of Wales, Cardiff). A total of 18 participants attended, including those who are currently studying at USP focusing on insects at the post graduate level and those involved in entomological research from USP, the government Forestry Department, Agriculture Department and Quarantine Department in Fiji. The workshop also included as part of the training field collections of scale insects from a farm in Wainibuku and a Forest Reserve in Savura, Viti Levu. Further training by Dr. Hodgson in field collecting and taxonomy of scale insects for USP researchers and officers from the Ministry of Agriculture was carried out on two islands visited following the workshop: Taveuni and Kadavu.
- Hilda Waqa continues research for her PhD on *Taxonomy, biogeography and host-specificity of Fijian long-horned beetles*. She has completed all of her field work and is currently analysing data to write up her thesis.
- Visheshni Chandra continues research for her MSc thesis entitled: *Study on habitat, distribution and behavior of Papilio shmeltzi (a butterfly endemic to Fiji)*. She is in the final stages of writing up and close to submission of her thesis.
- Training by Hilda Waqa has been provided to Tokasaya Cakacaka (lab assistant) and Apaitia Liga (parataxonomist) and volunteer John Fasi (post graduate student at USP).

##### (b) Field surveys

**Collection techniques:** Field survey techniques were outlined in the 2008 Annual Report, with modifications described in the 2009 Annual Report. At each site, an approximately 1 ha plot was chosen from an area of relatively intact forest. Insect sampling focused on malaise traps, light traps, butterfly collections, leaf litter sieving (in some sites) and hand-searching. Butterfly collections were mainly on roadsides, grassland areas and along forest edges. Canopy fogging was done at one site, producing approx. 1900 specimens. Vegetation surveys were conducted at each site with all plants >5cm DBH identified.

**Focal insect taxa:** As before, the following taxa were extracted from trap catches and were targeted for particular attention: Coleoptera (beetles), Hemiptera (bugs), Formicidae (ants), Lepidoptera (butterflies & moths), Odonata (dragonflies & damselflies) and Phasmida (stick insects). Butterflies were identified wherever possible in the field and small representative collections were made either to confirm identity or as voucher specimens.

**Surveys completed:** Field survey sites for the project were chosen to cover a range of island sizes and degrees of remoteness within the Fiji Islands archipelago. In the current reporting period, entomological surveys were completed at the following locations: (i) Namosi on Viti Levu, Koro Island, and Vatoa Island (full entomological surveys), (ii) Taveuni and Kadavu islands for scale insects, (iii) Navosa, Viti Levu for collection of *Raiateana knowlesi* (endemic Fijian Cicada).

The full project programme of field entomological surveys has now been completed. This has resulted in surveys of a total of 32 sites across 17 islands (23 sites from 8 major islands plus a further 9 sites on smaller islands within the Lau group) (See table of sites in Annex 3 Table 2 and map of survey areas in Annex 4). The team has therefore considerably exceeded the number of surveys originally planned (10, later revised to 14). The strategy has been to complete the field surveys as early as possible within the project, to allow the remainder of the time to process, curate and properly identify the material. This has also allowed the team to run a number of follow-up surveys to augment those already completed.

**Significant discoveries:** The following important records have been made in the course of routine surveys or as a result of specific searches:

- A new record for a very rare and endemic butterfly to Fiji, *Hypolimnas inopinata*, in Waisoi, Namosi. This species had previously been recorded only from Navai, Viti Levu.
- Sighting of *Xixuthrus heros* from Waisoi, Namosi. This is the endemic Fijian giant long-horned beetle (2<sup>nd</sup> largest beetle in the world, length 14-15cm) and likely to be endangered.
- Collections of an endemic cicada, *Raiateana knowlesi*, from Navosa highlands, Sigatoka. *R. knowlesi* has a lifecycle of 8 years, adults surviving for approximately 3 weeks.
- Collections of the rare Fijian stick insect, *Cotylosoma dipneusticum*, from the Nakorotubu Ranges, Ra Province. Discovery of the closely-related species *Nisyrys spinulosus* (syn. *Cotylosoma*), also extremely rare, was described in the last annual report.

### (c) Identification of specimens

The project's strategy for processing insect specimens has been as follows. Insect samples from field surveys are 'rough-sorted' by the parataxonomists in Fiji to order or family level. Wherever possible (i.e. where appropriate taxonomic literature exists) specimens have been identified to generic or species level. In most cases however, material is sorted into 'morphospecies', with representative specimens of each one separated out for sending to taxonomic experts who are then asked to verify them as unique taxa and identify them to species level wherever possible.

In the case of Coleoptera (beetles) we have developed an arrangement with the Entomology Department at the Natural History Museum whereby the entire beetle collection is sent to London, where the coleopterist staff will identify and label the material, retain a small number of duplicate specimens for the NHM collection, and then return the rest to Fiji. The advantages of this approach were discussed in the last annual report. To date, a shipment of approximately 300 beetle specimens have been sent to Mr. Maxwell Barclay (Entomology Department, Natural History Museum, London) and a second consignment of beetles is currently being prepared. All Coccididae (scale insects) from surveys have been sent to Dr. Chris Hodgson (National Museums & Galleries of Wales, Cardiff) who is a specialist in the group and who lead the training course in scale insects at USP in June 2009. Likewise, all specimens of Hemiptera-Auchenorrhyncha (leafhoppers, planthoppers etc.) have been sent to Dr Mike Wilson (National Museum of Wales). Phasmida (stick insects) and Orthoptera (grasshoppers, crickets and katydids) are not well represented in the survey samples, but all specimens have been successfully identified with the assistance of Dr Paul Brock (NHM, UK) using photos.

12,923 of the 19,023 insect specimens collected have been 'processed' prior to species-level identification (i.e. identified to order or family level, mounted, labelled and databased) (see Annex 3, Table 2 for breakdown into insect orders).

### (d) Development of the Fiji National Insect Collection and associated database

We described developments with the Fiji National Insect Collection (FNIC) at the South Pacific Regional Herbarium, USP in some detail in the last annual report. Since then, work has concentrated on accessioning all specimens in the collections and entering associated data into the specimen database. The latter has been developed on Microsoft Access with the assistance of Posa Skelton (PACINET co-ordinator, Fiji). It includes information on sampling site, habitat, date, weather, method, recorder, determiner, specimen location within the collection and provisional taxonomic determination. So far, a total of 2352 specimens have been accessioned and 1584 specimens have been entered into the database starting with the order Coleoptera.

The number of specimens mounted with proper locality labels and deposited in the Fiji National Insect Collection so far for the various target orders is as follows: Lepidoptera: 315; Coleoptera: 7540; Hemiptera: 700; Hymenoptera: 112; Diptera: 288; Orthoptera: 408; Odonata: 39; Isoptera: 11; Blattodea: 16; Phasmida: 19; Dermaptera: 5; Neuroptera: 6; Opiliones: 23; Total: 9482. All have been identified to order level and Coleoptera have been identified to family level. There has been some identification to species level for Lepidoptera, Coleoptera, Hemiptera, Hymenoptera, Odonata and Phasmida.

**(e) Field experiment on host-specificity in wood-boring beetles**

The last of the four seasonal repeats of the timber-bait experiments finished in October 2009. The background and design of this experiment was described in the last annual report. Standard-length logs were cut from 12 native tree species within lowland Savura Forest Reserve in collaboration with the Forestry Department in Fiji. Two replicate sets were exposed in the forest canopy for each of the 12 tree species to compare colonisation by wood-boring beetles. A total of 4 sets of timber baits, each exposed for 6 months, were spaced at 3-month intervals between July 2008 and October 2009. Beetles reared from the baits have been identified to family level. Those in the family Cerambycidae have been identified to genus level and then to morpho-species. A total of 6100 specimens have been identified in this way, across 22 beetle families. The most diverse beetle families include Scolytidae (bark and ambrosia beetles) and Curculionidae (weevils). An analysis of this timber bait experiment will be done in collaboration with scientists from the University of South Bohemia, Czech Republic who carried out a similar research project in PNG under Darwin funding led by Alan Stewart.

**(f) New Darwin Natural History Gallery**

The background to this exciting new project was outlined in the last annual report. Having received three competitive quotations, Interiorz Ltd. have been selected to construct the display units and cabinets for the new gallery in close collaboration with the curator at the Fiji Museum. The Darwin team in Fiji are also working on designing posters for the gallery to target the fauna and flora that are of significance to Fiji's unique biodiversity. Posters will be mainly focused on particular species but will also include a main poster to highlight the significance of Fiji's Biodiversity. We are hoping to launch the opening of this gallery to coincide with the national celebrations for the International Year of Biodiversity (1<sup>st</sup>-5<sup>th</sup> June, 2010). All posters will have the Darwin Initiative and USP logos on them. Annex 6 includes an example of the template for the species-focused posters.

**(g) Outreach and Awareness Activities**

- Presentation by Hilda Waqa on the 7<sup>th</sup> August, 2009 at the Fiji Islands Conservation Science Forum Conference (FISCF) held in Suva, Fiji, entitled: "Diversity and distributions of canopy Coleoptera along an elevational gradient on eastern Viti Levu, Fiji".
- Presentation by Visheshni Chandra on the 7<sup>th</sup> August, 2009 at the FISCF Conference held in Suva, Fiji, entitled: "Study on habitat, distribution and behaviour of *Papilio shmeltzi* (a butterfly endemic to Fiji)".
- Presentation by Hilda Waqa on the 18<sup>th</sup> September, 2009 at a Darwin Initiative project launch with BirdLife International, Fiji, entitled: "Focus for Fiji: Insect Inventories and Biodiversity Assessments".
- Lecture by Hilda Waqa on *Biodiversity of Insects in Fiji* at USP to undergraduate Biology students, 20<sup>th</sup> April 2009.
- Exhibit of Darwin Initiative project work at USP Open Day exhibition on the 25<sup>th</sup> September, 2009.
- News of Scale Insect Taxonomy Workshop in Fiji on USP's news webpage and IAS news webpage:  
[http://ias.fste.usp.ac.fj/index.php?id=6380&tx\\_ttnews\[tt\\_news\]=841&tx\\_ttnews\[backPid\]=5228&cHash=afe44dd52e](http://ias.fste.usp.ac.fj/index.php?id=6380&tx_ttnews[tt_news]=841&tx_ttnews[backPid]=5228&cHash=afe44dd52e).
- Hilda Waqa was interviewed about the emergence in Navosa province of the endemic periodic cicada *Raiateana knowlesi* after a period of 8 years: *Fiji TV 6pm News*, 15<sup>th</sup> September, 2009.
- Hilda Waqa appeared on the Fijian language TV programme *Noda Gauna* talking about the emergence in Navosa province of the endemic periodic cicada *Raiateana knowlesi* and its cultural significance to the people of this province; 12<sup>th</sup> October, 2009
- Lecture by Hilda Waqa to undergraduate Biology students, 24<sup>th</sup> March, 2010: *A case study- Entomological research work in Fiji at USP*.
- Arbor Day exhibition on the 14<sup>th</sup> – 16<sup>th</sup> April, 2010 at Sukuna Park, Suva. Exhibitions for the general public included insects of significance to Fiji's unique biodiversity e.g. Fiji's giant long-horned beetle- *Xixuthrus heros*, Fiji's endemic and rare butterfly- *Hypolimnias inopinata* and Fiji's rare and endemic stick insect *Nisyrrus spinulosus*.
- Hilda Waqa attended the BioBlitz 2010 event in Auckland, New Zealand and visited the Landcare Research Arthropod Collection on the 16<sup>th</sup>- 20<sup>th</sup> April, 2010. The BioBlitz event is a 24 hour programme which brings together taxonomists and the public to appreciate and learn more about

the biodiversity within an area. Collections and surveys are done with the general public and awareness is also raised at the same time on the significance of biodiversity. After the 24 hours, the number of species found are tallied and a final count for the day presented. This was an excellent learning experience and we are hoping to carry out something similar in Fiji but at a smaller scale to raise awareness of Fiji's Biodiversity.

- We have submitted a factsheet on the rare Fijian longhorn beetle, *Xixuthrus heros*, for consideration for the IUCN's *Species of the Day* webpage (<http://www.iucnredlist.org/species-of-the-day>) on which a different threatened species appears each day in 2010 together with information on the threats that it faces.
- Alan Stewart (Project Leader) attended the Zoological Society of London's symposium *Foundations of Biodiversity: saving the world's non-vertebrates* in February 2010 in London. Networking at this meeting resulted in submission to the IUCN's *Species of the Day* initiative (see above).
- Alan Stewart (Project Leader) attended a workshop on *Measuring changes in species' distributions* held at CEH Wallingford in February 2010.
- Alan Stewart (Project Leader) attended the Darwin Initiative workshop on *Monitoring and Measuring Progress in Biodiversity Conservation* in London in March 2010.

### 3.2 Progress towards Project Outputs

Progress towards each project output is summarised below.

#### Output 1: Training staff

Fiji staff (see list in Annex 3) continue to receive in-service training by the Senior Curator (Hilda Waqa) in the essentials of entomology, insect identification and techniques for the curation of the collection. Staff employed on the Darwin project, staff involved in entomological research at USP, as well as others from the Forestry Department, Agriculture Department and Quarantine Department in Fiji, received high-level training in the taxonomy and identification of scale insects by Dr Chris Hodgson in July 2009.

#### Output 2: Insect surveys

The programme of insect field surveys is now complete. Surveys have been completed at 23 separate sites on 8 of the major islands and 9 sites on smaller islands, producing 12,923 specimens, all of which have been sorted at least to Order or Family level, and 9482 of which have been mounted and stored. Further identification is being achieved by sending material to international experts in particular taxonomic groups.

#### Output 3: Insect collection

The Fiji National Insect Collection (FNIC) continues to expand as more material from the surveys is identified. It currently comprises 75 cabinet drawers, although the total will rise further by the end of the project. Specimens are arranged by order then family with a museum-standard labelling system in operation.

#### Output 4: Database of survey information

A bespoke database has been written in Microsoft Access to hold all the data from the surveys and all data on the FNIC. This is a fully relational collections database for maximal flexibility in information retrieval. Work is continuing on developing the database so that it can store data associated with the specimens and also supplementary material such as images and relevant literature.

#### Output 5: Outreach activities

The Darwin team has been active in promoting the project to a wide variety of audiences, including school children, university undergraduates, local NGOs, the general public (through activities such as the USP Open Day and BioBlitz) and scientific conferences (such as the Fiji Islands Conservation Science Forum Conference). Additionally, Hilda Waqa has appeared on two TV programmes, talking about exciting discoveries that have been made by the Darwin project team of rare endemic insects.

The Darwin team has been assembling a library of images for use in publicity and outreach activities. Entomological experts around the world have kindly sent us good quality images of different insects in their group together with information on endemism and their distribution within Fiji. We are preparing to use these for a pamphlet on the diversity of insects in Fiji and their significance, which will be distributed to school children. We will also use some of the images for posters for the Natural History Gallery displays.

The project website (<http://www.usp.ac.fj/index.php?id=7040>) continues to be an attractive advertisement for the project. The site highlights the aims and objectives of the project, describes the methodology and provides some initial results. In response to a comment in the review of our last annual report, the Darwin logo has been added at the top of the home page and a link to the Darwin Initiative webpage has been incorporated.

### 3.3 Standard Measures

**Table 1 Project Standard Output Measures**

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Total to date	Number planned for this reporting period	Total planned from application
<b>Established codes</b>								
5	Fijian nationals receive in-service training in entomology	2	6	6	7			11
6B	Fijian nationals receive 2 months training each in UK	0	1	0	0			6
8	UK experts provide 2-week intensive workshops in Fiji	2	1	0	1			6
9	Species Action Plans / recommendation for special protection ( <i>Xixuthrus</i> beetles)		1					1
9	Fiji insect conservation strategy plan							1
10	Guide book: Butterflies of the Fiji Islands		1					1
11A, 11B	Scientific papers published			2	1			3
12A	Specimen and field survey databases established	1	1					2
13A	Fiji National Insect Collection established at USP	1						1
13B	Fiji National Insect Collection enhanced at USP		1	1	1			
14A	Closing project seminar							1
14B	Conferences attended with DI project presented		1	1	1			4
15A	Fiji national & local press release announcing start of Darwin project	1,1						4

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Total to date	Number planned for this reporting period	Total planned from application
15C, 15D	UK national & local press release announcing start of Darwin project	1,1						2
18A	National TV programmes in Fiji		1		2			2
19A, 19C	Fiji national & local radio interviews	0	1					2
20	Equipment value: laptops, printers, microscopes, digital camera, insect storage facility	£7300						
<b>New project-specific measures</b>								
	Web-sites created / enhanced		1	1	1			
	Field experiments established			1				
	Field experiment completed				1			
	Permanent exhibits established / enhanced				1			1
	Single-species studies established / completed			1				

**Table 2 Publications**

Type (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Journal	* Waqa-Sakiti, H. & Lingafelter, S. (2009) New Fijian Callidiopini (Coleoptera: Cerambycidae). <i>Fiji Arthropods</i> . Bishop Museum Occasional Papers 106: 3-15.	Bishop Museum, Honolulu, Hawai'i	<a href="http://hbs.bishopmuseum.org/fiji/index.html">http://hbs.bishopmuseum.org/fiji/index.html</a>	Free

### 3.4 Progress towards the project purpose and outcomes

The project's primary purpose is to develop the within-country expertise in entomology, in order to enhance biodiversity conservation activity and allow stakeholders to meet their responsibilities under the Fiji Biodiversity Strategy and Action Plan. The project has been successful in training one senior curator to a very high standard of expertise, along with a range of more junior curators, support technicians and parataxonomists. Unfortunately, we have been unable to replace the other senior curator who left the project after the first year. In spite of a very large number of potential recruits within the general catchment of USP, it seems that the original assumption of a supply of suitably motivated people did not fully hold.

The field surveys progressed faster than expected, resulting in completion of more than double the number of surveys than originally planned and substantially in advance of schedule. However, the project has continued to experience delays in the training schedule. This is due to the difficulty in finding suitable trainers who are free to visit Fiji to run workshops, although three have already taken place. Thus, the original assumption that UK experts would be available to run intensive training courses has not completely held. The Darwin Secretariat has agreed that the resultant under-spend of £38,000 for 2009-10 can be carried over into the next financial year. It has also been agreed to extend the finishing date of the project to 30 September 2010. We are extremely grateful for these two adjustments to the project which we trust will allow us to complete the training programme within the project's lifetime.

We have been fortunate in gaining support from UK entomologists, and indeed others around the world, for assistance with identification of specimens. Also, we have had good success in outreach work to schools and village communities. Thus, the associated purpose-level assumptions still hold true. Likewise, the original indicators remain adequate for measuring outcomes.

### **3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits**

After addition of the longhorn beetle genus *Xixuthrus* to Schedule 2 of the Fiji Endangered and Protected Species (EPS) list, we continue to press for getting these species accepted for IUCN Red Data Book status. Visheshni Chandra's ecological work on the endangered Fijian swallowtail butterfly, *Papilio schmeltzii*, will feed important information into an action plan for its conservation within the Fiji Islands. The discoveries during the field surveys of a number of rare and possibly endangered insect species are providing information that may in future help to formulate action plans for their conservation. These include: *Hypolimnias inopinata*, a very rare and endemic butterfly to Fiji; *Raiateana knowlesi*, an endemic cicada; *Cotylosoma dipneusticum*, a rare Fijian stick insect.

## **4. Monitoring, evaluation and lessons**

We have been using the successful completion of the activities listed above to monitor progress on the project. The number of field surveys (considerably greater than the original target), specimens identified and curated, and databases created/enhanced can all be quantified. Training is more problematic to evaluate since it cannot be measured simply in terms of the number of people receiving training for specified periods. Accordingly, we have been monitoring the learning progress by including tests at the end of each training workshop, to assess the success of the workshop, provide feedback to trainees on their progress and to inform the planning of future workshops.

Ultimately, success will be judged against achieving the specified outputs, but the wider objective (project purpose) of developing the within-country expertise in entomology will be judged against our success in building local capacity in insect identification, survey and monitoring.

## **5. Actions taken in response to previous reviews (if applicable)**

The review of last year's annual report raised three issues:

- (i) It was suggested that we should engage the British High Commission in planning the launch of the Darwin Biodiversity Gallery at the Fiji Museum, making the connection with the 2009 Darwin 200<sup>th</sup> Anniversary process. Unfortunately, the construction of the gallery was delayed such that it was not ready in time to coincide with this anniversary. However, we will certainly make clear the connection with this significant milestone, both in publicity literature and in the gallery itself. Instead we are planning to launch the gallery in June 2010 and link it in with the International Year of Biodiversity (IYB) celebrations. We have a list of organisations and people to be involved in preparations for the event and to be invited on the day, including the British High Commission, a range of local NGOs and government departments. We intend the launch to be a very high profile event with wide-ranging publicity.
- (ii) A query was raised in terms of training local Fijian staff in the use and maintenance of the database (now in Access rather than previously in Excel). We are currently planning such training as part of the project's exit phase.
- (iii) In response to the reviewer's comments about the project's webpage, we have included the Darwin Initiative logo and added a link back to the DI webpage.

Other comments in the review will be dealt with in the final report.

## **6. Other comments on progress not covered elsewhere**

There have been no refinements or modifications to the project over the last year. The difficulties we have had in finding suitably qualified taxonomic experts to run training workshops in Fiji were discussed in the last annual report. This problem remains and has been referred to above. There is some risk that we will not be able to complete the full programme of training workshops in Fiji that we had originally intended but we are making considerable efforts to avoid this outcome.



## 7. Sustainability

Much effort has been made during the year to promote the project through the various outreach activities listed above. All public events (USP Open Day, BioBlitz 2010, Arbor Day) have attracted considerable interest. Discoveries of rare and endangered insects have received the attention of the media, including two TV appearances by Hilda Waqa. The project website continues to draw attention from amongst USP, local NGOs and the wider conservation community within Fiji.

We are excited by the prospect of a new museum gallery devoted to the promotion of biodiversity issues within the Fiji Islands. As a permanent gallery, this will ensure a strong legacy for the project lasting well into the future. Combined with the creation of the Fiji National Insect Collection and our training of the next generation of entomologists, we are confident that the main outputs from this project will be sustainable.

## 8. Dissemination

Dissemination activities are listed in section 3.1 (g) above.

## 9. Project Expenditure

**Table 1** Project expenditure during the reporting period (Defra Financial Year 1 April 2009 to 31 March 2010)

Item	Budget (please indicate which document you refer to if other than your project application)	Expenditure	Balance
Rent, rates, heating, overheads etc			
Office costs (eg postage, telephone, stationery)			
Travel and subsistence			
Printing			
Conferences, seminars, etc			
Capital items/equipment			
Others –Training Materials			
Others – Specimen Shipments			
Other – Entomological Equipment			
Other – Lab + Field Consumables			
Other- Museum Gallery			
Salaries Alan Stewart			
Salaries Dave Pritcher			
Salaries Hilda Waqa			
Salaries K Alton			
Salaries Visheshni Chandra			
TOTAL			

Budget agreed with Eilidh Young by e-mail 17<sup>th</sup> Feb 2010

**10. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes**

[I agree for LTS and the Darwin Secretariat to publish the content of this section](#)

The two really exciting achievements of this project in the last year have been:

1. Completion of more than double the number of insect surveys that were originally planned, at a range of sites across all the major islands and a number of smaller islands within the Fiji Islands biogeographic area. This has generated a very considerable amount of material from which initial patterns of occupancy and endemism will emerge.
2. The initiation of a Darwin Initiative biodiversity gallery at the Fiji Museum in Suva. This will provide an excellent showcase for all Darwin projects in Fiji as well as a platform for outreach and education on biodiversity conservation issues.

Further information and photographs (e.g. those in Annex 5) can be obtained from Ms Hilda Waqa (waqa\_h@yahoo.com).

## Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2009/10

Project summary	Measurable Indicators	Progress and Achievements April 2009 - March 2010	Actions required/planned for next period
<p><b>Goal:</b> <i>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</i></p> <p><i>The conservation of biological diversity,</i></p> <p><i>The sustainable use of its components, and</i></p> <p><i>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</i></p>			<i>(do not fill not applicable)</i>
<p><b>Purpose</b> Within-country expertise in entomology to be developed, to enhance biodiversity conservation activity and allow stakeholders to meet their responsibilities under the Fiji Biodiversity Strategy and Action Plan.</p>	<p>Skills tests at start and end of project, plus at intervals during project to assess training needs. Extent &amp; quality of data; incorporation of data into local conservation plans. Establishment of in-country insect collection; number of specimens fully processed. Awareness of insect conservation in schools and wider community; level of media coverage (radio, newspapers).</p>	<p>Total of 19,023 specimens collected with associated data. Insect collection expanded at USP; total of 12,923 specimens identified to minimum taxonomic level, mounted, stored.</p>	<p>Regular assessments of skills development in team. Further expansion of insect collection, based on specimens from surveys. Construction and launch of new Darwin Initiative biodiversity gallery at Fiji Museum. Dissemination of project outputs through local &amp; national media</p>
<p><b>Output 1.</b> 11 trained staff (3 senior curators, 3 support technicians; 5 parataxonomists).</p>	<p>Assessment reports on trained personnel from project partners.</p>	<p>Full project team is in place, each contributing varying percentages of time to the project, although some have left to return to previous positions or take up new posts after having been trained. 1 senior curator receiving on-going training; attempts to find other staff at this level have been unsuccessful.</p>	
<p>Activity 1.1 UK training of 3 Fijian nationals as senior curators.</p>		<p>None taken place during this reporting period due to no suitably senior staff available; we have adopted the alternative solution of concentrating on UK experts running identification workshops in Fiji, thus reaching a wider Fijian trainee audience.</p>	
<p>Activity 1.2 In-country training by 2 UK experts for 11 Fijians.</p>		<p>One workshop (on scale insect identification) took place during this reporting period; 2 in-country workshops planned for final stages of project.</p>	
<p><b>Output 2.</b> Insect survey information for 14 locations in Fiji.</p>	<p>Surveys completed; specimens deposited in collections; database on insect distributions</p>		

Activity 2.1. Insect surveys of 14 Fiji Islands sites, conducted by Fijian staff.	Field surveys completed for 32 sites: 23 sites surveyed on 8 major islands (or island groups) and 9 sites on smaller islands in the Lau group.
Activity 2.2. Sorting, curation and cataloguing of specimens. Assistance given by UK experts on in-country basis.	68% of all collected material has been sorted to order or family level, mounted, labelled and catalogued. UK experts providing direct assistance with checking identifications and access to personal worldwide networks of taxonomist contacts, both remotely and when in Fiji.
Output 3. In-country insect collection.	Extent and quality of collection. 19,023 specimens collected, of which 9,482 already deposited in newly established Fiji National Insect Collection (FNIC). Voucher material of all species sent for verification to appropriate taxonomic experts with knowledge of Fijian fauna. Coleoptera: 300 specimens sent to NHM for expert identification or verification; more to follow; voucher set of any duplicates retained by NHM.
Output 4. Database of insects within collection.	Proportion of insect collection identified to specified taxonomic levels. Information on specimens currently held in specially-written Access relational database for maximal flexibility in reporting. Full metadata recorded for all surveys. Training will be required in new database system. Image database (specimens, sites) under construction.
Output 5. Outreach activities to schools, communities etc.	Number of schools, communities etc visited; demand for extra information. Environmental awareness raising activities in villages hosting surveys. Major public exhibit, including specimens, posters, planned for launch of Darwin Initiative biodiversity gallery at Fiji Museum. Considerable interest raised in training in entomology, ecology and conservation through: <i>Butterflies of the Fiji Islands</i> guide; USP annual Open Day; Arbor Day; BioBlitz; TV appearances explaining discoveries of rare insects; presentations at conferences; lectures to USP students.

## Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources</p>			
<p>Purpose Within-country expertise in entomology to be developed, to enhance biodiversity conservation activity and allow stakeholders to meet their responsibilities under the Fiji Biodiversity Strategy and Action Plan.</p> <p>N.B. Change to single purpose as requested in response letter to Stage 1 application.</p>	<p>Skills tests at start and end of project, plus at intervals during project to assess training needs.</p>	<p>Fijian nationals trained as senior curators (3), support technicians (3) and parataxonomists (5).</p>	<p>Suitably motivated people available; UK experts available to run intensive training courses.</p>
	<p>Extent &amp; quality of data; incorporation of data into local conservation plans.</p>	<p>Survey reports; site assessments; statements on species of conservation concern.</p>	<p>Access permitted to sites; adequate spatial and temporal coverage of surveys.</p>
	<p>Establishment of in-country insect collection; number of specimens fully processed.</p>	<p>Database of specimens held at USP; metadata made available through web page.</p>	<p>UK support for identification is available.</p>
	<p>Awareness of insect conservation in schools and wider community; level of media coverage (radio, newspapers).</p>	<p>Environmental lectures and workshops for schools, communities; educational leaflets; media coverage.</p>	<p>Knowledgeable staff can be trained for outreach work; schools, communities etc are receptive to environmental issues.</p>
<p>Outputs 1. 11 trained staff (3 senior curators, 3 support technicians; 5 parataxonomists).</p>	<p>Assessment reports on trained personnel from project partners.</p>	<p>11 Fiji nationals trained as entomologists.</p>	<p>Dedicated people exist in Fiji to fill such posts; UK experts available to do training.</p>
<p>2. Insect survey information for 14 locations in Fiji.</p>	<p>Surveys completed; specimens deposited in collections; database on insect distributions</p>	<p>Survey reports; publications in appropriate journals</p>	<p>Intensity of sampling program sufficient; access to islands gained</p>

3. In-country insect collection.	Extent and quality of collection.	Substantial insect collection held in a safe location.	Time available to collect, sort and curate collection.
4. Database of insects within collection.	Proportion of insect collection identified to specified taxonomic levels.	Database of collection; identifications confirmed by experts.	Time available to conduct identification to appropriate taxonomic level.
5. Outreach activities to schools, communities etc.	Number of schools, communities etc visited; demand for extra information.	Reports provided by schools and participants.	Schools, communities etc willing to participate.
Activities	Activity milestones		Assumptions
1. Training	Yr1: UK training of 3 Fijian nationals as senior curators. In-country training by 2 UK experts for 11 Fijians. Yr2: UK training of 3 Fijians as technicians. In-country training by 2 UK experts for 11 Fijians. Yr 3: In-country training by 2 UK experts for 11 Fijians.		
2. Sampling/survey	Yrs 1, 2, 3: Insect surveys of 10 Fiji Islands, conducted by Fijian staff.		
3. Sorting and Identification	Yrs 1, 2, 3: Sorting, curation and cataloguing of specimens. Assistance given by UK experts on in-country basis.		
4. Outreach	Yrs 2 & 3: School, community visits to engender interest in entomology.		

## Annex 3 Tables

**Annex Table 1: Members of the Darwin project team during the reporting period.**

Name	Position & Roles	Starting Date	% time on project
1. Hilda Waqa	Project Co-ordinator	September, 2006-ongoing	100%
2. Tokasaya Cakacaka	Lab assistant- Fieldwork and curation	March 2008-ongoing	100%
3. Apaitia Liga	Lab assistant- Curation of specimens and databasing	Feb 2008-ongoing	100%
4. Presly Dovo	Technician- Fieldwork and curation	Jan- Dec, 2008	100%
5. Visheshni Chandra	Graduate assistant	Dec 2008-ongoing	80%
6. Alivereti Naikatini	Technician- Fieldwork and Plant identification	Jan 2008-ongoing	40%
7. Anare Caucau	Technician- Curation of specimens	Feb- Jun 2008	20%
8. Francis Wise	Technician- Curation of specimens	Feb- Jun 2008	20%
9. Vido	Parataxonomist- Fieldwork and Plant identification	Jun 2008- Nov 2009	20%

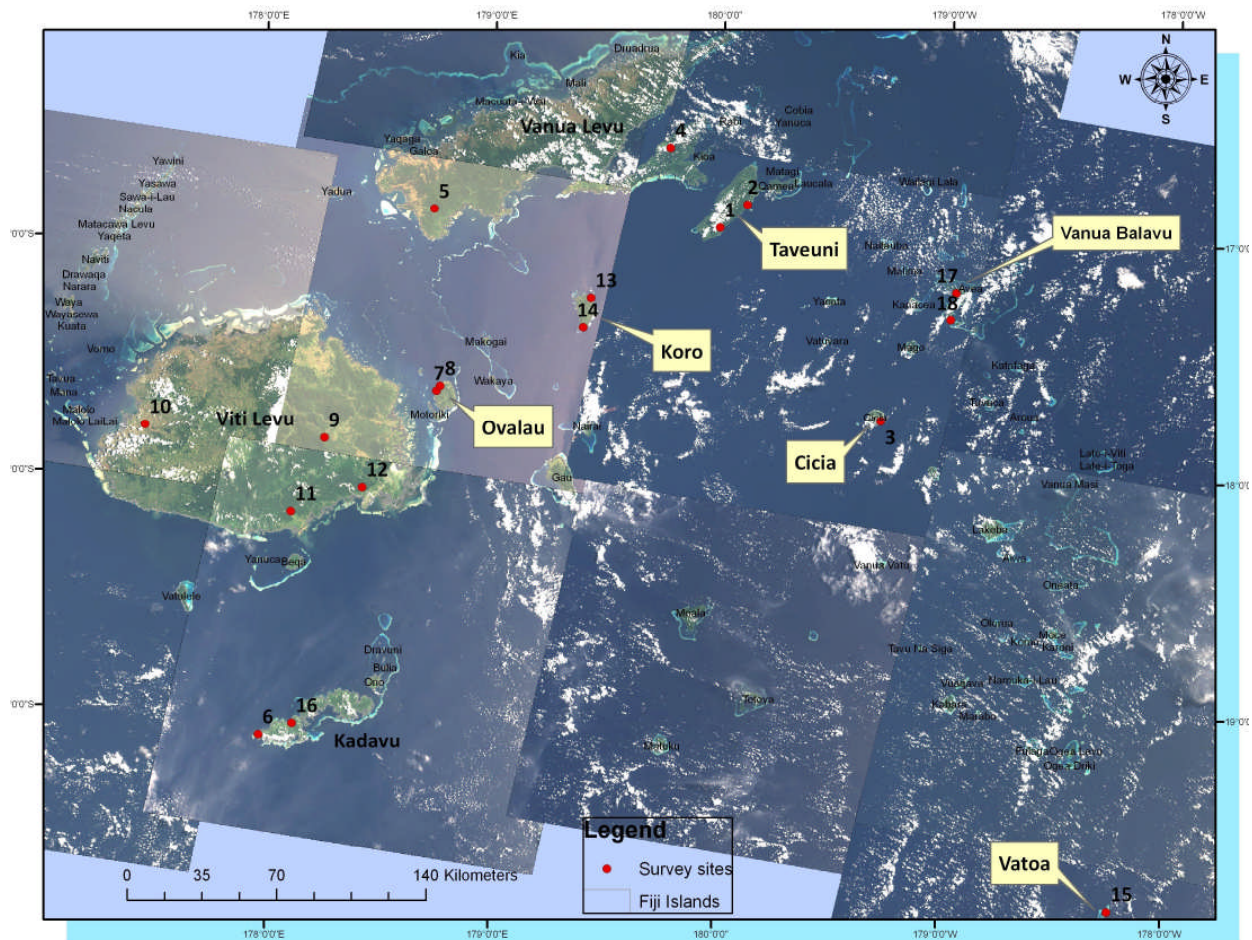
## Annex Table 2: Numbers of insect specimens sampled:

Insect orders: Col: Coleoptera; Lep: Lepidoptera; Hem: Hemiptera; Hym: Hymenoptera; Dip: Diptera;  
Orth: Orthoptera; Other: Other orders

Island	Location	Date surveyed	Number of specimens in insect orders							Total
			Col	Lep	Hem	Hym	Dip	Orth	Other	
Viti Levu	Savura	05.iv.08	353	0	16	57	63	27	2	518
Viti Levu	Serea	08.v.08	193	0	5	73	0	577	0	848
Viti Levu	Nakavu	05.v.08	127	0	26	34	244	53	3	487
Viti Levu	Vaturu	10.vii.08	238	0	143	147	69	122	10	729
Viti Levu	Nakauvadra	20.iix.08	115	24	5	68	0	0	5	217
Viti Levu	Monasavu Dam	02.xi.06	1918	3	31	79	0	0	0	2031
Viti Levu	Naitasiri	23.vii.07	605	0	0	0	0	0	0	605
Viti Levu	Namosi	22.x.07	759	0	0	0	0	0	0	759
Viti Levu	Ba	23.ii.07	0	3	0	0	0	0	0	3
Viti Levu	Waisoi, Namosi	16.v.09	111	7	170	40	63	23	11	425
Vanua Levu	Driti	01.iv.08	338	0	28	71	0	259	5	701
Vanua Levu	Loa	05.iv.08	40	1	12	14	0	28	1	96
Vanua Levu	Natewa	05.iv.08	445	0	17	29	0	66	0	557
Taveuni	Ravilevu	12.xii.07	301	2	140	121	277	32	14	887
Kadavu	Solodamu	22.iii.08	783	4	152	52	48	162	9	1210
Vanuabalavu	Daliconi	21.xii.07	0	10	4	0	75	2	0	91
Vanuabalavu	Boitaci	29.xii.07	0	2	7	2	0	0	0	11
Vanuabalavu	Namalata	22.xii.07	8	5	64	67	0	10	12	166
Ovalau	Viro	19.ii.08	373	0	152	99	113	141	7	885
Koro	Mudu & Nacamaki	22.vi.09	433	22	170	115	70	4		814
Central Lau	Komo/Driki	15.viii.08	0	0	0	0	0	0	0	0
Central Lau	Cicia	13.viii.08	131	0	260	146	232	0	0	769
Lau Group	Sovu	19.ix.07	0	3	0	0	0	0	0	3
Lau Group	Cikobia	18.ix.07	0	2	0	0	0	0	0	2
Lau Group	Lakeba	09.ix.08	0	17	0	0	0	0	0	17
Lau Group	Nayau	17.ix.08	0	5	0	0	0	0	0	5
Lau Group	Kanacea	19.ix.07	0	1	0	0	0	0	0	1
Lau Group	Tuvuca	24.ix.07	0	1	0	0	0	0	0	1
Lau Group	Kibobo	16.ix.07	0	1	0	0	0	0	0	1
Lau Group	Vatoa Island	07.ix.09	70	12	1	1				84
<b>TOTAL</b>			<b>7341</b>	<b>125</b>	<b>1403</b>	<b>1215</b>	<b>1254</b>	<b>1506</b>	<b>79</b>	<b>12923</b>



## Annex 4: Map of survey sites



### List of site names & islands:

- 1 Salialevu, Taveuni
- 2 Bouma, Taveuni
- 3 Cicia, Lau Group
- 4 Natewa, Vanua Levu
- 5 Driti, Vanua Levu
- 6 Mt. Nabukelevu, Kadavu
- 7 Viro, Ovalau
- 8 Rukuruku, Ovalau
- 9 Serea, Viti Levu
- 10 Vaturu, Viti Levu
- 11 Nakavu, Viti Levu
- 12 Savura, Viti Levu
- 13 Mudu, Koro
- 14 Nacamaki, Koro
- 15 Vatoa, Lau Group
- 16 Solodamu, Kadavu
- 17 Daliconi, Vanua Balavu, Lau Group
- 18 Namalata, Vanua Balavu, Lau Group



## Annex 5: Photo gallery



Figure 1: Hilda Waqa talking to students during USP Open Day, 2009.



Figure 2: Students learn about the second largest beetle species in the world, *Xixuthrus heros*, endemic to Fiji.



Figure 3: Scale insect taxonomy workshop participants at Laucala Campus.



Figure 4: Scale insect taxonomy workshop, led by Dr Chris Hodgson.



Figure 5: *Hypolimnna opinata* - rare Fiji endemic butterfly.



Figure 6: *Raiateana knowlesi* - a Fijian endemic cicada.





**Figure 7: Hilda Waqa giving presentation at the FICSF 2009**



**Figure 8: DI lab assistant Apaitia Liga talks to students about the significance of insects**



**Figure 9: Students learn of the periodic emergence of Fiji's endemic cicada *Raiateana knowlesi***



**Figure 10: Live *Xixuthrus heros* specimen; Fiji dollar coin (22mm diameter) for size comparison.**



**Figure 11: Hilda Waqa at the BioBlitz 2010 event in Auckland, New Zealand**



**Figure 12: Hilda Waqa talks to the President of the Fiji Islands (Ratu Epeli Nailatikau) about the significance of Fiji's insect fauna.**

## Annex 6: Publications

- Species-focused poster for *Xixuthrus heros* prepared for new Darwin Initiative gallery.
- Waqa, H. and Lingafelter S. W. (2009) New Fijian Callidiopini (Coleoptera: Cerambycidae). *Fiji Arthropods XV*. Edited by N.L. Evenhuis & D.J. Bickel. *Bishop Museum Occasional Papers*, 106: 3-15.