SEA TURTLES - FIJI

G.H. BALAZS

FIJI FILE

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4-2-86 MID-WEEK

Stan Delaplane

Chanting For Sea Turtles

The beach resorts at Korolevu are halfway between the capital of Suva and the crossroads airport at Nadi.

Guests used to sleep in grass shacks called "bures." They had modern plumbing and mosquito nets and the sea breeze made them comfortable. Now there are several up-to-date resorts.

"You should go sometime to Koro and see them call the turtles," said the man from the Fiji Visitors' Bureau. (Tourist bureau people always try to send you somewhere else, I find.)

"One thing about all South Pacific ceremonies, they usually involve staying away from women and coconuts. This is very difficult in the South Seas. We don't have much else.

"Anyway, ceremonies are performed," the man said. And they call the giant turtles.

"You can hardly believe this unless you see it. Dozens of these turtles — they're as big as a dinner table, you know — rise from the sea and swim to the land.

"The natives turn them on their backs and eventually eat them. Quite delicious."

On one island, women call the turtles.

The women wade into the water from the island of Kadavu — quite nude you know except for a flower crown.

The women wade in calling the turtles.

Just what they say, he did not know. Probably an ancient chant with magical properties.

In any case, turtles soon come popping up like bad debts.

They find the ocean full of chocolate cupcake. They swim to land and wind up fricasee.

I asked if the lady turtle callers had to stay away from anything to prepare for this giant Diner's Club event.

The man from the Visitors' Bureau did not know exactly. He suspected it would be coconut. Coconut is tabu whenever you are pulling any magic or calling on the gods for cooperation.

"It is well known that women steal a man's manna, his power," the Visitors' Bureau man said. "Therefore, they must not have anything to do with magic properties."

Something like taking their mink coat away. Only, of course, in this climate, you'd look silly calling turtles in mink.

12-7-82 HS-B A5

News

Sea Survivors

SUVA, Fiji (AP) — A California family of three survived an arduous voyage in the South Pacific huddled in two 8-foot dinghies lashed stern to stern and driven by a Windsurfer sail.

After almost four weeks during which they capsized many times, Robert Aros, 50, of Long Beach, his second wife, Margaret, 30, and his 17-year-old son, Christian, landed on a desolate sand cay. They subsisted on a mash of seabird eggs and hermit crabs for three days before Fijians rescued them last week and took them to Cikobia-I-Lau, an island 150 miles northeast of Suva.

A government helicopter brought the trio to Suva today, and they were treated at Colonial War Memorial Hospital for sunburn, exhaustion, malnutrition and exposure. A doctor said all three would make a good recovery.

The family left Long Beach a year ago, on Dec. 5, 1981, for a three-year, round-the-world voyage on their 36-foot sloop Vamanos. Four nights after sailing from Raratonga, in the Cook Islands, for New Zealand, the boat grounded on a reef while Mrs. Aros was on watch and her husband and Christian were asleep below, Aros said.

Tropic Island Paradises Dis

By Pat Orvis
Chicago Sun-Times

UNITED NATIONS — The tropic isle as paradise is a thing of the past, said a study by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Tromped over by tourists and otherwise ravaged by modern man and his domestic animals, few island Shangri-las have remained unspoiled, the study concluded.

"The introduction of cats, dogs, mongoose, pigs, rats and other non-indigenous animals often made short work of the local fauna," said one report of the study, which was carried out in 13 countries and included Hawaii, Fiji and Barbados.

In Hawaii, "80 percent of the native land birds have become extinct," the scientists found. And of the world's vanished vertebrates, they say, 40 percent were from Caribbean islands.

"There, too, the introduction of goats and land clearance has resulted in the disappearance of native flora and accelerated soil erosion," the report said.

THE STUDY, which scrutinized island "ecosystems" to find links between population growth and environment planning, is part of a global UNESCO program, "Man and the Biosphere," involving 10,000 scientists.

No big surprise: the research found that mass tourism is "the latest, and some would say most insidious, threat to island ecology."

"Ironically," said the report's author, "the specific qualities that attract tourism to such islands — beauty of landscape, tranquility, unfamiliar plant and animal life, 'exotic' cultures — all stand to be marred by the development and modernization deemed necessary to accommodate the tourists."

Among the exceptions to this trend is the country of Fiji, 322 islands in the Pacific, 2,000 miles northeast of Sydney, Australia.

Eastern Fiji — an archipelago of about 70 islands that are underpopulated (more than half are uninhabited) and with underdeveloped natural resources that include a potentially profitable fishing industry — would seem to have escaped the physical scars of progress.

BUT THE ECONOMY has been ravaged by modern man. These islands, which are of great ecological variety, said the UNESCO report, once supported "a miscellany of local production linked by trade" which was con-

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appearing, Study Concludes

ducted by canoe. Under colonial control, however, the islanders were urged — sometimes compelled — to produce a single cash crop, dried coconut.

It was a common practice during colonial times and extremely lucrative for the mother country, in this case Great Britain. As Indian journalist B.P. Menon has explained in his book "Bridges Across the South":

"The encouragement of cash crops such as sugar, jute, indigo and cotton in place of food met the needs of European industries for raw materials, but it left the population of the colonies ever more vulnerable."

Thus, like so many former colonies that constitute the developing countries, Fiji found itself cut loose from the mother land with little industry and no more than subsistence-level food production.

SO THIS underdeveloped region, Eastern Fiji — which could "easily support itself from its own resources," said UNESCO — is forced to import up to 40 percent of its food for a population that is rapidly moving to the more urban (and developed) regions, such as Viti Levu Island, where the capital, Suva, is located.

One part of the UNESCO study offers hope, however, for a modern yet balanced island culture.

For Barbados, despite its heavy tourism and the fact it's one of the most densely populated countries in the world, was found to have "a well-managed economy, diversified agriculture and effective industrial structure."

A ray of hope for the tromped-over utopias could be detected, too, in some remarks by the project's Dr. H. Brookfield.

Noting that the "ruination" of one island in the East Fiji group had occurred before modern times — between 1,500 and 1,800 years ago (by what or whom isn't stated) — the scientist then remarks:

"SINCE THEN there has been a certain amount of natural reforestation and it has recovered greatly.

"In fact, it corresponds with some of the findings, not by ourselves but by others in the West Indies, where it has been pointed out that the indigenous vegetation has a very considerable survival capacity, notwithstanding the destruction of many species.

What Brookfield seems to be saying in plain English is that "it can grow back, if you let it."

All except those destroyed species

Star-Bulletin & Advertiser, 8 November 1981

The U.S. & Fijian politics

robert trumbull

The writer was a foreign correspondent for the New York Times for 36 years, mostly in Asia and the Pacific, and now does special assignments for that newspaper from a Honolulu base. He writes this column for The Advertiser.

Nosy Westerners have influenced politics on independent Pacific islands, notably Hawaii, Samoa and Tonga, almost since the beginning of contact. Interference in Polynesian affairs reached its zenith with the coming of the missionaries. Intent upon rescuing the heathen from perdition, these godly men found it expedient to convert the kings and chiefs first, thus putting themselves in a position to change everything to their liking.

The rise of missionaries to temporal power in the Kingdom of Hawaii is a well-known story. None reached the eminence here that a controversial Wesleyan, the Rev. Shirley Baker, achieved in the kingdom of Tonga — around the middle of the last century, when he became prime minister — and ran the whole show for the glory of the Lord.

THE TONGAN MONARCHY has survived he saintly impact; Hawaii's did not, which distresses many native Hawaiians today. But this has not inspired many nostalgic Hawaiian royalists to emigrate to Tonga, it seems. Instead, the traffic is all in the opposite direction.

With the coming of independence to many Pacific island groups, a new generation of energetic Americans has moved in with purely secular interests. Their activities have affected the course of government in several instances, sometimes indirectly. For example, a Honolulu entrepreneur's real estate development in the New Hebrides, now the Republic of Vanuatu, may have accelerated local pressure for land reform, to keep foreigners from getting it all.

American involvements in the South Pacific these days rarely have visible political implications. There were two exceptions in recent months. One cost a Polynesian head of government his job, the other helped to derail tranquility in the ruling party of Fiji.

PRIME MINISTER Toalipi Lauti of Tuvalu, apparently without consulting his parliament, invested a sizable chunk of the treasury in the United States through a friend in California. At around the same time, hundreds of Tuvaluans demonstrated their faith in America by sinking their savings in a Texas land development with the beguiling name of Green Valley Acres, sight unseen.

The prime minister's financial judgment became the principal issue in Tuvalu's first election since independence three years ago. Lauti kept his parliamentary seat in the voting a few weeks ago, but was bounced from the prime ministership.

Several months ago, the government of Fiji barred a businessman from Arizona from entering the country, thereby widening a political breach that could cost the Fijian prime minister, Ratu Sir Kamisese Mara, dearly in the elections next year.

The Fijians in the western part of Viti Levu, the main island, were unhappy with the Mara government's handling of their interests. Too few westerners were appointed to political jobs in Suva, and the area was being neglected in other ways, they said. In this roiled atmosphere, the government called for bids on a project to develop the forestry industry in the west.

The man from Arizona turned up with a proposition that the Fijian chiefs of western Viti Levu thought was just dandy. A firm of Canadian consultants hired by the government to analyze the various bids thought otherwise, and the American's proposal was rejected in favor of a deal offered by combined British and New Zealand timber interests. The chiefs were furious.

MEANWHILE, the government became interested in the personal background of the Arizonan, who had been coming and going on a visitor's visa. Investigation disclosed that he had once been tried, convicted and sentenced to 15 years in prison in Texas on charges of fraud. That was enough to get him declared a "prohibited immigrant" in Fiji.

The chiefs took the immigration department's decision badly, apparently believing that the affair was part of a scheme to do down the west. In their anger they formed a new political party called the Western United Front, or WUF, thus splitting an important segment of the Fijian vote from Prime Minister Mara's ruling Alliance Party.

The western secession from the Alliance might have happened anyway, but the barring of the chiefs' American friend from the country was thought to have speeded up the separation. At the least, the incident deepened the hostility to Mara.

THE RESULT, UNLESS the break in Fijian solidarity is mended, could be the loss of enough Alliance seats in the parliament to give the government to the rival National Federation Party, which represents the numerically superior but politically submerged Indian community of Fiji.

A victory for the Federation Party would be a watershed development in Fiji politics, turning the native race out of power for the first time since independence came in 1970. The consequence would be a severe test of the fragile racial harmony in that lovely South Pacific country.

An American changed Fijian history even more dramatically — more than a century ago. The American consul's house was burned down while he was celebrating July Fourth with fireworks. Blaming the mishap on Fijians, he demanded 9,000 British pounds — a staggering sum then — in reparations from King Cakobau, and the United States government backed the claim. The penniless king, imagining American warships steaming into Suva's harbor, hastily ceded the islands to Britain.

Fijian, Ha

SUVA, Fiji — They are all citizens of Fiji, but only the 45 percent who belong to the indigenous island race are called Fijians. A larger number — 50 percent, according to the latest official population estimates — are called Indians. Often the two groups refer to each other as "us" and "them." These are the facts of life that make race an underlying factor in the lively politics of this beautiful and fascinating multicultural country.

A VISITOR WHO HAS been here often before, but not for a few years, quickly senses that racial tensions are far less palpable than they were before. The last big

robert trumbull

The writer was a foreign correspondent for the New York Times for 36 years, mostly in Asia and the Pacific, and now does special assignments for that newspaper from a Honolulu base. He writes this column for The Advertiser.

physical clash between the Fijians and Indians occurred in the late 1960s, and there have been no incidents to speak of since this former British colony became an independent country 11 years ago.

Yet the subject of racial relations is always near the surface in politics. The ruling Alliance Party of the prime minister, Ratu Sir Kamisese Mara, is overwhelmingly Fijian. The opposition National Federation Party speaks for most Indians. Both parties preach "national unity," but one cannot talk politics without considering race.

Relations between the two major communities rock along fairly well as long as the Fijians are in power, as they have been from the beginning, although the Indians feel so uncomfortable with the setup that nearly 4,000 of them leave every year — for Australia, Canada and the United States.

The question everyone asks is what would happen if the Indian party managed to wrest control of the government from the Fijians. The test may be imminent, for they nearly pulled it off in a national election four years ago. They will have another chance next year. A tendency toward disunity in both parties, growing out of personality clashes and sectional differences, could make the result go either way.

THE INDIANS ARE descended from laborers brought here by the British in the last century to work on the plantations, or from later arrivals. Most have lost all direct connection with the land of their ancestors, but they have kept their culture, even to the extent of speaking English with the accents of the subcontinent that few of them have ever seen.

Like the Japanese and other Asians who came to Hawaii, also to work on plantations and beginning around the same time, the Indians of Fiji have moved into business and the professions, but continue to work the sugar fields. Thus they dominate the key occupations, another analogy with Hawaii except that in Ha-

waiian similarities & diss

waii the achievers of immigrant stock are distributed among various races.

The Fijians, unlike the Hawaiians, have held onto their cultural identity throughout the community. This is part of Fiji's problem, for the ancient communal system, lost in Hawaii but still healthy in Fiji, hardly promotes any sentimental affinity for commercial and other pursuits that flourish in Asia and the West.

Thanks to a far-seeing British law, now part of the constitution of independent Fiji, the Fijian clan groups still own 82.5 percent of the land and are prevented from selling any part of it to Indians or anyone else. Fiji, like Hawaii, has a tourist industry, but there, unlike here, every developer is paying lease rent to Fijian families of the vicinity.

If Hawaii had the Fijian system, the Japanese-owned hotels like the Royal Hawaiian would now be paying rent to the native families of old Waikiki, and the Hawaiians of Waianae would be collecting from the Makaha resort — if, that is, ordinary families had ever owned those lands in the first place.

THE BRITISH ALSO preserved the traditional au-

imilarities

thority structure built around the area *ratu*, or chief, probably because that was the easiest way to run things.

None of this tickles the Fiji Indians, nor have the easy-going Fijians become rich.

In a period of unrest before independence, when there was thought to be danger that Fijian hotheads would put Suva to the torch, Ratu Mara — then only a civil servant — summed up the relative positions of the two races in a concise but extraordinarily ill-advised way. If the city burned to the ground, he said in effect, the Indians would lose their businesses but the Fijians would lose nothing but the records of their debts.

Neither side has forgotten that unfortunate utterance, which is nearly as valid today as it was more than a decade ago. A distinguished Fijian put it like this the other day: "Let a Fijian earn ten dollars, and he will spend 12 dollars. If an Indian earns ten dollars, he will spend 50 cents and save the rest."

There was consternation among the Fijians when the Indian party won the national elections by a narrow margin in 1977. In what looked like a fast shuffle, the Fijian governor-general — Ratu Sir George Cakobau, who might be King of Fiji if an ancestor had not asked the British in to protect him against his enemies — invoked a constitutional technicality to invite Ratu Mara to form a minority government.

A DIVISION among the Fijians had been the undoing of Ratu Mara's Alliance Party. The Indian success at the polls brought the Fijians together, and in a new election called the same year the Alliance won by a landslide. Ratu Mara now has a Cabinet with only one Indian member, which hardly helps.

New fissures have appeared in the Fijian camp. Some observers are even saying that Mara, long an idol of his people, has lost his grip. But the Indian party is fractured too, so this is no time for political predictions.

Eight days of interviewing here produced a variety of answers to the question: What would happen if the Indians win the government? Nothing would happen, nothing at all, according to some relentlessly optimistic Caucasian businessmen, all naturalized Fiji citizens. Others were less certain.

A high official of part-Fijian blood thought that 50 percent of the Fijians, confronted with a National Federation government, would shrug and say, "Give them a chance." About 20 percent might be apathetic. But another 20 percent of the Fijians might react angrily, he said, adding that "this would be enough to blow the whole thing up."

A member of the small Chinese minority pretended not to hear the question and went on talking about something else.

At a dinner party, the inquisitive American visitor sought the views of the stately, well-traveled Fijian lady on his right. "If the Indians win the government," she answered without hesitation, "the Fijians will become just like the Hawaiians."

Times 3/31/92

Lautoka turtles galore

It's the turtle season again and people shopping at Lautoka market have found some fine shells there.

One of the first to get to the market was a large 473-lb male (above right) caught by Semesi Tui of Yasawa-I-Ra.

Semesi, 62, caught the turtle while spear fishing off the Yasawa-I-Ra reef about 80 kilometres from Lautoka.

Helped by his son Mosese, the two fought with the turtle for half an hour before they landed it.

The meat of the turtle is a delicacy and the shell is used for decoration.

After the meat is taken from the turtle, its shell is treated and polished for sale in the market.

Lautoka Market vendor Melaia (above) shows off two big turtle shells she brought from Sigatoka. She was selling the shells at $50 each.

The shells weighed about 12 kilograms each.

Turtles are protected in November, December, January and February.

FIJI T. 4563
3/31/82

COINCIDENTALLY—

WATERFRONT

THE end product ... Lautoka market vendor Melaia shows two big turtle shells she's selling at $60 each.

THE turtle catchers .. standing left to right are: Suliasi Ravai, Semesi Tui (owner of MV Tutu Boto), Mosese Tui (skipper), Mosese Mouyawa, Peniasi Rasuaki, and Vereniki Loba. (Picture by JOHNNY SINGH.)

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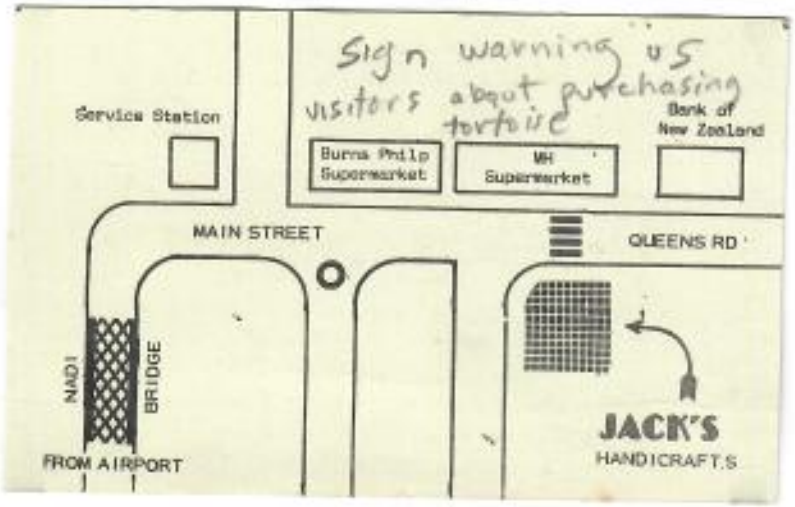
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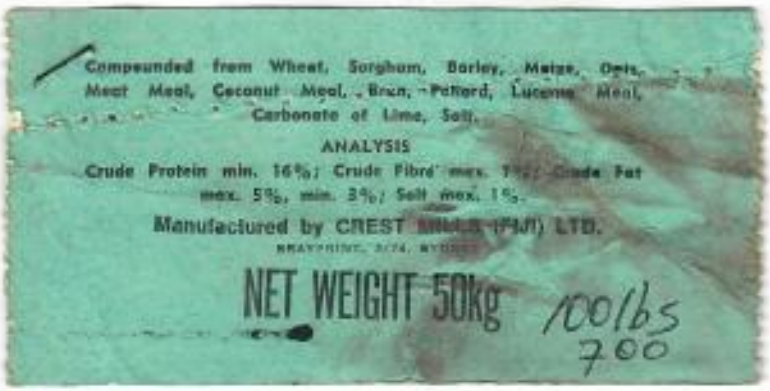
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SOUTHERN LAU, FIJI: AN ETHNOGRAPHY

BY
LAURA THOMPSON

BERNICE P. BISHOP MUSEUM
BULLETIN 162

HONOLULU, HAWAII
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Northwest of Undu a few small, low house mounds, bordered by oval-shaped rings of stones, mark the site of old Undu, occupied, according to the natives, at the time of the measles epidemic (1875). The fortress of Thaukenaloa (p. 219) is situated on the edge of the limestone plateau southwest of Undu at an altitude of about 80 meters. Vakawangga (p. 220), a hamlet site, is located in a pocket in the limestone cliffs about 40 meters above old Undu. The Nambewa fortress is on the precipice north of the village.

Wangava

The uninhabited island of Wangava lies about 3 miles northeast of Kambara. The passage between the two islands, called Ai Vuthuninggase, is considered the roughest in Lau. Wangava is a forested, basin-shaped mass of limestone 3.3 miles in length, 1 mile wide, and 106.7 meters in altitude at the highest point. It is surrounded by a fringing reef.

In the center of the island is a brackish lake, called Sauvanaroa, 0.75 mile wide. The lake rises and falls with the tide. The lake is used by the natives for sea turtle breeding (p. 141). Fertile soil in the interior basin is used for manioc, sweet potato, banana, papaya and maize gardens by the Naivotavota clan of Nggalinggali village on Kambara. However, only a small part of the arable land, which extends over most of the northeast end of the island, is cultivated. Part of it is planted with coconuts, but most of it is forested. Next to garden crops, the main resources of the island are hardwoods, especially greenheart, *mbau*, and ebony. A coarse quality of pandanus grows on Wangava. Fish and shellfish abound, and the *kekewa*, a highly valued shellfish which flourishes in the Wangava lake, is found nowhere else in Lau.

A few aged natives of Namuka say they were born on Wangava before the island was deserted. Informants believe the last village was abandoned between the coming of Christianity (about the middle of the nineteenth century) and the English flag (1874), because of illness caused perhaps by contaminated water, perhaps by evil spirits or sorcery.

The village site last occupied on Wangava is Ndaitukavondo on the sandy flat at Savena, the northeastern point of the island. Here are house sites and a Christian cemetery with about 16 graves. Eight temporary shelters at Ndaitukavondo accommodate gardeners and canoe travelers passing along the canoe route from Kambara to Namuka or Komo. The inhabitants of Wangava moved to Ndaitukavondo from Nambukua (p. 221), a village site on the ridge about 30 meters above, where many stone-flanked house foundations may be seen. Nambukua is said to have been the first Christian village on Wangava.

Two hamlet sites, Toyovu and Nawarowaro (p. 220), are located in the garden lands at the northeast end of the island, and another hamlet site,

Lolousiusi, is on the west side of the island above Vuninawanawa on the west coast. At Vuninawanawa are two temporary shelters.

The two important fortress sites of Wangava are Korombalavu (Koronggara) (p. 220), a fortified cave with one entrance in the central basin and another high up on the cliffs above the sea at Naivakevu on the north coast of the island; and Ndengei (p. 219), a fortified village on the highest point of the island, above Saurai on the west coast. A hamlet site called Nakumbua on the west Wangava beach below Ndengei is said to have been occupied by the inhabitants of Ndengei after the coming of Christianity.

My guide to the archaeological sites of Wangava was Rasolo of the Naivotavota clan, Nggalinggali, reputed to be the only one who knows their location.

Namuka

Namuka is a relatively fertile, limestone island about 4 miles long and 1 mile wide. The maximum elevation of the island is 79.2 meters. The island is nearly surrounded by a barrier reef. Nawatchia, the only village on Namuka, is located on a small bay on the south coast. Fifty sleeping houses occupied by the 289 inhabitants are clustered around the ceremonial ground. Nawatchia has a Chinese store. Paths from the village lead to garden lands in the central basin and northwest across the island to the only anchorage. Fresh water is obtained from a reservoir in the village.

Namuka is geologically older than the other limestone islands and of them has the richest garden lands. The island produces an abundance of food to cover the needs of her population. The main garden products are manioc, sweet potato, and banana. Her principal resources are the paper mulberry (called *masi, Broussonetia papyrifera*) and other plants used in making fine types of barkcloth.

Mothe

Mothe is a circular volcanic island about 2.3 miles in diameter. It is surrounded by a barrier reef. The island rises from sandy beaches toward a central ridge, which attains a height of 179.8 meters at Ndelaimakotu hill. The hillside slopes are forest free, and fertile valleys are watered by creeks. Mothe is rich in garden lands but lacks the forest resources of the limestone islands. Besides an abundance of food, including yams and taro, as well as manioc and breadfruit, the island produces good paper mulberry.

The population of the island is concentrated at the southern end in the two villages of Nasau and Korotolu. These villages occupy adjacent sites, separated only by a narrow drainage ditch. Nasau has 260 inhabitants occupying 52 sleeping houses. Korotolu has 80 inhabitants occupying 15 sleeping houses. Nasau has a Chinese store.

The procedure is simple on less formal occasions, such as marriage or death feasts for individuals in the village. The kava is prepared either by young men or by girls. Sometimes the kava maker and the cup bearer are girls and the kava chewers are men. In olden days kava was prepared and drunk by men only. Today it is occasionally drunk by women in southern Lau. The assistants at the bowl are frequently absent. Occasionally the bowl has several legs or no legs at all. It is not raised for inspection by the herald before water is added, the hands are not examined, and the mixture is tested, after being strained, by being poured into the bowl from a raised cup. The tabus pertaining to the straining process are not observed, and the drinking order is not fixed, nor is it called by the herald. The men in the kava circle usually smoke between rounds. To light his cigarette, which is leaf tobacco rolled in a dried banana leaf (*suluka*), each has placed before him a burning brand.

Occasionally a few individuals hold a kava party in the very early morning called *pongipongi*. Lauans say this is a Tongan custom.

FEASTS

Every important ceremony is marked by a feast, which is presented by one group to another, divided into shares, and distributed according to rank to both recipients and donors. Feasts vary in size and quality of food according to the rank of the recipients and the resources of the donors. Food for most feasts differs from that of the daily meal only in the larger quantity for each individual and in the addition of a sweet pudding for each. Communal fishing which provides fish for the feast usually yields more and larger fish than are caught daily by the women. Turtle and pig are great delicacies served only at important feasts for high ranking persons. Turtle is considered the most chiefly food.

In Lau important feasts are steamed in the earth oven (pl. 2, *A*) by men, while small feasts, eaten in the morning, are boiled by women. In contrast to the daily use of the earth oven in Lau (p. 153) it is used only for feasts in the interior of Viti Levu.

The cooked food for a large feast is placed on the village ceremonial ground or outside the house of the recipient and is presented according to the usual ceremony (pp. 65-66) by one of the donors. A small feast is divided outside the house of the donor. Coconut leaves are spread on the ground and the food from the oven is piled upon them. Freshly plaited coconut-leaf baskets, one for each household, are arranged in a circle around the food. The food is shared according to households and distributed by the host. At a large feast the food is distributed according to clans under the direction of the chief of crops or the chief of the ceremonial ground. True food (*kana ntchina*), namely garden produce, is distributed first, then puddings, fish, turtle,

or pig. Pots of boiled food, covered with slightly dry breadfruit leaves, fastened down by tying a piece of pandanus around the rim, are brought by the women from the kitchens into the circle. The boiled food is either wrapped in leaves and put into baskets with the steamed food by the men, or is left in pots to be distributed with the baskets. The rank and size of the household and its relationship to the host determine the quantity and quality of its share.

The food in the baskets is covered with leaves (hibiscus, banana, breadfruit, ti). The shares are then delivered to each household by young men related to the host. The food is distributed to the members of the household and eaten quickly and informally. Sweet puddings are eaten first, then the main part of the feast. Guests from other villages often carry their food home and eat it in their own village. Shares for visiting guests with canoes are delivered to the canoes. Frequently the shares for close relatives in nearby villages are set aside and delivered.

The chief or person of highest rank always receives the first and best share of a feast. Cooked food presented to the chief or other high persons is covered with green leaves as a sign of respect. Large fish and turtles are wrapped in breadfruit, banana, or ti leaves and steamed in the oven. The head is preferred because it contains the mana and is therefore served to the person of highest rank. Formerly the head of the turtle or pig was eaten by the chief only. Now, in accordance with the Tongan custom (Gifford, 9, p. 125), the back is eaten instead and the priest receives the head.

Ceremonial Exchanges

Large competitive ceremonial exchanges (*solevu*) are made according to a definite ceremonial pattern based on the *sevusevu* rites which were formerly used to make offerings to the ancestor gods but are now used to present first fruits to the chief (pp. 65-66).

On Kambara a *solevu* with deferred payment is occasionally held between the rival villages, Tokalau and Nggalinggali, and between Undu and Lomatchi. Each village tries to outdo the other in quantity of food presented. Several months or years may elapse between the initial payment and the return payment.

The following description of a competitive exchange with immediate payment, held in January 1934, between Komo and Muanaithake was obtained on Fulanga.

The exchange was initiated by the Komo people who sent a message to Muanaithake by a visiting Muanaithake man, asking that a *solevu* be held. The Komo people stated that they wished wooden bowls, a small canoe, paddles, chickens, mats, and pandanus, and that they would bring manioc. A village meeting was held in Muanaithake and the proposal was accepted. Work began on the articles, and four months later a group of Muanaithake men went to Komo on the Fulanga cutter. The Komo people gave a feast called *mangitchi ni veikandavi*. The Muanaithake helped the Komo people cut manioc in

their gardens and after two days, returned with some of the Komo people to Maunaithake. When they arrived the *veikendavaki* ceremony was held in the house of the *mbuli* Fulanga (headman of Fulanga district). First a ceremonial presentation was held; kava was presented by Komo and accepted by Muanaithake. The Komo men said they wanted to make a little *solevu* and they discussed the plans. A Komo man was sent to tell the rest of the Komo people to come with their property to the village, while the *mbuli* Fulanga prepared two guest houses (*i thili*), one for the Komo men and one for the Komo women. A small feast (*i takitaki*) was presented by the chief of the ceremonial ground to the Komo men in the guest house. The men ate first, then the women and children. The chief of Komo and the chief of Fulanga discussed the *solevu* in the chief of Fulanga's house and then decided to begin the ceremonies on the following day. That night the Komo men and the Muanaithake girls gathered in the men's guest house and the Komo girls and Muanaithake men gathered in the women's guest house for kava drinking and a *meke* (dance).

Early the next morning the chief of the ceremonial ground of Fulanga took a banana shoot (*vu ni vuntchi*) to the men's guest house, stood outside the door, gave the chiefly greeting (*tama*) to the chief of Komo, and thrust the banana shoot through the door. The chief of Komo, inside the house, unfolded the shoot. (Informants say that the shoot, just beginning to unfold, symbolizes the awakening of the people.) The chief of the ceremonial ground entered the house and put down the stem. He was followed by young men of Fulanga carrying a feast (*i vaka vundra*, to awaken), which was presented to the Komo people and eaten by them.

The Komo people took the property brought for the *solevu* from the guest houses to the village ceremonial ground. This was called *i siko Tui Fulanga*. First many manioc roots in baskets were placed in a pile. On top of the pile were placed many breadfruit and over all was spread Tongan tapa. The people seated themselves on the ceremonial ground in two semicircles facing each other, the pile of property between them. The chief of Komo knelt in front of the Komo group. The chief of Fulanga sat on a coconut-leaf mat with the chief of crops, *tui naro*, and the *mbuli*. Then the ceremony called *vakathombo Komo* was held. The chief of Komo presented a whale's tooth to the *mbuli* Fulanga according to the usual ceremonial pattern. The *mbuli* Fulanga held the whale's tooth, saying, "Ndou a mbula tchiko manda nga na, tui Komo" (May you remain in good health, chief of Komo). He gave the whale's tooth to the chief of the ceremonial ground, who then presented a bunch of ripe coconuts (*i vono*) to the chief of Komo, according to the usual pattern. This ceremony is called *vutonakisa*. Then the Komo girls danced a *vakamalolo meke*, called *meke ni vakathombo*. The Komo people returned to the guest houses and were given a feast, called *mangitchi a vua viri* by the Muanaithake people. That night a *meke* was held. While the Komo people were on Fulanga the Muanaithake people prepared a small feast each morning and a large feast each afternoon for them.

On the afternoon of the fourth day the *vakathombo Muanaithake* was held. A feast called *mangitchi ni vakathombo* was presented to the Komo people. It was not eaten until after the presentation of property. The Muanaithake men carried their property to the ceremonial ground and piled it as follows: first about 15 wooden bowls and fish plates, and several headrests, then pandanus, and finally a score of rolled mats. Many chickens with legs tied were placed in front of the pile. The *mbuli* Fulanga stood (he did not kneel because he was the host) beside the pile and presented a whale's tooth to the chief of Komo. This ended the *solevu* ceremonies.

The Fulanga people won the competitive exchange because the property they presented was considered of greater value than that of Komo.

Meke

A *meke* is a rhythmic chant accompanied by dancing or gestures and by drum beating. *Meke* are performed on ceremonial occasions such as large

the islands. Today the leaves of the cultivated sweet potato are also eaten. The stems, with the leaves adhering, are broken from the plants and placed in baskets which are strapped to the back in the same way as bundles of wood (p. 151).

Fruits, especially those eaten raw, are usually gathered by boys, but the *ndawa*, the Tahitian chestnut (*ivi*), and the *vala* are gathered under the supervision of grown men. On all the islands the Tahitian chestnut and *vala* are gathered and esteemed highly. In harvesting the *vala*, care is taken not to harm the trees. Boys climb the tree and push or twist off the fruit clusters with a straight or a forked stick. The men gather them from the ground and boys or men carry them home in baskets on a stick resting on the shoulder. Usually two baskets are carried on one stick, one behind, the other in front of the shoulder. The lower branches of the Tahitian chestnut tree are picked by hand. The upper branches are picked from the ground with a stick, or a boy climbs the tree to shake the branches and loosen the nuts with a stick.

Other fruits gathered from the bush are: *yaka* (*Pueraria thunbergiana*), *yaumitha* (*Malaisia scandens*), *yangai, tarai,* important especially on Fulanga; *songa* (the fruit of the mangrove) eaten on Fulanga and Ongea, *mbau levu, mbau thana,* preferred to the larger *mbau levu* because of its sweetness, *mbawaki,* and *nggalaka.*

Arrowroot (*yambia, Tacca pinnatifida*), the tuber of which was formerly the staple on the volcanic islands, is eaten only in years of drought, except on Fulanga and Ongea, where it is eaten often. The arrowroot does not grow on Kambara.

The *wangiri* nut, formerly the staple on the limestone islands and Kambara, is eaten occasionally on Fulanga and Ongea, but elsewhere only in times of famine. It does not grow on the volcanic islands.

Sugar, extracted from wild ti root, is used to sweeten puddings.

Yavato, an edible grub (the larva of the long-horned prionid beetle, *Olethrius*) found in decaying trees, is highly prized. Men search for grubs in old tree trunks lying in the bush. On Kambara I watched a European-Fijian half-caste searching for grubs. The saliva ran from his mouth when he found an old trunk with many holes eaten into the wood. Roughly he cleaned off the dust of decaying, moulding wood with his hands and hastily ate 46 grubs.

The coconut crab (*unga vule*) is considered a great delicacy. The crab, which weighs up to 12 pounds, is caught by men who turn it on its back and tie vines around it so that the legs are lashed to the body. A stick is pushed under the vine and the crab is slung on the shoulder.

Birds' eggs are never gathered or eaten, but turtles' eggs, found on the beach, are relished.

TURTLE FISHING

The sea turtle (*vonu*) is a chiefly animal in Lau, and is protected by special rules. Permission to fish for turtles must be granted by the master fisherman of the chiefs' phratry. Most of the turtle fishing (*vothevothe*, to paddle) in southern Lau is done by members of the chiefs' phratry on Kambara. The master fisherman describes the day and place of the hunt, and at the appointed hour the whole community streams to the beach.

Men and women (mainly young girls) board the canoes. The master fisherman paddles out near the reef and the boats line up, with the two canoes on the wings about 50 meters ahead. "Vola", the master fisherman cries, lifts his paddle, and all boats paddle forward. If a turtle is seen in the water the person who detects it calls excitedly, "Vonu, vonu!" and points toward a dark spot moving ahead. The fishermen paddle quickly with all their strength to catch up with the turtle. Frequently it escapes, but sometimes after a chase of several minutes it pauses at the bottom of the lagoon. A young man dives down behind the turtle, grasps it under the plate nearest the neck with his hand, and with his foot against the back of the animal, turns it over, shoving it to the surface upside down. The people on the canoe haul it aboard and place it on its back. The same method is used on a dark night, when the moving turtle causes a phosphorescent light. The conch shell is blown on the return of the canoes from a successful turtle hunt.

Turtle breeding is described on pages 141-142.

Turtles bred in the lake on Wangava are caught by means of a turtle net. The only net in southern Lau belongs to Mothe but it has been borrowed by the people of Kambara, who use it on the Wangava lake. I witnessed a netting day there. The net was hanging over a rod set on two forked stakes near the lake. Before it was taken down, dry leaves were gathered and lit to windward so that the smoke might blow through it and purify it on the chance that a pregnant woman had touched it. "But no one lives here", I said. "Just the same some women are *tha* (bad)", was the answer.

The net was placed on a canoe and taken on the lake. Floats of *vutu* (*Barringtonia*) nuts kept the upper length of the net on the surface of the water, while weights of stone held the lower length of the net on the lake bottom. The net was put out at eleven in the morning and at four o'clock in the afternoon one turtle had been caught. The next morning two turtles were netted and on the third day two more. They weighed from 90 to 175 pounds. The animals were taken to Kambara. One soon to be eaten, was taken to the village of Nggalinggali where it was kept on its back. The others were placed inside a turtle fence in the lagoon.

POISONOUS FISH

The natives claim that the fish in the section of the Kambara lagoon stretching for about 200 meters along the northwest shore of Tokalau have been poisonous since the hurricane in 1929. They say that three people in one clan died from eating fish caught there. They do not know why the fish from this

section are poisonous while those from the surrounding waters are not, but some believe that during the storm poisonous seaweed was carried through the passage situated opposite the poisoned section and now grows there. Patches near the islands of Komo and Mothe have also been poisoned since the 1929 hurricane.

Hunting

PIGS

Though wild pigs are no longer found on Lau, some old people have participated in pig hunting. Moto of Undu describes it as follows:

> Many young men went with spears through the jungle, sometimes with a dog. We encircled a large coral pocket and placed men with spears at the exits. Other men went down into the pocket. The pigs ran from the exits and were speared. Often the injured pigs ran back into the pockets or to other exits until they were killed by another spear or died of loss of blood. The legs of the dead pigs were tied together and two men carried them home on a stick across their shoulders. The pigs belonged to all the hunters and after the hunt a feast was held.

GOATS

There are wild goats on the uninhabited island of Aiwa and a few on Kambara. Men sailing by canoe between southern Lau and Lakemba usually stay over night on Aiwa and occasionally hunt goats. The goats are chased into a coral pocket, and as the animals try to pass through the exits, they are clubbed. Occasionally live goats are caught and taken home.

WILD FOWL

The Lauans are not very successful in trapping wild pigeons. They are occasionally trapped in a basket (*wali*) in which are tied red berries for bait. But I have seen the trap placed in a red berry bush where the birds can have all the berries they want without entering the trap.

There are wild chickens on Kambara, Fulanga, Wangava, and Namuka which closely resemble the domestic chickens. Wangava and Kambara have many. Traps are occasionally set for them in the jungle. A chicken trap (*ndau ni toa*) is a pyramid-shaped, four-sided frame of any kind of wood faced with slats. It is open at the base and is placed on the ground with the bait inside. One side is raised and propped up with a stick just high enough so that the fowl can enter.

Wild ducks are seen on the brackish lakes of Namuka and Wangava.

Animal Husbandry

PIGS

Pigs (*vuaka*), which are scarce in southern Lau, are the most valued domestic animals. Pork is an esteemed food for feasts at important weddings, initiations, and funerals.

brood and imparts his mana to the consumer. To be served an old tough rooster is a sign of respect and the good will of the host. On Muanaira, a rooster said to be nine years old was thought to have much mana and was called master (*matai*). Inhabitants of the other villages on the island knew about him. The natives said that to kill such a rooster might have a bad influence on all the chickens of Fulanga.

The natives know that it takes about three weeks for baby chicks to hatch. They believe that without a rooster to fertilize a hen she cannot lay an egg. Old Mosesi of Namuka says, "A long time ago it happened that we had no rooster on Namuka, but we had eggs because the chickens mated with the ground pigeons." Asked if they had any chicks from these eggs, he said, "Yes."

When I arrived on Kambara two domesticated ducks (*nga*) were sitting on eggs under an overturned old canoe. One day the owner lamented that both birds had been sitting over three weeks and that no young ducks had arrived. A week later the owner of the ducks complained that there were still no young ducks. I found that there was no drake on the island and that these two ducks were the first birds of the kind on Kambara. They had been brought from Moala, whence they had come from Viti Levu. Natives said that they had been greatly surprised when the birds began laying, but had deduced that the ducks mated with the roosters.

In 1934 there were about 30 turkeys on Kambara. They belonged to Mosesi of Naivotavota, who said he had procured them from Viti Levu in 1929. They ran freely in the Ndelaioloi garden lands and in the jungle. They were not butchered and were steadily increasing.

I saw no bird cages, but the natives on all islands remembered that at one time or another they had kept a *kaisevou* bird, a pigeon, or a wild chicken.

DOGS AND CATS

There are two or three dogs (*koli*) on each island. The natives pay little attention to them and the animals are usually forced to steal their food. They are often seen scratching around the earth oven, and boys chase them away with stones. During my visit four dogs were born in Tokalau, and the owner killed them by throwing them against a tree. Informants say that dogs were occasionally eaten on Kambara in the past.

A few cats (*pusi*) are kept as pets on each island. The children play with them and carry them around. They are not fed. I saw a wild cat on Wangava and informants claim that there are wild cats on Kambara.

TURTLES

The Kambarans catch young sea turtles, keep them in the house, and later place them in Sauvanaroa, the brackish lake on Wangava. There they grow

and develop a finer shell and flavor than they would in the open sea. On the shore at one corner of the lake are a few shelters of pandanus and coconut leaves where the turtles rest and dig their nest holes. The natives say the old female watches the eggs when they are about to hatch and that before the young ones reach the water she eats some of them.

It is said that in olden days the chiefs used the lake as a breeding pond for turtles and that since then the Naivotavota, Tanggu, and Saumua (Tokalau) clans have replenished the supply of young turtles from the open sea.

Near Nggalinggali is a turtle fence 5 meters in diameter, in which turtles to be butchered are kept. The fence is circular and consists of sticks rammed into the ground near the beach. The sticks stand only 3 cm. apart and are tied together with *wali* string.

Gardening

New land is rarely cleared. When it is cleared, a flat spot with a few big trees is selected. A fire is lighted around the trunk, and soon the bark dries and loosens. After a few months the foliage drops and as the years pass the branches drop, but the trunks remain a long time. On one spot, said to have been cleared 15 years ago, the big, white trunks are still standing and sweet yam vines climb on them. Sometimes cleared land is not used for a garden, either because the native has not had enough energy to loosen the soil and prevent shrubs and bushes from growing, or because an evil spirit is discovered in the neighborhood.

Garden Produce

As far as possible, crops are rotated. Usually on the best land on most of the islands crops are rotated as follows: a crop of sweet potatoes, another crop of sweet potatoes, a fallow year, a crop of *kawai* (sweet yams) which are stringy and are cultivated only on islands with poor soil. The following rotation is considered ideal: yams, sweet potatoes, manioc. The land is then allowed to lie fallow for a year or even longer. Soil conditions, however, do not permit this preferable rotation except perhaps on Mothe, Komo, and Namuka. Since on all the islands a larger acreage is planted with manioc than with yams or sweet potato, two crops of manioc are often planted in succession on the same land.

Manioc

The varieties of manioc (called manioke; forms of the cultivated Manihot) are: *mbavisondoi* (many branched); *vula tolu* (three months, because it ought to be planted in three months only—February, March, and April); *niumea* (the natives claim that this variety came from Noumea, New Caledonia);

occasionally mixed with the manioc just before it is made into balls. Each ball is wrapped separately in breadfruit, *valevale,* or ti leaves as follows:

If a breadfruit leaf is used, the ball is placed near the base of the leaf. The upper part of the leaf is then bent over the ball and the leaf drawn together to form a bag around the ball. The bag is tied with a strip of pandanus as follows: Loop the pandanus over the thumb of the hand which holds the bag of pudding upright, pass the pandanus back under the thumb below the ball of pudding, wind the pandanus around the ball twice, cut it with the teeth, pull the free end upward through the loop over the thumb, pull the other end down tight and close the loop. This ties the knot. Cut off the extra pandanus with the teeth. If *valevale* leaves are used to wrap the pudding, place two leaves at right angles, in the form of a cross, place ball on the intersection, draw the leaves up over the ball and tie with pandanus as described above. If ti leaves are used, place the ball on a ti leaf folded in half with tip meeting base, draw the leaf tightly around the ball to form a bag and with the teeth pull down a strand from the lower end of the midrib of the ti leaf, pass the strand around the ball twice and knot in the same way.

The bags of pudding are placed in the oven below the sweet potatoes.

Turtle, which is eaten only at a feast, is prepared on Kambara as follows:

The animal, lying on its back, is killed by a blow on the head with a stone. Then the fore and hind flippers are removed with a knife. The turtle is turned over and boiling water is poured onto the back shell. The end of a pointed, chisel-like stick is shoved under the plate closest to the neck. The plate is lifted, hot water poured into the opening, and the stick shoved deeper until the plate loosens. When all the back plates are thus removed, the turtle is placed on its back again and the belly shell is removed in one piece by first cutting around it and then cutting and lifting it off. If the turtle is being prepared for a chief, the cutting around the belly shell starts at the back, otherwise at the side. Next, by starting at the chest and working toward the rear, the meat is taken out. It is placed in a wooden food bowl, and cut into small pieces. Then comes the most important part of the preparations. The leader of the feast selects the portions to be given to each household, the quality of the meat and the size of the portion depending on rank. Cuts from the head of the turtle are for the chief. Each portion is placed in a scorched, double banana leaf, the midrib of which has been trimmed to make it pliable. The banana leaf is pleated into a bag, half a tumbler of water is added, the bag is covered with two *viavia* leaves, and the whole is tied with a strip of leaf. Each bag is marked with a sign known only to the maker—such as a special knot, an extra leaf, or a mark on the leaf—so that it may be identified later and presented to the proper household. The bags of turtle meat are placed on the *viavia* leaves covering the hot stones in the earth oven, the largest bag in the center. More leaves are placed over the bags, then over the whole is set the inverted lower shell of the turtle, then another layer of leaves, a layer of old coconut-leaf baskets, and finally earth. The oven is opened after three or four hours. The bones and viscera of the turtle are boiled into soup, if possible in a kerosene tin.

Pork is eaten only at a feast. It is prepared as follows:

The pig's throat is cut with a bamboo knife and the blood allowed to flow freely. The pig is then slung, back down, on a pole and singed over the fire. Next the entrails are removed through a slit in the belly, which is later filled with hot stones wrapped in leaves. The pig is then ready for the oven. If yams are used they are cut in pieces and placed next to the hot stones. The pig is placed, legs down, on top of the yams or other garden produce. The whole is covered with hibiscus leaves and finally with earth. Pigs to be eaten immediately are steamed for about four hours. Pigs to be distributed and taken home are steamed a shorter time. Before being eaten they are cut into pieces and boiled.

Roasting

Roasting is a quick method of preparing food. Breadfruit is often placed whole, stem down, directly on the coals or placed on sticks across the oven pit above a fire in which stones are heated. After roasting, the skin of the breadfruit is quickly removed with a small, sharp stick. The breadfruit is ready to be eaten or be made into pudding. Wild yams and bush fruits are often roasted over an open fire in the bush. After roasting they are scraped, dipped in salt water, and eaten.

Boiling in Pots

Food was formerly boiled in earthenware pots (*kuro*), but now large imported iron pots are used. The fire is laid at one end of the kitchen and the pots are placed upon two iron rods above it. It is fanned with a pandanus-leaf fan (*iri*). The pots are covered with dry breadfruit leaves, which fall from the trees in the village and are gathered when needed.

Sweet potato and non-poisonous manioc are usually boiled in fresh water, but most of the boiling is done in coconut cream (*lolo*). Coconut cream is made as follows:

Ripe nuts are husked by ripping the husk open at the stem end of the nut on the upturned pointed end of a husking stake (*ndoko*). The strip of husk, which has been freed, is pulled off by hand. The process is repeated until the husk has been removed. The nut is then halved by one blow from a cane knife and the flesh is grated on the tooth edged, upturned end of a piece of iron attached to a board. A person sits on the board astride the rod and grates into a wooden bowl. (Usually little girls do the grating for the kitchens.) Coconut milk is added to the gratings and the mixture is strained with a hibiscus strainer.

Salt is not manufactured in Lau. According to Tchosaia of Tokalau, formerly salt water was sometimes used for boiling. Today it is little used in pots although food is occasionally soaked or dipped in salt water before being eaten.

Mboro, the daily boiled dish, is made of greens and coconut cream with or without fish. Leaves of the cabbage, the sweet potato, *mboroa sovivi* (*Ipomea gracilis*), *mbelo,* pumpkin, or manioc are picked from the stems. They are placed in the pot with coconut cream and some of the coconut gratings from which the liquid has been extracted for coconut cream. Fish or shellfish, if available, are added to the greens and coconut cream, and the pot is covered with a slightly dry breadfruit leaf and boiled slowly for about two hours.

Fish or shellfish are cleaned on the beach, but scales are not removed from the fish.

Soups are popular but are not made every day. A delicious fish soup called

ika vakalolo is made by boiling fish in coconut cream to which a few small red peppers (*roketè*) have been added.

During the breadfruit season the main meal on Fulanga consists of breadfruit, peeled, cut into pieces, and stewed with shellfish in coconut cream.

In the papaya season a dish called *sepo* is prepared. Peeled, slightly green papayas are boiled in water until soft and grated manioc and grated coconut are added just before serving.

Stone Boiling

I saw the technique of boiling with hot stones used only once in Lau. The method was used at Naivindamu, Fulanga, in the preparation of *nggalu sua*, a pudding of *yambia*, for a wedding feast. *Yambia* is a slightly poisonous tuber, formerly a staple food in Lau. The poison is extracted as follows:

Yambia roots are washed and then grated on sticks wound with sennit. A hoop-shaped stick is sewn to the mouth of a gunny sack. The sack is filled with a mixture of grated *yambia* and water and hung from a wooden tripod over a wooden bowl. The strained liquid, caught in a bowl, is allowed to settle. When the starch has settled at the bottom of the bowl the liquid is poured off, more water is added, allowed to settle and again poured off. The starch is then dried in the sun. If not used immediately it is put into bags of coconut reticulum, again dried in the sun, and finally stored.

The *nggalu sua* was cooked as follows:

About 50 basalt earth-oven stones were heated in an open fire. A large wooden bowl or trough, 2 meters long and 30 cm. deep, was one third filled with *yambia* starch. The bowl was placed near the fire and made secure by placing a log crosswise under one end and driving two stakes into the ground, one on each side and touching the other end of the bowl. The stakes were tied tightly together over the top of the bowl with a tough vine. Fresh water was added to the starch and thoroughly mixed by hand. Then one stone from the fire was dropped into the mixture to test it. Coated with starch, it was shown to the leader of the feast, who decided whether or not more water should be added to the mixture. Then, one by one, all the hot stones were dropped into the bowl while the mixture was stirred vigorously by two boys, each with a straight branch of *moli*, about 2 meters long, from the lower end of which the bark had been removed. The hot stones were taken from the fire with a half coconut shell and a stick, or with a discarded *i yuli* (the lower end of the midrib of a coconut leaf shaped into a sort of paddle), from which a wedge shaped piece had been removed to form tongs. The mixture boiled and thickened into a gelatinous, amber-colored mass. Two boys, dipping their hands frequently into salt water in a bowl to moisten and cool them, removed the stones, one by one, and closed air holes in the mass. The salt water slightly darkened the color of the starch. Finally small handfuls were wrapped together with *ti lolo* (pudding sauce sweetened with ti) in banana leaves, which had been made flexible by shaving the back of the midrib. They were then ready for distribution with the feast.

Sweet Puddings

Sweet puddings (*nggalu*), which accompany every feast, are made with or without a sauce. Sweet sauce is added to puddings made of manioc, breadfruit, taro, or *yambia*. Puddings with a sauce are often served and eaten as soon as they are made, before the earth ovens have been opened and the feast

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OUR REF:-
YOUR REF:-

18th February 1981

Dear George.

Just a hurried note to thankyou for the "Synopsis of Biological Data" and the snippet from the Honolulu Advertiser (It seems out of date. Terrible reading, as I gather was popular in the 1950's at some resorts, but I haven't heard of any such goings on while I was there.

I was successful in getting the money for the aerial survey from USP - lucky I guess. Nevertheless my luck was short lived for after the first day's flying (from Vanua Balavu north) we found that none of the airports outside of Suva carried a stock of aviation gas. We returned to Suva for the night.

The next day, Wednesday (14/1/81) we were grounded due to Cyclone Esther. During the blow that came that night, the hangar door fell off and broke one of the wings of the Cessna 172. It is still out of action. As all the alternative planes were three times the price, I've postponed the survey of the Southern Lau Group until December ie next season. There was scattered green and hawksbill nesting on Nukusemanu, Nukubalati and Nukubasaga, Nanuku Laibi (hawksbill) and Nanuku Levu (greens) much the same as last year. Large numbers of tracks (Turon 6s style) were not seen on any of the islands. I could have been late in the season - but not by much.

Other turtle news: We had several long discussions with the people at the Fiji Dictionary Project who have varying names for turtles - different growth stages, species etc from a couple of parts of the group. Together we should be able to put something together on Fijian classification of sea turtles - something along the lines of Linnaean classification but based on different characters.

I trust that your visit to W Samoa was rewarding. I'm due to have a satellite discussion to Alafua and Tonga within the next month. USP has a slow scan photo transmitter and they want to experiment with some things of interest to the region. I was asked to put something together on sea turtles It will be based on loggerheads for my slides from Wreck Is seem the most suitable for conversion to B+W for transmission Each photograph takes 90 secs for complet reproduction. After about 15 slides the rest of the hour will be for discussion etc.

Changing the subject to sea snakes. We come across

an interesting problem with Laticauda colubrina. Having collected freshly laid eggs from captive females, I find that the shell is similar in texture and possibly porosity, for they imbibe water for the first 24 hrs, as sea turtle eggs. My attempts to find eggs in the wild have been unrewarding. More intensive work will follow when I locate their hiding place. Are there any sea snake experts on your staff? I read with interest a book review of McKeown's "Hawaiian Reptiles and Amphibians" It mentioned a sea snake in your area. Would it be possible to send a photocopy of the pages dealing with sea snakes and turtle?

I haven't heard from Mark Gentle. He is with SPC in Noumea apparently coordinating the sea turtle research. Along the grapevine I hear that nothing much is going on!

Enough for now. I'll write at length when the usual chaos of the start of semester has been sorted out.

Best wishes
Mich Guinea.

FIJI

Ponang - Vatoa "Cooks Turtle Island"
Southern most in Fiji group - green
Vomo - NW coast of Viti Levu - Hawksbill
Token Dec - March

Hirth
Turtle Grass pastures off Suva and Tomberua Is.
1 loggerhead shell seen.
Hawksbills - KADAVU

XEROX FUJI MAP

MINISTRY OF AGRICULTURE FISHERIES AND FORESTS
AND THE UNIVERSITY OF THE SOUTH PACIFIC

QUESTIONAIRE (NO. 2) ON CAPTURED TURTLES

Name and address of captor

1. The kind of turtle captured.
2. Date captured
3. Area of locality where the turtle was caught
4. What method was used in capture
5. Size (see attached sheet for help)
   (a) Carapace length (inches, feet or cms.?)
   (b) Greatest carapace width "
   (c) Greatest head length "
   (d) Greatest head width "
   (e) Plastron length "
   (f) Estimate of weight (pounds)
6. What sex (male or female - males have elongated tail)?
7. Description of stomach contents (i.e. type of food found in it)
8. Any other relevant information on the turtles?

MINISTRY OF FISHERIES FORESTS AND AGRICULTURE

AND THE UNIVERSITY OF THE SOUTH PACIFIC

QUESTIONAIRE ON TURTLES

AREA.

Name and address of person answering the question

NAME : KADAVU

ADDRESS : 109 Lbs

1. What kind of turtles are found in your area. (See attached sheet for identification of each kind found in Pacific waters).

2. Define your area (ie. area pertinent to your answers).

3. How many turtles are captured per week or per month in your area?

4. Can you give any indication of the sizes of turtles captured in your area?

   Average size

   Smallest size

   Largest size

   Which of these above three sizes is most abundantly caught?

5. Which methods are used to capture turtles in your area (nets, gigging, capture of nesting females, spearing, etc.)?

6. Where do turtles nest in your area (name of islands or beaches)?

7. Can you indicate the following information on the nesting season in your area?

   (a) When turtles start laying eggs (give the month)

   (b) Which month is the peak of nesting season?

   (c) Which month do the turtles stop laying eggs?

   (d) Which month the most number of hatchlings appear in your area?

8. If turtles do not nest in your area, are you aware of the islands where turtles may go to lay eggs?

9. In your area, are turtles found in any particular concentrations other than around nesting beaches?

   If so, can you define this area?

2/.....

10. Are you aware of special turtle feeding grounds in your area?

    If so,

    (a) Define the area

    (b) How big is the area (eg. square metres; square chains)?

    (c) Do turtles feed there seasonally? If so, which month?

11. What do you think the turtles in your area feed on, that is,

    (a) What grows in the turtle feeding grounds?

    (b) What kinds of food are found in the turtle stomach?

12. Are there any local customs against killing or eating turtles or their eggs?

13. Give names and addresses of any turtle fishermen in your area.

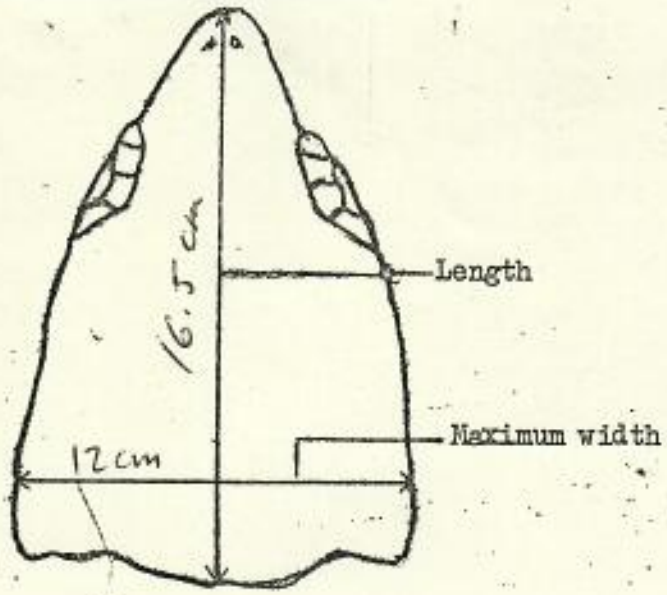
14. Are people in your area aware of the Government laws relating to utilization of turtle (ie. closed season, prohibition on taking eggs hatchlings, or very young turtles)?

15. Do you have any particular recommendations on how one might get accurate information on the turtle populations and the size of the annual harvest in your area?

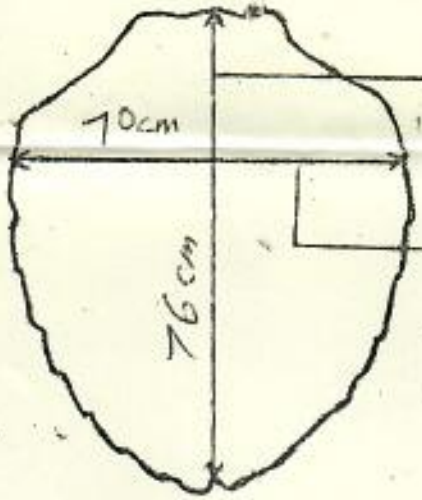
16. Do you have any additional information or recommendations on turtles in your area and in other parts of Fiji Islands?

AIDS TO VARIOUS MEASUREMENTS REQUIRED IN QUESTIONAIRE NO. 2.

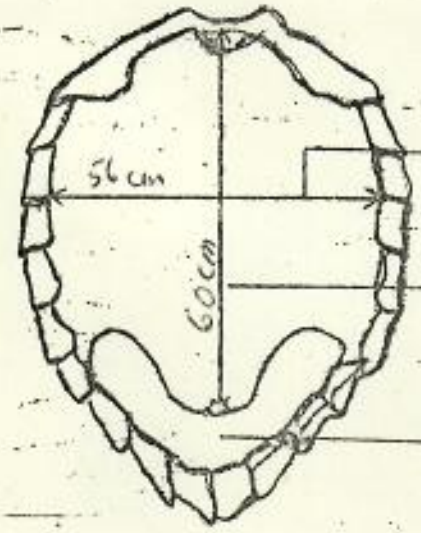
A. Top View of a Turtle Head.



B. Top View of a Turtle Shell (Carapace)

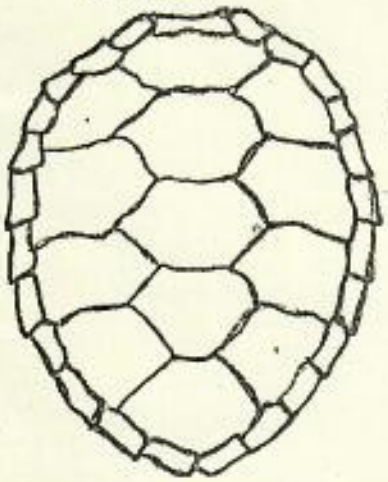


C. Bottom View of a Plastron (underside of a turtle)



The Appearance of Carapace and arrangement of shields in turtles reported from Fijian waters.

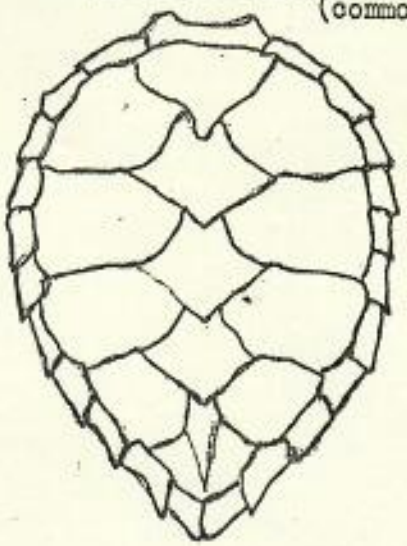
A. GREEN TURTLE (Vonudina)
(common)



FEMALE

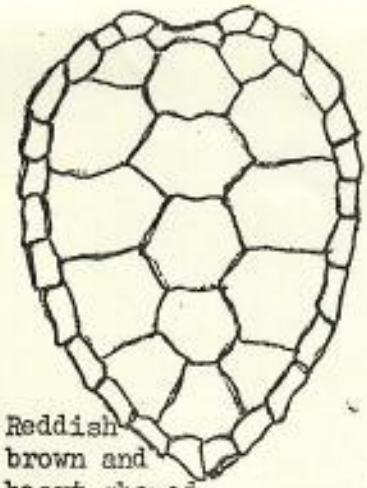
Shell - black to dark olive, scutes do not overlap
Fat - Green (hence name)
Plastron - very light and often white
Distinguishing character - Serrated lower jaw.

B. HAWKSBILL TURTLE (Taku)
(common)



Shell - mottled-brown
- overlapping scutes
Plastron - yellowish
Distinguishing Character - hawk-like jaw and overlapping scutes.

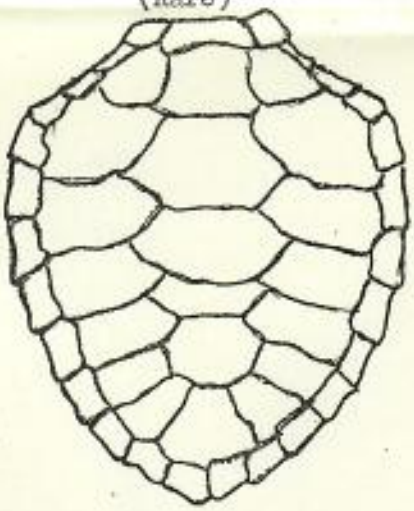
C. LOGGER HEAD TURTLE
(Relatively rare)



Shell - Reddish brown and heart shaped.

Distinguishing Character - Reddish-brown shell and large broad head.

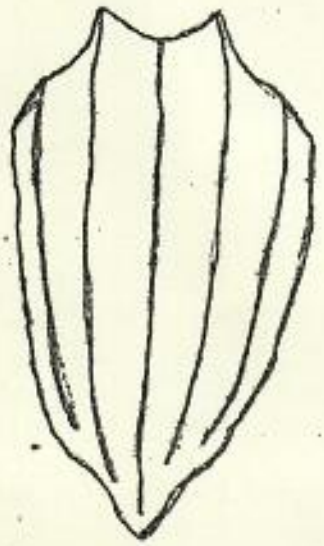
D. PACIFIC RIDLEY
(Rare)



Shell - Broad and nearly circular shell, olive-brown colour.

Plastron - Greenish yellow or greenish white

Distinguishing Character - broad, nearly circular shell. Smallest of all turtles.



E. LEATHERBACK TURTLE (Ika dina)
(Relatively rare)

Shell - does not have hard formed shell. Its back is composed of black skin with 7 narrow ridges. This is distinguishing character.

NA TABANA NI QOLIQOLI, VEIKAU KEI NA TEITEI

VATA KEI NA UNIVESITI NI CEVA NI PASIFIKA

NA VEITARO ESO MT BALETA NA VONU

Yaca kei nai tikotiko nei koya e saumi taro

YACA : KADAVU

NONA I TIKOTIKO : FEMALE

85 lbs

1. Na vei mataqali vonu soti vakacava e dau kune eke?
2. Vakamacalataka na vanua era dau kune kina na vonu?
3. E rauta ni vica na vonu e dau tobo ena dua na macawa se dua na vula eke?
4. E rawa ni ko ni vakaraitaka na kedra lelevu na vonu era dau kune eke.

Ka veimama

Ka lalai

Ka lelevu

Nai vakatagedegede cava veiratou oqo e cake e dau tobo vakalevu?

5. Na vei sala cava e dau vakayagataki me tobo kina na vonu eke, (lawa, vesu, gauna ni vakasucu, laucoka)?

6. Ena veivanua caka beka era dau vakalutu yaloka kina na vonu ena yasana oqo. E yanuyanu se toloni nuku?

7. E rawa ni koni vakamacalataka na gauna ni vakasucu ni vonu ena nomuni yasayasa.

   (a) Vula era dau vakalutu yaloka kina?

   (b) Vula era vakasucu kina vakalevu

   (c) Vula era cegu kina na vakalutu yaloka

   (d) Na vula cava beka era dau kune kina vakalevu na luve ni vonu eke

8. Kevaka era sega ni dau vakasucu eke na vonu, ko ni kila beka eso na veiyanuyanu eke era dau vakalutu yaloka kina na vonu?

2/.....

9. E tiko tale beka eso na vanua era dau kune kina vakalevu na vonu, me kakaani wili kina na matasaya.

   Kevaka kina vakamacalataka na vanua oqori?

10. O kila beka eso na vanua era dau kana kina vakalevu na vonu?

    Kevaka kina

    (a) Vakamacalataka na vanua oqo

    (b) Vakacava na kena levu

    (c) E dau kana kina vakagauna na vonu? Kevaka kina, na vei vula cava soti?

11. Na cava beka o nanuma era dau kania na vonu e nomu yasayasa, me vaka

    (a) Na veika era dau tubu enai kanakana ni vonu kei na

    (b) Mataqali kakana cava e dau kune e ketedra na vonu

12. E tu beka eso nai tovo vakavanua ka dau vakatabuya se vakadredretaka na kena dau vakamatei se laukana na vonu?

13. Tukuna na yacadra kei na nodrai tikotiko eso na dau qoli vonu eke.

14. Era kila tu beka na tamata ena nomu yasayasa na veilawa vakamafanitu eso ka vauca tu na bula ni vonu me vaka na kena dau vakatabui me tobo na vonu, na yaloka ni vonu kei na luve ni vonu lalai?

15. O rawa ni tukuna e dua na sala ka rawa ni tauri kina e dua nai tukutuku matata me baleta nai wiliwili ni vonu kei na levu ni vonu ka dau qolivi rawa ena dua na yabaki eke.

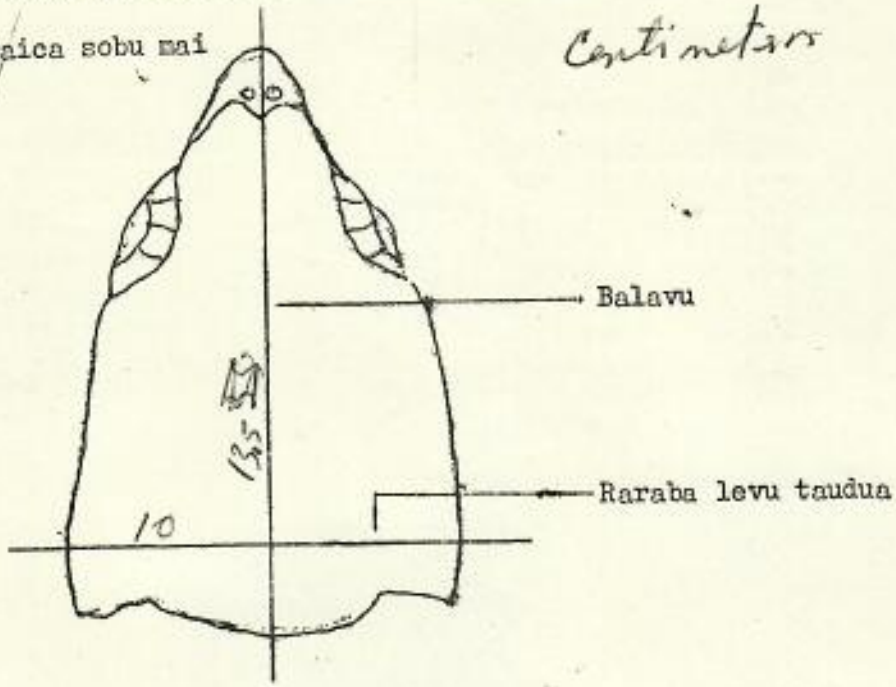
16. Eso tale beka nai tukutuku kei nai vakasala me baleta na bula ni vonu eke kei na veiyasai Viti tale eso?

NA VEIKA ESO ME VAKARAWARAWATAKA NAI VAKARAU ESO

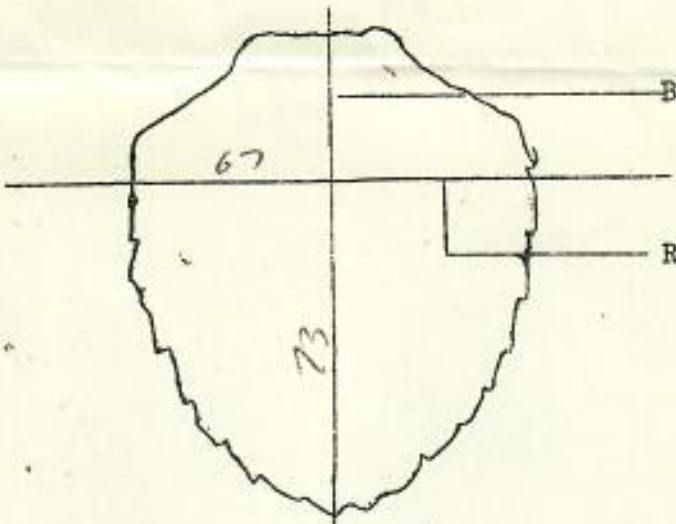
E VINAKATI ENA TARO ENAI WASEWASE NABA RUA

A) Ulunivonu ni ko raica sobu mai cake

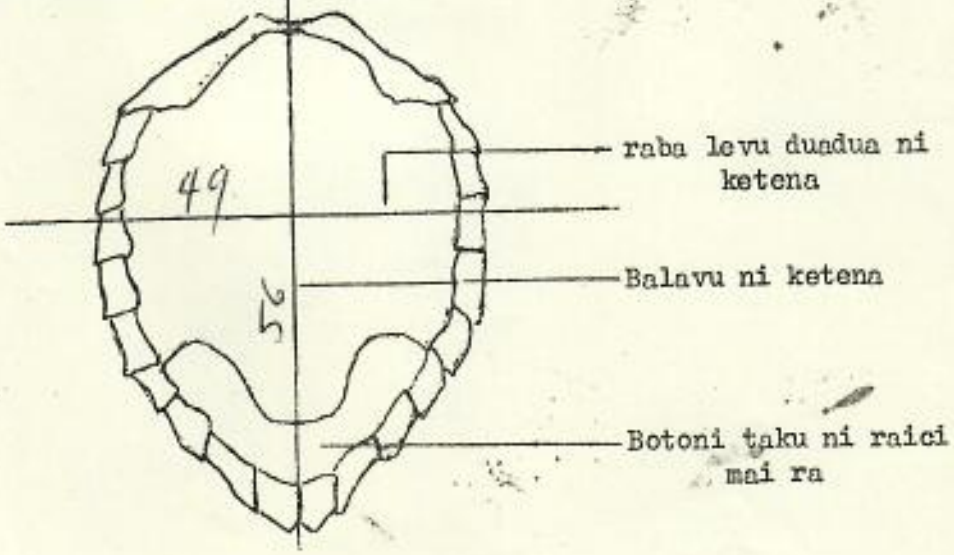
Centimetars



B) Na Qa ni Vonu ni ko raica sobu mai cake (Taku)

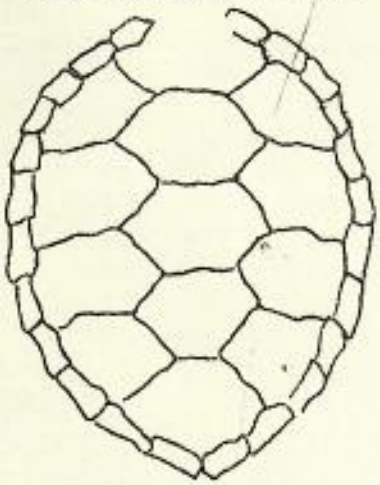


C) Na Kete ni Vonu mi raici mai ra (botona)



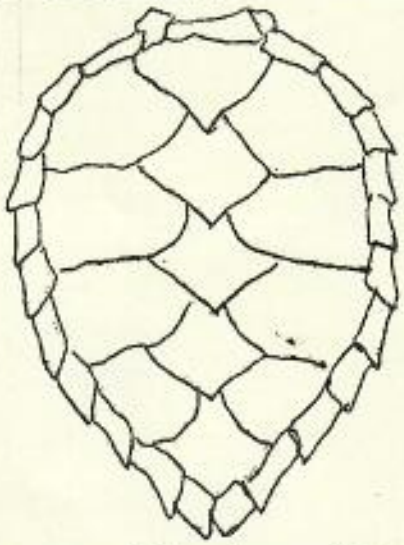
Nai rairai ni Taku kei nai tuvaki ni qani vonu ka vakaraitaki mai na veiwasawasa e Viti

A) Vonu Drokadroka (kune vakalevu)



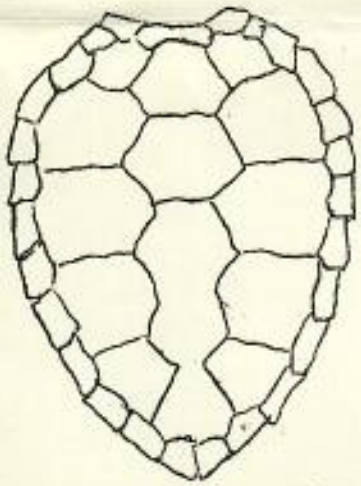
Qana - loaloa ki na loaloa lumisa, na taku era sega ni veitaqataqai
Uro - Drokadroka (Kau mai kina na yacana)
Ketena - Mamada ka vakalevu e dau vulavula
Na ka e duidui kina mai na vonu tale eso - Vakabatibati na kumina

B. Vonu Taku (kune vakalevu)



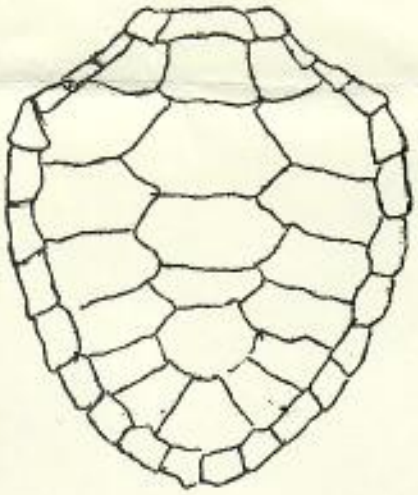
Qana - Volavola na kena taku
Veitaqataqai na kena taku
Ketena - Dromodromoa
Na ka e duidui kina mai na vonu tale eso - Gusu momoto vaka na gusu ni koki se manulevu ka ra veitaqataqai na kena taku.

C) Vonu-Bala (Sega so ni dau kune vakalevu)

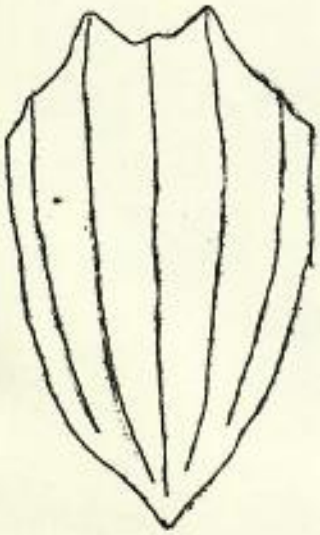


Qana - Roka vaka na qele damu ka vaka nai bulibuli ni uto
Na kena duidui mai na vei vonu tale eso - Roka vaka na qele damu na qana ka ulu levu qai raraba.

D. Vonu Lalai (Kunekune dredre)



Qana - Raraba ka viavia momokiti na qana, roka loaloa lumisa
Ketera - Drokadroka dromodromoa se drokadroka vulaci
Na kena duidui mai na veivonu tale eso - Raraba, viavia momokiti na qana. Na mataqali vonu lalai taudua



B. Ika dina (Sega so ni dau kune vakalevu)

Qana - Na qana e manare ka malumalumu
Na dakuna e loaloa na kulina ka vitu nai wasewase sobu a dakuna. Na ka oqo e duidui kina mai vei ira na vonu tale eso.

the university of the south pacific

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OUR REF:-
YOUR REF:-

6th. August 1980

G. H. Balazs
U. S. Department of Commerce
P. O. Box 3830
Honolulu
Hawaii 96812

Dear George,

Just recieved your comments on the "Turtle Data Sheet" proposed by Mark Gentle. This is the first time that I've seen it although we discussed it some time back. Your comments, I think are valid. I spoke to Mark of some of the problems of such a survey sheet. This is not the first sheet of its kind (see attached sheets). The previous sheet had very little response the reason for which is beyond me. The green turtle travels under many names in Fiji e.g.

MAKALOA is the black version ,
DAKAROSAWA is the black and white variety some times seen in the males
VONU DAMU is the sun ray i.e. subadult with red colours
VONU DINA is the real turtle some times used for the leatherback (IKA DINA)
IKA BULA is the green used in traditional ceremonies
TODRO is the cross between a male and a female, presumably a subadult male. It is the one with the most fat and therefore prized for the table.
BALA is the male. The name refers to the tale which the Fijians think to be the penis
MINO is the female

These names were given to me by the GONEDAU (turtle catcher) of the Tunola District in Cakadrove on Vanua Levu last December. On the western side of Viti Levu, Nadroga is the language. This is

totally different to Baun (Fijian). So the common Fijian names could be a problem unless the fisheries officers are able to identify the turtle the head, fat, flippers etc.

The loggerhead is called TUVONU and I've also heard it called VONU NI TONGA (the turtle from Tonga - a snide remark by Fijians about Tongans with big heads).

The hawksbill always seems to be called TAKU - both males and females

Lepidochelys seems not to be known by the turtle fishermen that I have spoken with. Those with an eye for the trinket trade know the number of scutes on the shell (not counting the marginals). They talk of 13 for the hawksbill and green and 15 for the loggerhead but never of 20 (the ridley).

The number of prefrontals also vary from what I've seen in counting countless hundreds of head scales for Col Limpus whilst doing hatchling clipping.

I agree with deleting the flipper length measurements as I measured 30 flipper lengths of greens on Heron Island. The measurements were taken from the outer scales to the base of the claw and to the tip of the flipper. They are difficult to take unless the procedure is standardized and the same person is doing all the measurements. In Fiji we don't have enough weights and flipper lengths to do any regression analysis.

A problem that arises with preserving the head of a loggerhead is that the head is usually sold at the same price as the flesh and intestine i.e. F$2.80 a kilo. The head and neck of an adult green has been quoted to me at F$8.00 in Suva market. I could have bought the carapace for F$15.00.

Mark is correct in that only a minor amount of the turtles caught end up in the town markets. Those that do are often kept for several days or even weeks for transport to town or even for the market to clear of other turtles. One fisherman, Thomas in Vatawaqa near USP will keep his turtles for a week or more until he can get the best price. He has a turtle pen and is in no hurry to get his catch into Suva.

As an indication that all the turtles don't get to market, a villager by the name of Andrea in Koroko Village on the Natewa Pen. makes his living by buying turtle shells at $1.00 or so each, drying and polishing them and selling them to the tourists when the cruise ships call into Savusavu on Vanua Levu.

I've also heard by turtle telephone that Sylvia has her research assistants for the Long Island programme. Valonna Baker is one of them She has worked for Col Limpus as a part-time assistant for about 8yrs and has been to more places than Col tagging. Sylvia has the pick of the bunch in Valonna. I hope everything goes well for both of them.

Col, in case you haven't heard from him thinks that there is no justification to consider the beach washed male green as an agassizi. As he pointed out to me, I didn't record the colour of the carapace, plastron.

Mark Gentle has had a shift in SPC to the position of Fisheries Officer and will be based in Noumea organising the turtle tagging programme in the SPC region.

I stumbled across your article in the Marine Turtle Newsletter (July 1978) on Tattooing Green Turtles - the grey matter gave a twitch and I've enclosed a copy of "Fish tagging with injected dyes" Mauri Ora 1975 (3):55-61 by Paddy Ryan who works with me at USP. I'm looking at this method as a possible tagging method for sea snakes and turtles (if only I had a large population)

With regards to your letter of 24 July, both Satish Choy and myself would be most happy and eager to support such an informal information paper. Personally, I've a few questions I would like to put to the researchers in French Polynesia regarding their tagging techniques i.e. Did they ever write or carve Tahati into the carapaces of any green turtles as I've a report from a villager on Tavuni of catching such a turtle? Am I to believe him? We have limited translation facilities here at USP and such an information paper would be most welcome. Also with Col's permision I'm sure that I could pass on some helpful information about how he went about collecting data in the Australian programme.

Enough for now. I hope that your new position is all that you expected. I look forward to hearing from you.

Kind regards

M L Guinea

Michael Guinea

the university of the south pacific

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TEL. SUVA 27131

OUR REF:-
YOUR REF:-

2 April 1980

George Balazs
University of Hawaii at Manoa
P.O. Box 1346
Kaneohe
Hawaii 96744

Dear George,

I was pleased to receive your letters of January 28 and February 4, aswell as the reprints. I'm sorry to have taken so long to reply but the university year has started with its usual chaos.

With regards to that dead green on Heron Island, a straight carapace length was not taken as Col had the calipers with him at Mon Repos at the time. However it was not particularly large as two of us lifted it into the boat which was used to take it to the research station. I would estimate it to be 100cm (CCL). It must have washed ordead onto the beach with the tide. When I saw it, I thought it was asleep, as sleeping turtles had been reported from Erskine Island during the season. This turtle made no effort to move during the twelve hours that I observed it whilst waiting for permission to kill and dissect it. Again, I'll refer you to Col for more information if you think that it could have been agassizi.

The pages from Derrick's " The Fiji Islands" are enclosed. This book has been out of print for some years now. Twelve months ago the latest edition was printed but in true Fijian style it hasn't been bound yet. I'll send you a copy if it is released while I'm still in Fiji.

Rob Stone is now a consultant with the Institute of Marine Resources attached to USP. However he is in Kiribati at the moment. I'll contact him when he returns. The island that you mentioned sounds like the sand cay on Cakau Levu which is one of the most remote islands in the group. The other (Qamea, pronounced Nggamea) does have a low level of nesting of hawksbills. The villagers there boasted of catching mating hawksbills in December, as well as killing any nesting females that they came across. There are also a number of sub-adult greens caught on the Syringodium beds to north-east of Taveuni. I was in that area in January and hope to be there again in December. The islands to the north and east of there look promising.

the university of the south pacific

P.O. BOX 1168-SUVA, FIJI.

School Of Natural Resources

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OUR REF:-
YOUR REF:-

30th. June 1980

George Balazs
University of Hawaii at Manoa
P.O. Box 1346
Kaneohe
Hawaii 96744

Dear George,

Again my apologies for being so late in my replies to your letters. I've had an overload in teaching this semester and consequently little time to catch up on my correspondence.

In the interim, I've heard that the bond between UH and USP has gone through some teething problems, and might not exist in the future. To add insult to injury USP has decided to cease funding of my turtle research and has directed me to investigate sea snake biology. Although it is not a killing blow, I'm still able to get out to villages and ask questions about sea turtles. Sea snakes are not that bad. They are plentiful and the Fijians don't eat them, so they might be a better MSc. animal. However, I've organised several activities for this December that could be the crux of any sea turtle surveys in the future. One is an aerial survey of the Lau Group. It will involve 14hrs flying time and at $50 an hour that comes to $700. This was to be the stepping stone for a survey by boat through the northern Lau Group. The owner of the boat is not talking money at the moment and it could be for gratis as long as he can do some fishing on the trip.

I've been instructed to seek funding from elsewhere for such surveys. SPC seemed to be a likely source, however, the people from SPC involved in the Workshop, Rene Grandperrin and Jim Crossland have since resigned which brings my personal contact with SPC to an end. What I'm looking for is ideas --maybe you can

HELP. If this sounds like an SOS you are not far from the truth. I've 18months to go on my contract with USP and although I look like getting a second contract, I'll be tied to the same 40hrs a week to the University which leaves little time to get out into the field. Market surveys just tell how many pass through Suva and nothing about how many are left. Fiji needs somebody in the field for two years before a statement can be made about the status of sea turtles in the region.

I've heard nothing of the proposed Pacific wide tagging programme mentioned at the SPC workshop. I don't know what was passed at the previous workshops, but I assume that a certain amount of tokenism and lip service goes on. Is there any chance of any large scale regional programme being established?

Sorry to bother you with such questions, but things seem to have died a natural death after the workshop in Noumea. I've enclosed a first day cover of the last "endangered species" issue from Fiji. Sea turtles didn't get a mention, yet the tree frog and the parrot finch are common animals to those who spend any time out of Suva.

Kind regards,

M L Guinea.

Michael Guinea

[my underscores – Gilbertese]

the university of the south pacific

School of Natural Resources
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OUR REF:-
YOUR REF:-

29th January 1980

Dear George,

Just a short note to accompany some shots of a male green turtle that was darker than the usual Queensland greens. I mentioned it to you in Noumea as a possible agassizi. I found this turtle on the beach at Heron Is late at night. It hadn't crawled there, for as you can see from the photographs there are no tracks. Having obtained permission from the Fisheries Dept, I dissected it and found no visible cause of its illness. It was thoroughly checked for parasites as well by a visiting parasitologist at the research station. Col has a full report as well as copies of these photos so if you require more information, I suggest that you contact him. It was in 1975 or 6 I'm not sure which at the moment.

Also I've enclosed a copy of a Mauri Ora article dealing with a N.Z. leatherback.

I've just returned from Nanumea Is. (cf Bustards 1970 paper). I spent 9 days there over the new moon and saw no nesting nor hatchlings. There were 24 body pits on the island - 9 green and 14 hawksbill. Fifteen of the nests had been broken into by Fijians and just before Christmas 2 hawksbills and one green were killed on the beach before they laid. I'll have to write a full report and send you a copy. I think if a large green rookery

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still exists in Fiji it will be on a remote, uninhabited island in rough seas. I have my hopes for Nukumbasanga Is. but I've yet to get there.

I hope that your 1980 season goes well.

Regards.
Michael Guinea

Turtles and an Iguana in Fiji

H. Robert Bustard

At least four species of sea turtle nest in the Fiji Islands. In January 1970 Dr Bustard, aided by a grant from the FPS, visited the eastern group in order to assess the populations. He found, as had been feared, that the turtles were reduced to very low numbers, largely through killing for food; his main recommendation for restoring them is the enforcement of the very good legislation that already exists but which is openly flouted. He also investigated the status of the unique Fijian Iguana and urges the need to establish at least one national park to save it—and that quickly.

Four, perhaps five, of the world's seven species of turtle nest in the Fiji Islands (of which there are about 300). This is a very rich turtle fauna, especially as two species are extremely local. The four are the green *Chelonia mydas*, hawksbill *Eretmochelys imbricata*, leathery *Dermochelys coriacea*, and a 'loggerhead' turtle. This may be *the* loggerhead *Caretta caretta*, or the Pacific Ridley *Lepidochelys olivacea*, the two species being often confused; or it may be that both are present.

In May 1969, on my way back to Australia from the IUCN Marine Turtle Specialists' meeting in Switzerland, I made a brief stop in Fiji to find out something about the status of sea turtles there. I had attended the meeting as the official Australian delegate, but had also covered the whole South Pacific, and the Fijian Ministry of Natural Resources had informed me that, although no information was available on the current status of turtle stocks in Fiji, 'from all accounts it would appear that the turtle population is fairly large'. Protective legislation under the Fisheries Act is excellent on paper. Turtle eggs are totally protected: 'no person shall at any time dig up, use, take or destroy turtle eggs of any species'; all turtles of less than eighteen inches in shell length are also protected, which eliminates the curio trade in small stuffed turtles; there is a close season for all turtles: 'No person during the months of January, February, November and December in any year shall in any way molest or take or kill any turtle of any size', and the export of turtle flesh is banned, thus preventing exploitation to satisfy a western gourmet trade. The Government takes the legislation seriously; about the time of my visit a Fijian was fined \$20 (about £10) for taking a turtle out of season, and two further prosecutions have been made since. But turtle meat has long been a delicacy among the Fijian people. It is served in hotels and restaurants, and the demand is increasing with the rapid development of tourism. A correspondent told me, 'Now, as the turtles come up to lay they are killed and eaten by the Fijians as fast as they come up. In some parts of Fiji, the mongoose eat the eggs before they hatch, and the young turtles are also eaten by the mongoose before getting to the sea. It is only in the outlying areas that they really survive.'

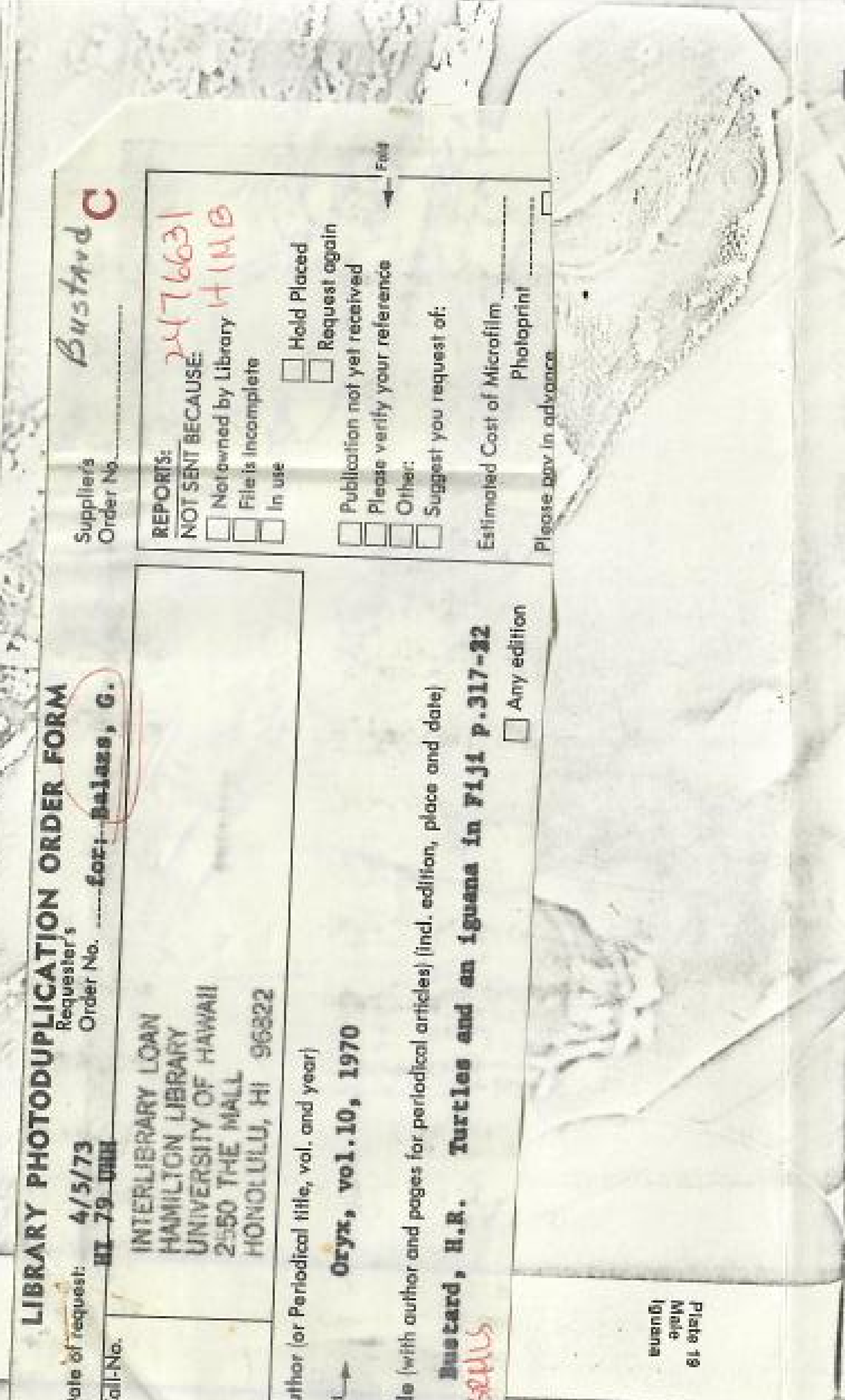


Plate 19 Male Iguana

During my first visit to Fiji I learned that the leathery turtle was nesting there and requested the Government to give total protection to this world-endangered species. (I am glad to say that legislation to effect this is being gazetted.)

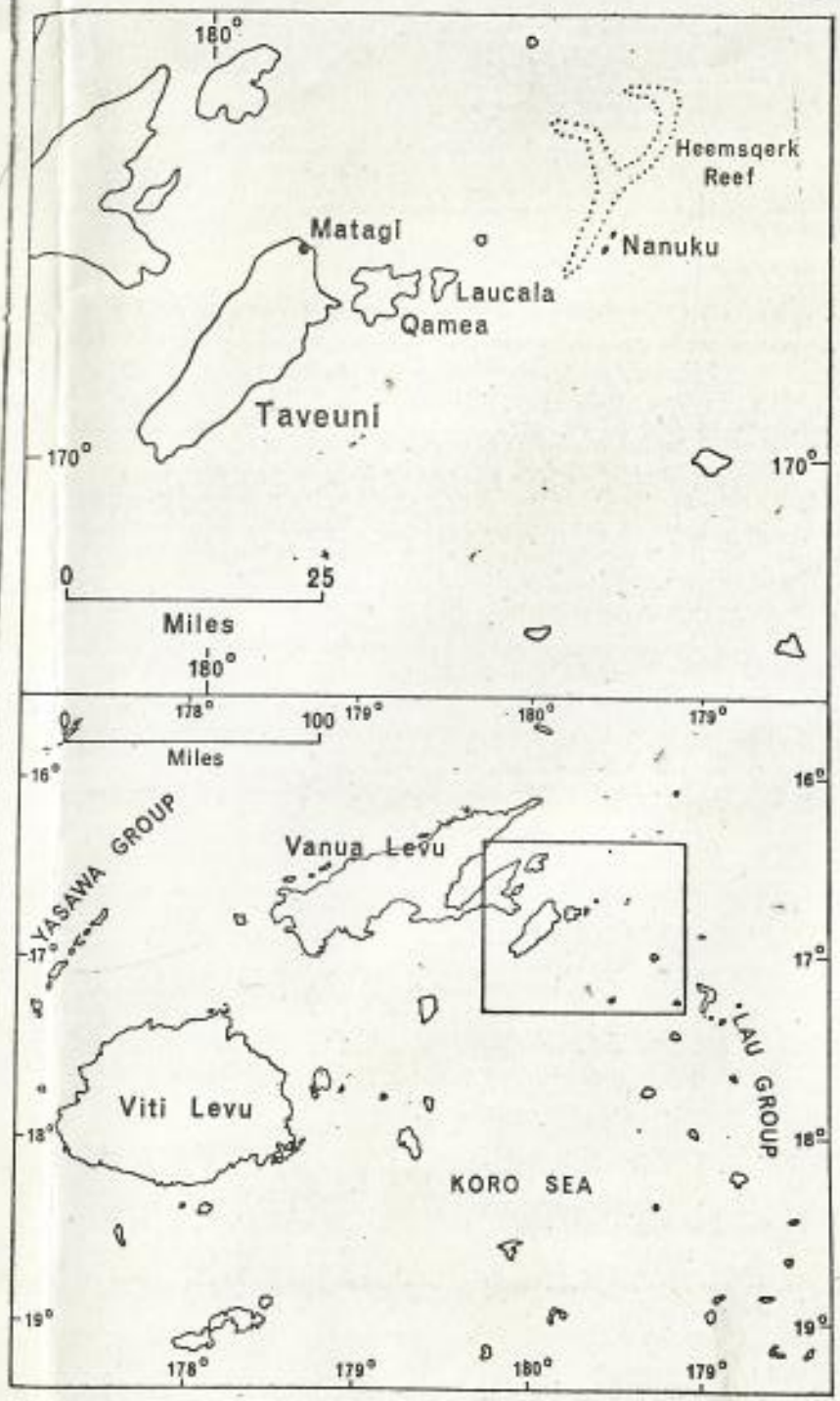
The purpose of my second visit was to investigate the status of sea turtles in the outlying islands where there are no mongoose. Based on Taveuni I visited the outlying islands by launch, and in this way collected information about turtle-nesting on Taveuni, Laucala, Qamea, Matagi, and the cays of Heemsqerck Reef, Nanuku Levu and Nanuku Lailai (Lailai being Fijian for small).

Present Numbers

Turtle nesting on Taveuni is now a very rare occurrence. I visited beaches in two parts of the island where green turtles used to nest according to two reliable long-term residents who had watched them ashore. They can be seen feeding in the passage between Taveuni and the large island of Vanua Levu but do not nest in the vicinity. On Laucala only the hawksbill and the green are known to nest, the latter rarely. Hawksbill nestings are now much less common than formerly and only a handful appeared to have nested during the summer of 1969–70. On Qamea no nesting of any significance takes place, and on Matagi only the hawksbill nests, and that sporadically: about one nesting a week last summer. Matagi is 280 acres, and has a perimeter of several miles, but only certain areas are suitable. During my two visits to the island, each of several days duration, no turtles nested.

Having been told by Fijians on Matagi and Laucala, and residents in Taveuni that the Nanuku cays were the only good nesting places now, I went there at what should have been the height of the nesting season. I spent the night of January 12th ashore on Nanuku Levu and found evidence of only six previous nests, mostly of green turtles, probably made over the previous two or three weeks. No turtles nested that night despite excellent conditions including a very high night tide. The vegetation of the high beach platform was dense, indicating little use by turtles in recent years. (Where nesting is extensive green turtles damage the fringing vegetation extensively.)

The following day I examined Nanuku Lailai, a small sand cay without vegetation close to Nanuku Levu. Here the coarse sand provided clear evidence of nesting, particularly by hawksbills. I counted twenty nests which I estimated were made over a period of about three weeks (based on appearance when checked on a subsequent visit), of which eighteen were hawksbill and two green turtles. When eight days later I revisited Nanuku Lailai, although no one else had visited the cay in the interval (no tracks other than our own in the coarse sand), only two fresh nests were found, both hawksbill. Nesting was extremely poor considering the attractive features of both Nanuku Levu and Lailai to green and hawksbill turtles respectively. If Nanuku Levu were situated at a similar latitude on the Great Barrier Reef I would expect an average of 40–50 green turtles to nest *each night* from November to February inclusive.



FIJI ISLANDS. The top map is an enlargement of the area in the square on the lower map.

The Poaching

The cause of the decline is poaching, which is rife despite the excellent legislation for which the Fijians, who are well aware of its existence, have little respect. On all the inhabited islands I visited, Fijians who had never seen me before readily admitted that they ate both turtles and eggs whenever possible—they like the flesh of both hawksbill and green turtle and take the nesting turtles whenever they can, despite the close season. They are well aware of the fortnightly nesting cycle and say that most turtles nest at the time of the full moon plus one day either side and at the mid period between full moons. On these nights throughout the close season many Fijians are out looking for turtles. If they miss one they take the eggs, note the beach, and make a point of being there to collect the turtle when it lays again about a fortnight later. Thus, little nesting now takes place, and the remnants of the breeding population are being killed and their eggs taken. Undoubtedly this situation has existed in some degree for hundreds of years, but the increase in population, combined with greater mobility (for example, possession of outboard motors) has allowed high levels of predation on nesting grounds previously visited only rarely. Nanuku Levu is Fijian-owned but uninhabited and used to grow coconuts. One land-owner only gave me permission to go ashore and look for turtles on condition that one of them came with me in the launch to collect eggs, which are totally protected the year round, and (hopefully) turtles. I was openly solicited in the middle of the close season when in the company of two Europeans who like myself were complete strangers to the Fijians! (This situation has been brought to the attention of the Senior Fisheries Officer, Mr. A. E. Adams, who is most interested in conservation, well aware of the sea turtle potential, and is acting to strengthen enforcement.)

What Should be Done?

No Fijians in the outer islands had any idea of conservation or resource management, and the best hope of persuading them that rational as opposed to total exploitation is in their own interests is by education in the schools. Presumably food has never been at a premium; until recently turtles were numerous, and crawfish 'in berry' are eaten whenever obtained. However, to save the turtles now needs speedy and effective action. If the present legislation could be enforced the problem would rapidly be solved, but if this is not possible, then the cays of Heemskerck reef and other important uninhabited turtle nesting areas should be declared strict turtle sanctuaries at all times of the year.

Turtles and Tourism

The loss of the turtles would be much more serious than just the loss of a food resource. In Australia we have found that sea turtles are just as integral a part of the mystique of coral islands as white sandy beaches, palm trees and clear blue water. Undoubtedly this has been a factor promoting their rigid conservation in Queensland and the Great Barrier Reef, where all visitors want to see turtles laying their eggs—

every summer literally thousands of people see the nesting process at Heron Island alone. When swimming, snorkeling, water-ski-ing or boating, they want (and expect) to see turtles swimming lazily over the reefs during the day, and this requires substantial turtle populations. In Fiji tourism is fast becoming the most important source of income, and already the 'calling of the turtles' is becoming known as something to try and see in Fiji. Properly managed the maze of islands which make up the Fiji group can absorb much greater numbers of tourists, but this will only be achieved—and sustained—if the natural unspoilt setting can be maintained. Wise conservation action is needed now to ensure the future of this lucrative industry.

The Fiji Iguana

The Fiji iguana *Brachylophus fasciatus* is one of the most distinctive land animals, world-renowned because outside the Americas the iguana family is only known in Fiji, Tonga and Madagascar. Oceanic islands are not rich in vertebrate animal life, and this iguana is an attractive animal. About two feet long when adult, the females are bright green and the males banded in green and brown. Rare throughout almost all its range, it is listed in the IUCN Reptile Red Data Book, which says that, although 'not uncommon as recently as 1915, it must now be considered rare, if not extinct, on many of the islands' and gives the reasons for its decline as: 'mongoose devour both eggs and young . . . persecuted by the Fijians . . . many were killed by the Fijians who climbed the coconut palms to control the rhinoceros beetles . . . the Fijians kill it whenever they see it. Forest clearance is also greatly reducing the potential habitat'. Since the iguana is known to eat cockroaches and beetles it probably eats the rhinoceros beetles, so it seems remarkably short-sighted to allow the beetle control workers to kill a valuable indigenous form of control. The iguana should be actively encouraged in the coconut crowns; if it were not now so rare the rhinoceros-beetle problem might never have reached its present proportions!

Here is a real challenge to an independent Fiji—a chance to educate its people towards an understanding of their own native animals. Certainly to explain to them that these are revenue-earners from tourists. (When I addressed the Fiji Society, which advises the Government on the need for legislation affecting wildlife, there was not a single Fijian in the audience.)

Both the introduced mongoose and cane toads *Bufo marinus* have been blamed for the disappearance of the Fijian iguana. But there are no mongooses on Taveuni and cane toads have been common for at least 20 years, yet in the last two to three years the iguana has decreased alarmingly. For two years now Mr. R. Douglas of Qacavulo Estate has seen and heard of none, despite extensive bush felling by his men who report sightings to him. Before that it was not uncommon; working in the bush one would see several every hour. The decrease on Taveuni is not due to insecticides and cannot at present be readily explained. At the same time a formerly abundant species of skink has also virtually

disappeared; this could be caused by magpies, introduced to eat the rhinoceros beetles, eating the eggs and/or hatchlings. The iguana occurs even on small islands provided they are forest clad, such as Matagi (228 acres), which is privately owned and half of which has not been cleared; even there it is not at all common. Rewards, equivalent to a day's wage for each specimen (to be subsequently released again) resulted in only one seen and captured in over a week.

On Laucala iguanas are either extremely rare or absent. On Qamea, where they are seen during felling operations, they are reported to be not uncommon. On Kanacia island in the Lau Group, where there are no mongooses or cane toads, iguanas are present. In the suburbs of Suva, where it used to be common, it is now much less numerous. Wherever it occurs real estate development and forest clearance, in addition to introduced predators, pose real threats to the iguana.

A Government ordinance, recently gazetted, provides for the setting up of national parks. Several should be declared urgently (all will be invaluable to tourism in the future) and one of them should take in an area of important habitat for the Fijian iguana. The island of Kandavu appears to be one of its last remaining strongholds, and a suitable area there should be gazetted a national park without delay. Legislation should also close the export loophole. At present it is not even necessary to have an export permit to take iguanas out of Fiji, and this showy animal could rapidly become a popular exhibit in zoological gardens, depleting the natural populations still further.

The Fiji Museum has recently become interested in the iguana. From a single individual at the time of my first visit they had increased their collection to five by January 1970, and their display aroused considerable interest, especially when the only female laid five eggs. In late January the eggs were developing well (though unfortunately none hatched) and the female was about to deposit a second clutch. Such activities deserve every encouragement; hopefully, they will give Fijians an increased awareness of, and interest in, their fauna.

I have concentrated on sea turtles and the iguana, which are large and showy with tourist potential. Steps should be taken to conserve them first, before it is too late. But this does not mean that the other reptiles and the native frogs are doing well. They are not.

Australia is becoming increasingly active in the South Pacific, and I am sure that a request from the Government of Fiji to the Australian Government for a marine turtle specialist to advise them on turtle resource management and for an expert to help in the setting up of national parks would result in help being provided.

Acknowledgments

I am particularly indebted to Dr Leonard Goodman who arranged the complete itinerary of my first visit and did most of the planning for the second, and to the Douglas family on Taveuni without whose help the survey work on the second visit would not have been possible. The Fauna Preservation Society generously provided funds for the second visit.

The Tsavo and the Elephants

P. E. Glover

In 1966 the Ford Foundation made a grant of £78,000 to finance a three-year research project in the Tsavo National Park in Kenya. The big problem to be investigated was the vast and increasing numbers of elephants which were said to be destroying the park by their wholesale destruction of trees. A research programme was started, involving the killing of large numbers of elephants. This aroused considerable controversy, and in May 1968 the Director and a research ecologist resigned. Research has, however, continued under the direction of the author, who is Botanist Warden, aided by a zoologist, both of whom joined the project later in 1968, and a count of the elephants in 1969 showed that they had not increased at all since 1965. Dr Glover's account of the work that is being done, the findings so far, and the changes in the park itself explains why it is important that the work should continue, and for this new funds must be found.

One of the largest big game sanctuaries in the world, covering some 8000 square miles, the Tsavo National Park contains the biggest elephant and black rhinoceros populations in Africa. But, as is now well known, the very large numbers of elephants have brought widespread changes in the vegetation, and for the past ten years the 'elephant problem' has been a matter of great concern to the Director and Trustees of Kenya National Parks. Many discussions have taken place and much has been written. Elephant population dynamics and reproductive rates have been studied; 300 elephants were shot as a sample in 1966, and it was recommended that 2700 more should be killed in the course of further studies.

The most obvious and urgent problem in the park is to discover just what effect elephants are having on their habitat, and what the long-term results are likely to be, both for the elephants themselves and for the other important herbivores. It has been said that the Tsavo is well on the way to becoming a desert, and will become one unless immediate action is taken to reduce the elephants. It is true that they have drastically altered the vegetation pattern, and that in the 1961 drought it looked as if the park was indeed becoming a desert. Today, however, the situation is very different. An upward trend in the annual rainfall, combined with the elephants' destruction of commiphora and other trees, has brought a new vegetation pattern with a higher carrying capacity than has existed there since the writer first saw the Tsavo park in 1951. More plains animals—oryx, zebra, eland, kongoni, buffalo—are appearing, and the variety of species seems to be increasing. In fact, at the moment the park is understocked with plains game, and there is plenty of food with a wide choice of plants for both elephant and rhinoceros.

Periodic aerial counts of all the large animals have been made in

SPC/Fisheries 8/WP.24
20 October 1975

ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION

EIGHTH REGIONAL TECHNICAL MEETING ON FISHERIES
(Noumea, New Caledonia, 20-24 October 1975)

AN ATTEMPT TO GROW HAWKSBILL TURTLES (ERETMOCHELIS IMBRICATA) IN FISH PONDS IN FIJI

by

N. Gundermann & D.M. Popper
Raviravi Fish Pond Project
Fiji

A fish pond project was started in Raviravi on the north western coast of Viti Levu in 1972. Some thought was initially given to introducing green turtles (Chelonia mydas) into the ponds for the purpose of fertilization or conversion of vegetarian feeds, such as mangrove leaves (which are known to be acceptable to green turtles) into more readily available fertilizer. Unfortunately however, no young green turtles were available for the experiment. Some good hatchings of hawksbill turtles (Ertmochelis imbricata) were obtained at the same time at the University of the South Pacific where Dr Uday Raj is conducting experiments in rearing turtles as part of a study on marine turtles. Dr Raj experienced some difficulties with lack of suitable holding facilities for the hatchlings. This led to the co-operation that was meant to provide preliminary information as to the feasibility of rearing turtles in fish ponds and the problems to be expected.

The experiment was initiated on April 18, 1975, when 82 turtles were transferred by road in cardboard boxes from Suva to Raviravi. The turtles, which were of four different age groups,(Table I) were initially placed in a holding tank of 1.5 cu. m. and transferred after 6 days into 6 x 100 l. bins. Two larger turtles were placed in a similar size cement tank together with 25 Tilapia mossambica to establish whether they could catch and predate on fish that should be grown together with them in the same pond.

The small turtles were fed twice daily with roughly 2.5% of their body weight. Infected turtles (fungal infections resulted from the turtles biting each other) were treated with KMn04 solution. Within 2-3 weeks the remaining turtles were transferred into 2 enclosures constructed at the edge of two half-acre ponds. The area of the enclosures was 0.8 m. each. Water depth varied between 30 to 40 cm. The turtles were kept in the enclosures for an additional 5 months being fed daily at a rate of roughly 5% of their body weight. Before feeding a stone was knocked several times against the concrete edge of the enclosure. This was done in order to try to condition the turtles to associate the noise produced with feeding time.

The two larger turtles were not fed at all and were released into a half-acre pond stocked with tilapia fingerlings. After three months they were transferred with the fingerlings into a 5-acre pond with both tilapia and milkfish (Chanos chanos).

Problems with the small turtles began two days after their arrival when they started biting each other, causing fungal infections, blindness and mortality of about 50% of the total number. Treatment with KMnO4 did not have a noticeable effect. Division of the turtles into groups of 6-8 in smaller plastic containers eased the situation.

Two weeks later, the turtles were transferred into the enclosures in the ponds. This included 12 of group A, 13 of group B and 17 of group D. None survived of group C. All turtles of group D disappeared within three weeks, probably due to predation by birds (herons), mongoose or mud crabs (Scylla serrata).

On 9 June, 1975, only 12 turtles were left and a screen was placed on top of the enclosure to avoid predation by birds and mongoose. Very little could be done against predation by crabs apart from setting traps and capturing some of them. The number continued to decrease until only 3 were left on 21 August 1975. These turtles survived in the enclosure to the day of writing this report (10 October 1975).

Rate of growth was not very encouraging (Table 2, Fig. I) in spite of good feeding. Conditioning to associate feeding with noise produced by knocking stones gave positive results and the turtles reacted by fast swimming in the direction of the feeding corner and stretching their necks out of the water.

The two larger turtles (3.8 and 4.2 kg. upon arrival) did survive in the pond during the 6 months of the experiment. They were introduced into the pond after it was established that they did not predate on tilapia in the small tank. Their growth, however, was negligible (9% weight gain in 6 months). They were never observed to feed or approach food offered to them and were rarely seen in the pond apart from when the pond was drained.

The only positive results to be concluded of the experiment are that large turtles (probably $\frac{1}{2}$ kg. or more) can survive in marine fish ponds without causing damage and with the possible benefit of causing slight turbulance in the water which may ease situations of bad oxygen shortages. It is recommended not to try to hold smaller turtles in fish ponds unless in strong and covered enclosures.

It is felt though, that it may be worthwhile to try to rear green turtles (Chelonia mydas) in fish ponds for purposes of improving fertilization by utilization of cheap feeds and possible relief of oxygen shortages. The results must however be compared with similar ponds without turtles and the turtles should be introduced into the pond after being conditioned to feed on mangrove leaves or other inexpensive feed that would be converted into fertilizer.

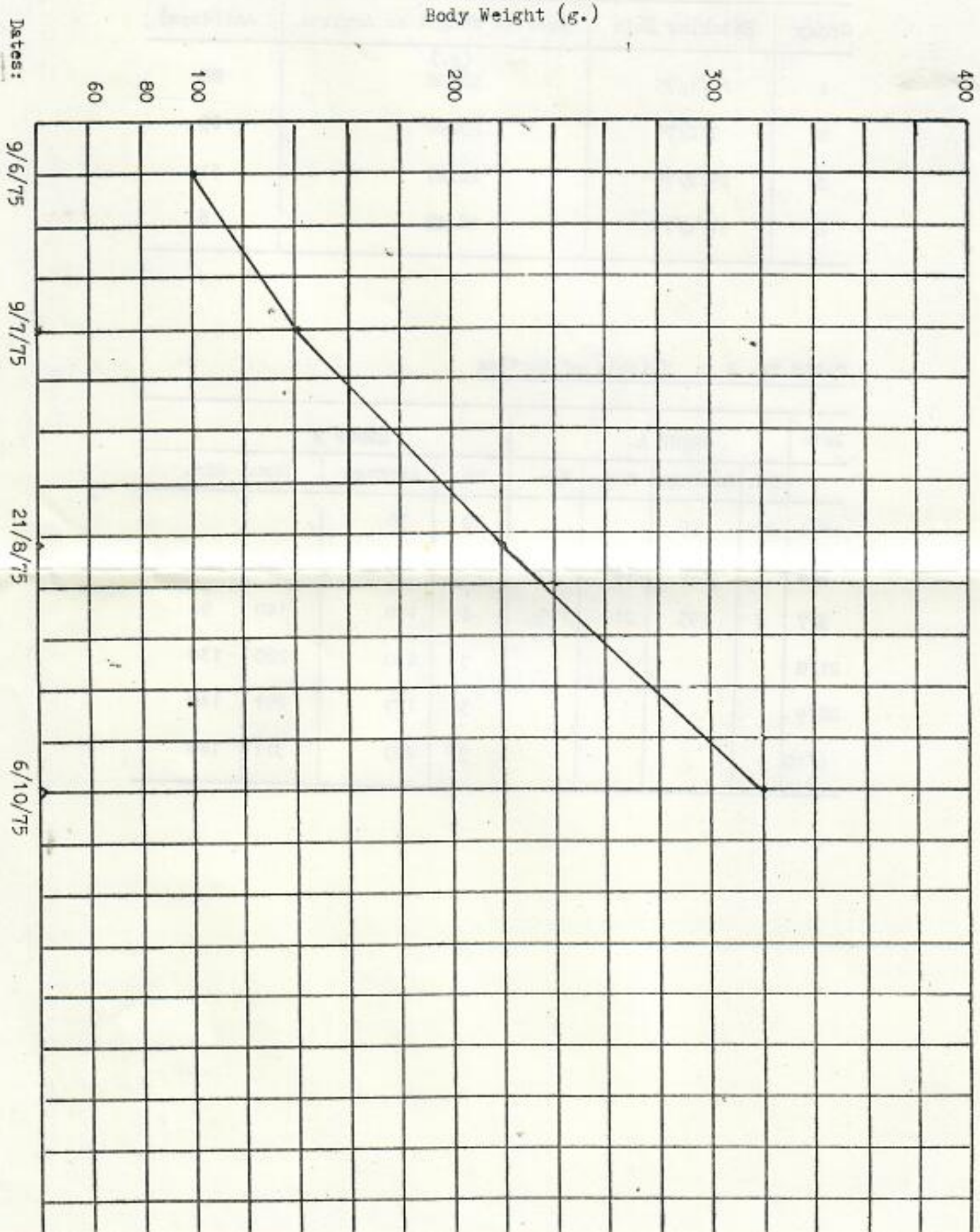
TABLE No. 1 : Weight on arrival - 17 April 1975

Group	Hatching Date	Average Weight on Arrival (g.)	Age(days)
A	21/1/75	50.68	86
B	7/2/75	29.92	69
C	25/2/75	22.27	51
D	11/4/75	16.39	6

TABLE No. 2 : Weights of turtles

Date	GROUP A				GROUP B			
	No.	Average	Max.	Min.	No.	Average	Max.	Min.
17/4	20	50			20	30		
9/6	7	120	144	104	5	85.3	101	81
9/7	4	153	210	125	4	100	140	90
21/8					3	160	220	130
22/9					3	173	251	140
6/10					3	203	311	140

GROWTH RATE OF THE BIGGER TURTLE IN GROUP "B" DURING 120 DAYS
(From 9 June to 6 October 1975)



THE APPEARANCE OF CARAPACE AND ARRANGEMENT OF SHIELDS IN TURTLES REPORTED FROM FIJIAN WATERS

by

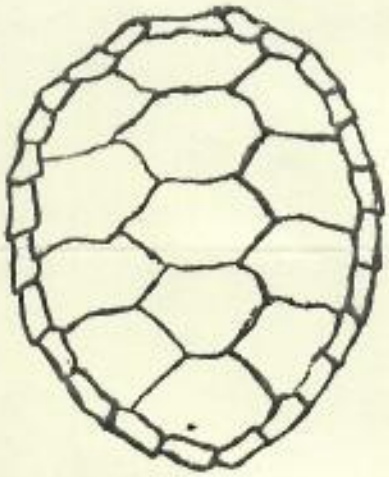
Dr Uday Raj
University of the South Pacific
Suva, Fiji

Dr Raj is currently working on dietary requirements of both green and Hawksbill turtles at the University of the South Pacific.

At the SPC Seventh Technical Meeting on Fisheries it was recommended (Recommendation No. 8) that a central bank of information on stocks of turtles in the Pacific be maintained by the University of the South Pacific. Any information on stocks and distribution, nesting beaches and seasons of nesting would be gratefully received by Dr Raj.

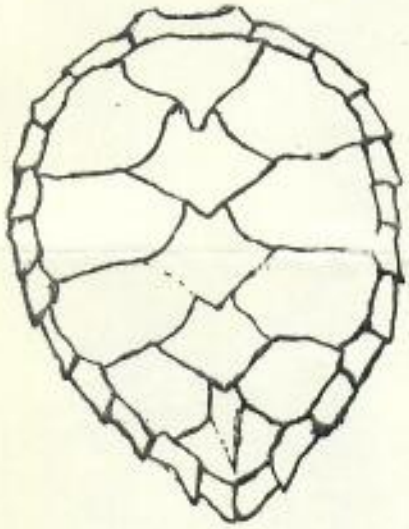
The following sketches are extracted from a questionnaire prepared for distribution to obtain information on turtle stocks in Fiji.

A. GREEN TURTLE (Chelonia mydas)
(Common) (Vonudina)



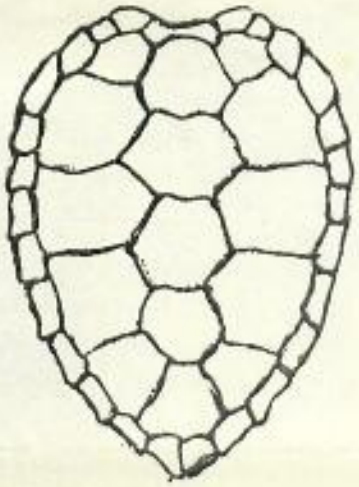
Shell - black to dark olive
- scutes do not overlap
Fat - Green (hence name)
Plastron - very light and often white
Distinguishing Character:
- serrated lower jaw.

B. HAWKSBILL TURTLE
(Eretmochelys imbricata)
(Common) (Taku)



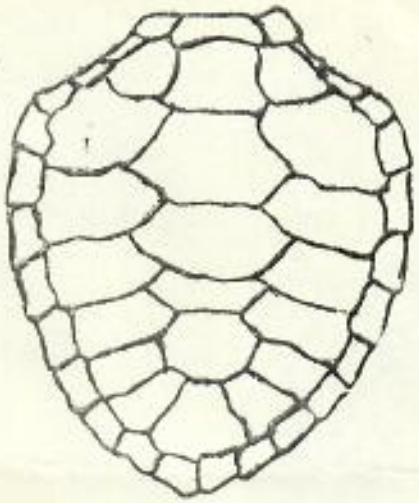
Shell - mottled-brown
- overlapping scutes
Plastron - yellowish
Distinguishing Character:
- hawk-like jaw and over-lapping scutes.

C. LOGGER HEAD TURTLE
(Caretta caretta)
(Relatively rare)



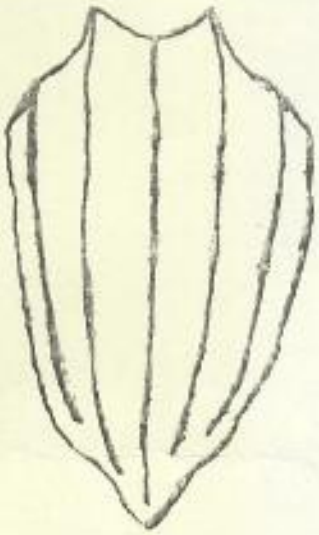
Shell - reddish-brown and heart-shaped
Distinguishing Character:
- reddish-brown shell and large broad head.

D. PACIFIC RIDLEY
(Lepidochelys sp.)
(rare)



Shell - broad and nearly circular shell, olive-brown colour
Plastron - greenish-yellow or greenish-white
Distinguishing Character:
- Broad, nearly circular shell; smallest of all turtles.

E. LEATHERBACK TURTLE
(Dermochelys coriacea)
(relatively rare) (Ika dina)



Shell - does not have hard formed shell. Its back is composed of black skin with 7 narrow ridges. This is distinguishing character.

Fiji Economy Appears Poised for an Upturn

SUVA, Fiji (AP) — Fiji's economy appears to be "poised for an upturn in 1979," according to a quarterly review issued by the Central Monetary Authority of Fiji.

Economic conditions in the third quarter, ending Sept. 30, indicate a moderate recovery in business activity compared with the first half, with the brightest spots being the pickup in tourist traffic, increased building activity and the possibility of an increased quota for the Fiji sugar industry under the international sugar agreement, the review said.

By the end of September the rate of local inflation had dropped to 6 percent compared with the 7 percent average of 1977, it said.

The industrial relations scene had been "comparatively calm" compared with the previous year and while no figures were available yet for the second and third quarters of this year, indications were that employment was increasing again after a period of being "static," the report said.

After a four-year slump, "almost every hotel and resort experienced full occupancy during the quarter and the trend is expected to continue for the rest of the year," the review said.

Iguana in danger

•FIJI'S banded iguana could be in danger of extinction, according to a report in Heritage, monthly newsletter of the Fiji Museum, Arts Council and National Trust.

The newsletter says the harmless, attractive creature is threatened by thoughtless people who hurt or kill it on sight.

Although the lizard is the subject of scientific research, the newsletter said.

But, unless people learn to appreciate and protect this fascinating species, it could be in real danger.

FIJI SUN WED. MARCH 9, 1977

Honolulu Star-Bulletin

Published by Gannett Pacific Corporation

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Published at 605 Kapiolani Boulevard / Honolulu, Hawaii, 96813

Difficult Times Ahead for Fiji

A persistent question in the newly-independent nation of Fiji has been: "After Ratu Mara, what?"

It recognized the towering role of Prime Minister Ratu Sir Kamisese Mara in Fijian politics, perhaps the only figure in the nation of more than 500,000 who can enjoy the full trust of its two antagonistic racial groups, Fijians and Indians.

Ratu Mara

The usual answer to the question was uncertainty, but rendered with a lack of urgency based on the presumption that Mara, 56, would remain prime minister for life or at least as long as he chose.

Now a startling election result has deprived the prime minister of his parliamentary majority and framed the question of "After Ratu Mara what?" in a 1977 context.

For many this early address of the question is alarming and dismaying. The possibility of racial bloodshed is mentioned. There are great fears about control of the land, most of which has been held in trust for native Fijians but made available for lease to Indians.

To ease the land tenure plight of Indian farmers, Mara last year pushed through the Parliament extremely controversial legislation to extend the permitted length of leases from 10 to 30 years and to improve the appraisal system on which rents are based.

There is some indication that the present situation in which no party has a clear parliamentary majority, but the pro-Indian National Federation Party controls 26 of the 52 seats to 24 for Mara's Alliance Party, may yet be resolved in a manner that retains Mara as prime minister.

If, on the other hand, one of the Indian leaders assumes the prime ministry, Fiji will enter a time of racial testing that Mara's giant presence had allowed it to postpone.

Hawaii's neighbor to the south faces some difficult politi-

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Hawaii's neighbor to the south faces some difficult political times.

People In the News

Brooke Shields III

SYDNEY, Australia — **Brooke Shields**, the 14-year-old American film star, underwent extensive tests today to determine whether she has contracted a tropical disease while on movie location in the Fiji islands.

A hospital spokesman said she had a temperature of 101 degrees.

Doctors suspect she may be suffering from dengue fever, which is similar to malaria, which she may have caught after being bitten by mosquitos on film location in Fiji.

Several members of the Australian film crew working with Shields on the film "Blue Lagoon" on Turtle Island, Fiji, have been striken by the disease and ordered to bed.

Brooke arrived in Sydney Friday to promote another of her movies.

She was due to return to Turtle Island today but was too ill to leave.

University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW

April 26, 1977

Dr. R. Grandperrin
Fisheries Adviser
South Pacific Commission
Post Box D.5
Noumea Cedex
New Caledonia

Dear Dr. Grandperrin:

Enclosed is the report which has resulted from my review of the South Pacific Commission Turtle Project. It is my hope that the information contained in this document will be valuable in the formulation of sound plans for future action. To the extent possible, I will be available to provide additional assistance.

Sincerely,

George H. Balazs

George H. Balazs
Jr. Marine Biologist

mk
Enclosures

CABLE ADDRESS:
"SOUTHPACOM," NOUMEA

ADRESSE TELEGRAPHIQUE:
"SOUTHPACOM," NOUMEA

SOUTH PACIFIC COMMISSION
POST BOX D.5
NOUMEA CEDEX
NEW CALEDONIA

COMMISSION DU PACIFIQUE SUD
BOITE POSTALE D.5
NOUMEA CEDEX
NOUVELLE-CALEDONIE

In reply, please quote PRO 84/10/1

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

10 December 1976

Dr. George H. Balazs,
Hawaii Institute of Marine Biology,
University of Hawaii,
P.O. Box 1346,
KANEOHE,
Hawaii 96744, USA.

Dear Dr. Balazs,

As you know, the South Pacific Commission is involved in a turtle farming programme. This programme is divided into two sub-projects: one which is set up in the University of the South Pacific in Suva and run by Dr. Raj, and the other in the Cook Islands, run by a New Zealand volunteer, Mr. Don Brandon.

The project in Fiji was intended to cover the scientific aspects, and the one in the Cook Islands a practical field project. After two years, it appears that the results are far from what was expected. As a matter of fact, it appears now that the aims of both these projects have never been clearly defined. The South Pacific Commission is nearly ready to stop them but, as this decision must not be taken in haste, we urgently need expert advise on this matter (food, growth, diseases, conservation problems). This is the reason for this letter.

I was advised by Richard Shomura who is attending a meeting on skipjack in Noumea at the present time to write to you. In short, we would be extremely grateful if you would accept to be this consultant.

As I understand, you are extremely busy, but this trip could be a nice change in your routine work and gives you the opportunity to visit some of the Islands of the South Pacific involved in turtle problems. This could be a 2-3 weeks trip. The main point is that the final decision must be taken before May 1977, that means when the Planning Committee for the 1978 Programme is due to be held. In case you accept the idea of this trip, it should consequently take place early 1977, at least before the end of March to give you time to write your report.

The South Pacific is looking forward to taking benefit of your experience on this matter and will be happy to follow up with your recommendations as well on turtle farming as on conservation in the whole SPC area.

Of course, SPC will pay for your travel and your per diem.

We hope your reply will be positive. However, in case you could definitively not provide us with your assistance, may I take the liberty to ask you who else but you could be of some help in this matter?

Looking forward to hearing from you.

Yours sincerely,

R. Grandperrin
Fisheries Adviser

called QUANTAS 2/3/77 confirmed

CABLE ADDRESS:
"SOUTHPACOM," NOUMEA

SOUTH PACIFIC COMMISSION
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NEW CALEDONIA

ADRESSE TELEGRAPHIQUE:
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COMMISSION DU PACIFIQUE SUD
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NOUMEA CEDEX
NOUVELLE-CALEDONIE

In reply, please quote PRO 84/10/1

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

19 January 1977

Dr. George H. Balazs
Hawaii Institute of Marine Biology
University of Hawaii
P.O. Box 1346
KANEOHE
Hawaii 96744, U.S.A.

Dear Dr. Balazs,

Thank you for your letter of 28 December and also for your cable of 14 January received here on Monday 17th. I am sorry to learn that you will be unable to attend the Fisheries Meeting.

2. First of all, I would like to thank you very much for accepting to serve as a consultant for the South Pacific Commission.

3. Your proposal to undertake the assignment during the middle of February, as far as I am concerned, is perfectly convenient and will give you time to write your recommendations before the Planning and Evaluation Committee Meeting which is due to be held in May.

called QUANTAS 2/3/77 confirmed

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3. Your proposal to undertake the assignment during the middle of February, as far as I am concerned, is perfectly convenient and will give you time to write your recommendations before the Planning and Evaluation Committee Meeting which is due to be held in May.

4. Our Travel Officer has prepared a suggested travel itinerary but of course it could be changed slightly. No reservations have yet been made.

Flight	QF 4	14-15/2/77	Honolulu	0115	Nadi 0530
"	FJ 122	15/2/77	Nadi	0710	Suva 0750 (Grand Pacific Hotel)
"	FJ 123	21/2/77	Suva	0820	Nadi 0900
"	TE 574	24-26/2/77	Nadi	1315	Rarotonga 1805
"	TE 575	28/2 - 3/3	Rarotonga	1230	Nadi 1425 (Tanoa Hotel)
"	TE 556	3/3/77	Nadi	2215	Honolulu 0630

5. As you see, this gives you the opportunity to spend four working days in Fiji and a full week in the Cook Islands. We understand here very well your wish to visit other places in the tropical Pacific area, but the aim of your travel is directed towards solving the problems we have with the turtle projects in Fiji and in Rarotonga as already said in my previous letter.

6. The Commission will financially cover your consultantship as follows:

(a) return air fares, economy class, by the most direct route;

(b) a daily subsistence allowance of $A23 (approx. US$24.80) while staying in Fiji, and $A24 (approx. US$25.90) while staying in the Cooks. (This allowance covers hotel room and meals);

(c) a daily consultant allowance of $A5 (US$5.40) to cover incidental expenses.

7. It is regretted that the Commission cannot offer you any salary or fees other than the allowance mentioned at (c) above.

../

8. The Commission will not arrange insurance but will, however, reimburse you, on presentation of a receipt, for an accident policy which you may wish to arrange for yourself up to a maximum cover of $A10,000.00 for the period of your assignment with the Commission.

9. As soon as you cable your agreement with this travel schedule, an MCO (Miscellaneous Cover Order) covering the travel fares, and a cheque covering the per diem and consultant allowances will be sent to you.

... 10. In the attachment you will find the specific terms of reference for your assignment. In Fiji you will have to contact Dr. Raj and Mr. Stone. In Rarotonga you will have to contact Mr. Don Brandon and Mr. Marsters.

11. I am sending you today, under separate cover, all the documents available on the SPC Turtle Project.

12. In short, to end up this letter, I take the liberty to ask you:

(a) to cable urgently your reply to give enough time to our Travel Officer to send you an MCO and a cheque;

(b) to make your reservations immediately;

(c) not to forget that there is only one flight a week from Nadi to Rarotonga.

13. I hope the suggested itinerary will suit you, as well as the other arrangements regarding allowances and terms of reference. I thank you again for your kind cooperation.

Yours sincerely,

R. Grandperrin
Fisheries Adviser

RG/mc

Attach.

cc. Dr. Raj
Mr. Stone
Mr. Marsters
Mr. Brandon

Proposed specific Terms of Reference for the consultantship of Dr. BALAZS to advise the South Pacific Commission on the future of the South Pacific Commission Turtle Project based in Fiji and the Cook Islands.

The short-term Consultant will:

1. visit the SPC Turtle Project based at the University of the South Pacific in Fiji,

2. contact Dr. Raj, in Fiji, who is running the Project,

3. contact Mr. R. Stone, Chief Fisheries Officer, Ministry of Agriculture, Forests and Fisheries, in Fiji,

4. visit the SPC Turtle Project based in Rarotonga, Cook Islands,

5. visit the location chosen in Aitutaki, Cook Islands, to set up a semi-intensive turtle farm,

6. contact Mr. Brandon who is running the Project in Rarotonga,

7. contact Mr. Marsters, the Director of Fisheries in Rarotonga,

8. submit an appraisal of the above two projects to the SPC on the above, with recommendations or otherwise for the continuation of the Projects,

9. advise the South Pacific Commission on other possible action on turtles (farming, conservation, clearing house, workshop, information, publication, etc.),

10. report to the South Pacific Commission before the end of April 1977.

Addresses

Dr.U. RAJ, the University of the South Pacific,
P.O. Box 1168, Suva, Fiji. (Telephone 27131 Suva, Extension 218)

Mr. R. STONE, Chief Fisheries Officer,
Ministry of Agriculture, Forests and Fisheries,
Suva, Fiji. (Telephone 361122 Suva).

Mr. D. BRANDON, Turtle Project Officer (SPC)
C/- Marine Resources, P.O. Box 96,
Rarotonga, Cook Islands.

Mr. T. MARSTERS, Director of Fisheries,
Marine Resources, P.O. Box 96,
Rarotonga, Cook Islands.

cc. Dr. Raj
Mr. Stone
Mr. Brandon
Mr. Marsters

Send - BIO.CONS. -
Elepaio
Booklet
CODE 119
ATOLL RESEARCH

CABLE ADDRESS:
"SOUTHPACOM," NOUMEA

ADRESSE TELEGRAPHIQUE:
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In reply, please quote CONF 2/9/7/1

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

17 November 1976

Dr George H. Balazs
Hawaii Institute of Marine Biology
University of Hawaii
P.O. Box 1346
KANEOHE
Hawaii 96744, U.S.A.

Dear Dr Balazs,

I was told by Mrs Mahony, the Peacesat Operator at the Commission, that you were looking for funds to attend the Ninth Technical Meeting on Fisheries, which is due to be held in Noumea from 24 to 28 January 1977. In this respect, I would like to precise that only a short part of the Meeting will be devoted to turtle farming and conservation. This means it might be disappointing and time-consuming for you to come over. As far as funds are concerned, you should consult the directory of funding agencies.

As you are well known as an expert in the field, I would deeply appreciate a short paper dealing with turtle farming or with any particular topics related to these organisms.

Be sure I am sorry not to be able to be of further assistance to you. Thank you in advance for your kind cooperation. Hope to meet you in the next future.

Fiji -
Brandon Summore of activities
Be glad to review
proposal - reports

Yours sincerely,

R. Grandperrin
Fisheries Adviser

RG/wp

Limited distribution
Confidential

SOUTH PACIFIC COMMISSION

REPORT ON VISITS TO FIJI AND THE COOK ISLANDS

(17 November - 3 December 1976

by

R. Grandperrin
Fisheries Adviser

Noumea, New Caledonia
January 1977

SUMMARY OF CONTENTS

a day.

1. INTRODUCTION

The purpose of the visits was to:

- Make contact with Programme Officers in charge of the SPC project on sea turtles, and take stock of results, difficulties, and short and medium-term prospects.
- Make contact with local fisheries officers so as to identify problems to which the SPC may be able to provide a partial or total solution.
- Make contact with regional representatives of UNDP, FAO and USP, and examine their programmes with a view to future collaboration.
- Evaluate the ORAFP contribution to the development of fisheries in Aitutaki, drawing conclusions relevant to future locations of the project.

2. THE SPC TURTLE PROJECT

The objectives of this programme have apparently not been clearly defined, or at least clearly understood. It appears to have been initiated on the following bases:

- farming for scientific research purposes, carried out by Dr. Raj at USP;
- farming geared both to conservation for existing stocks and to production of marketable turtles (flesh, shell); the field work involved was based in the Cook Islands, and entrusted to Mr. Don Brandon, a New Zealand volunteer, with the recommendation that he work in close collaboration with Dr. Raj.

2.1 USP Turtle Project (Dr. Raj)

2.1.1 Results to date

The Project commenced in 1974 with hawksbill turtles, as only hawksbill eggs had been collected. Dr. Raj intends to make a new start in 1977 using green turtle eggs, all the hawksbills having since fallen victim to disease. Results thus far have been obtained from observations and experiments on:

- collection of eggs (precautions required),
- transport of eggs (precautions required),
- incubation (temperature and humidity requirements),
- hatching (duration of hatching, and successful emergence rates),
- feeding of hatchlings and juveniles,

- growth rates,
- adjustment to fresh water (isotonic difficulties through loss of salts),
- diseases (fungi, bacteria),
- over-populated tanks (cannabalism),
- water pollution.

In addition to the USP studies being conducted, work was being carried out in other centres:

- hatching and raising of a few turtles in a village on Dolphin Islands,
- transfer of 80 turtles to Mr. Popper (FAO) for raising at Raviravi (all died after three months),
- village-level survey by means of a questionnaire given to the Fisheries Department for distribution to fishermen (only 100 questionnaires, incompletely filled out at that, were returned),
- study of the egg-laying season (which turned out to be longer than expected).

2.1.2 Difficulties encountered

These come under several headings:

Co-ordination: Dr. Raj feels that there is a lack of co-ordination.

Schedule: Much of Raj's time is taken up by the lectures he gives at the USP School of Natural Resources; he has very little time to devote to his research work.

Personnel: Research of this type requires an assistant working full-time, inclusive of week-ends, as the turtles must be fed, and the tanks cleaned, twice a day.

Premises: Originally, these were inadequate. SPC funds were used to construct a building housing three concrete tanks.

Water Pumps: Water is pumped in from an inlet about 100 metres out in the bay. Bad weather or heavy rain results in turbidity and a drop in salt content. There are also some signs of pollution.

Boat: It has become necessary to collect seaweed from the reef in order to test its nutritional value. A 12-foot aluminium boat ($F600) with a 5 HP Seagull outboard ($F300) has been ordered out of SPC funds. It has not yet been delivered.

Fisheries Department: The Department takes no interest in the project.

2.1.3 Discussion - Prospects

Strangely enough, Dr. Raj seems to have the same bones to pick with the SPC as the SPC has with him: lack of coordination, ill-defined objectives, faulty management. He considers that unless roles and objectives can be more clearly defined, it would be preferable to put a stop to financing by SPC. If this should eventuate, he would continue working on the project with USP funds, as he is determined to fulfil the objective he has set himself: to achieve the complete life cycle of the green turtle in captivity. In his opinion turtles can be made to lay eggs in tanks (this has already been achieved,) with the result that he would no longer be dependent on unreliable egg supplies during the laying season. He is obviously most impressed by the work done at Grand Cayman Island. The main scientific difficulties, he says, have already been overcome; an operation on a similar scale in the Pacific would only require a transfer of technology. In the unlikely eventuality of the SPC and/or Fiji undertaking such a venture, he would willingly accept responsibility as one of the scientific advisers. In fact, his ideas go further still; he recommends that all projects concerned with turtles and with the farming of seaweed (Caulerpa and others) for use as turtle food be concentrated in one place - the turtles would enrich the "pastures" by means of their excrement. The result would be more information, and savings in money and energy - an integrated project, in fact. Turtle farming, he considers, can be feasible - and profitable - only if the entire cycle is achieved in captivity. At the same time, the problem of protection of stocks would be overcome; since not all the hatchlings can be raised (overcrowding), a large number of them would have to be released into the ocean, once a critical stage had been reached, and this would considerably boost up natural stocks. Furthermore, the enormous production resulting would keep the local markets supplied with turtle eggs, considered a delicacy in many quarters.

2.1.4 Recommendations of Fisheries Adviser

I concur with many of Dr. Raj's arguments, particularly concerning the definition of objectives, coordination, the need for a full-time assistant, and the non-duplication of projects (Fiji and Rarotonga). For this last reason, however, (quite apart from the enormous amount of money required). I am not in favour of developing in the Pacific a centre comparable to Grand Cayman.

Furthermore, considering:

- the small budget requested for 1977 by Dr. Raj (see Annex 1),
- his determination to continue working towards a definite objective (achievement of the complete life cycle in captivity),
- the need for an expert appraisal of this objective,
- the funds already spent on as yet unused equipment and premises (boat, building),
- the need for a policy of cooperation with the University of the South Pacific, even if some of the projects of the latter are unsuccessful because the research staff is mostly made up of teachers with a very heavy schedule,

I recommend:

(a) that the USP project be maintained for a further year (1977),

(b) that its extension to 1978 be subject to approval by a universally acknowledged expert (Mr. Archie Carr, for example), who will also evaluate the Cook Islands project,

(c) that the Secretariat of the SPC give consideration at the earliest opportunity (before the Planning and Evaluation Committee in May) to the recruitment of an Assistant Fisheries Adviser, one of whose duties (other responsibilities listed subsequently) would include initiation and coordination of a Pacific-wide turtle conservation programme. Working in close collaboration with the Regional Ecological Adviser, he would provide a clearing-house service, organize working meetings, and conduct feasibility studies prior to the commencement of any farming project. The whole issue of turtles is significant, as they play a large part in the diet and income of some islands. The species is disappearing, and nothing - with the exception of the monthly PEACESAT exchanges - is being done to coordinate the different operations under way (Western Samoa, French Polynesia, Australia, New Zealand, Fiji, Cook Islands, etc.).

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2.2. Cook Islands Turtle Project (Don Brandon)

2.2.1 Objectives

These have not been clearly defined. There is no consensus as to whether the purpose is conservation or farming. It seems that originally it was conservation; however, the real problem lies elsewhere. The Cook Islands project was planned in two phases: methods were first to be tested in Rarotonga, after which a farm was to be established at Aitutaki. The latter site was chosen for touristic reasons, and also because it was supposedly rich in seaweed and fish which would provide additional food supply. In anticipation of the project, the Government rented land which will be returned to its owner if development has taken place within one year. All the construction equipment required for the project was sent by boat several months ago. However, work has not yet started there, the project still being based in Rarotonga.

2.2.2. Results to date

In early 1975, after eggs had painstakingly been collected in the northern island group, farming seemed to have got off to a good start (hatching, growth of hatchlings, bacterial and fungal diseases etc.). Many foods were tested: copra pawpaw, bananas, cabbages, fish, bêche-de-mer, etc. The results were disastrous. With the exception of fish, none of these foods seemed suitable for the hatchlings (green turtles are carnivorous during the first year of life, then become herbivorous). However, it is inordinately difficult to obtain fish in Rarotonga as there is virtually no local fishing - the team had to go out and catch their own! Now, after two years of work, turtle growth rate is nil or negligible; their weight is one eighth of what it should have been (2 kg as against 16 or 17 kg under normal growth conditions). Nonetheless, there is one very positive aspect. The turtles' ability to respond to a sound signifying feeding time has been proved. Well-developed conditioning of this type could be put to use in more extensive farming, or even in ranching (semi-freedom).

Lastly, it must also be remembered that the turtles are a definite tourist attraction, as some tour operators have already shown to their advantage.

2.2.3 Difficulties encountered

These are many and varied:

- supply of eggs,

- food supplies, and choice of local quality food,
- diseases,
- theft of turtles (door broken in),
- incompetence of project assistants (territorial counterpart) and reluctance to cooperate.
- growing hostility between the Director of Fisheries and Don Brandon (this point requires no further comment- it has already caused a substantial exchange of correspondence),
- accommodation,
- problem of Don Brandon's girlfriend,
- lack of support from the territory, etc.

2.2.4 Discussion, prospects

The project as it stands - i.e. based at Rarotonga, - must obviously be stopped without delay. A short visit to Aitutaki, and the more detailed observations of the Regional Ecological Adviser have shown the site to be completely unsuitable (barren sea-bed, channel prone to storm damage). Nor, because of the general lack of satisfactory seaweed resources, would any other site in the atoll be suitable.

In addition, the local economy precludes (as is also the case for Rarotonga) provision of appropriate turtle food. The fish required would have to be bought or caught; a farm such as this cannot afford to be dependent on unreliable fishing by the team members!

Here again, the idea of the project must clearly be abandoned, which means withdrawal from the Cook Islands. This in turn, however, will lead to a number of problems:

Psychological: disappointment on the part of the local Government (there have already been too many examples of withdrawal of projects funded by international organizations).

Financial: after prolonged negotiations, approval has finally been given for the rental of the land to be used by the project in Aitutaki.

Organizational: in Rarotonga a shed has been built to house the pump, and some equipment has been bought and already transferred to Aitutaki.

Most of these difficulties should be fairly easy to overcome, although the psychological objections mentioned above will continue to be a stumbling block. Thus, a solution is required that will enable the SPC to bring the project if not to a happy ending, at least to an irrefutably justified end - specifically, an unfavourable expert opinion. The Minister of Agriculture, his secretary, and the Director of Fisheries accept the principle (although the latter seems determined to continue the project subsequently despite all negative recommendations). Approval would also be given for Don Brandon to remain until his contract expires in August 1977 (he himself wished to abandon the project immediately, and the Director of Fisheries had no desire to see him continue).

2.2.5 Recommendations of the Fisheries Adviser

I recommend:

(a) that the turtle project be abandoned both at Rarotonga and Aitutaki,

(b) that winding up be nonetheless subject to expert approval (cf. Fiji project),

(c) that surviving turtles (58 at present) be given preferentially to the Fisheries Department if it intends to continue the project,

(d) that these turtles be used (if the Department decides to abandon the project) in experiments on conservation of stocks. It is still not known whether turtles raised in captivity and released in the ocean at the age of one or two years are capable of survival. Should this be so, it is not known whether they would return to lay at the place where they were released. The turtles should therefore be tagged, flown to Penrhyn (this virtually uninhabited island is visited by turtles), kept there for two or three weeks in an enclosure, and then released. Concurrently, the whole of the population would be notified of the experiment and encouraged to take an interest in it. Rewards would be offered for capture, measurements, release, and, theoretically, recapture a few months later. This project, which was suggested by the Regional Ecological Adviser, would provide information of great relevance to turtle conservation. Don Brandon is prepared to put it into operation before the end of his contract,

(d) that Don Brandon write his final report,

(f) that there be no renewal of his contract in August 1977,

(g) that the Assistant Fisheries Adviser (cf. turtles, Fiji) take over responsibility for the tagging experiment in collaboration with the Regional Ecological Adviser,

(h) that no further field projects of this type be undertaken, especially with a young volunteer as project manager, until such time as the results of scientific farming are somewhat more conclusive.

3. THE OUTER REEF FISHERIES PROJECT AT AITUTAKI

Information from the Minister of Agriculture, his secretary, the Director of Fisheries, the Director of Agriculture for Aitutaki, and local fishermen showed that the ORAFP had no impact whatsoever. The sum total of change brought about was that one local fisherman (a Dane) built a wooden reel designed from the electric reel used by the project team for bottom fishing. Criticising an unsuccessful venture is all too easy. The purpose of this brief report is rather to avoid such errors in the future, out of consideration for the reputation of the SPC and for the money invested both by the Commission and by host governments.

3.1 Reasons for failure

The island of Aitutaki appears to have been chosen for the following reasons:

- regular air services to Rarotonga, whence the possibility of "exporting" to the capital where there is a shortage of fresh fish,
- as most of the members of the present government come from Aitutaki, great efforts are being made to boost its development,
- the number of visiting tourists is on the increase.

Failure is partially due to this choice[1]. Other reasons are:

- very steep outer reef slope
- small, impoverished and already over-fished lagoon,
- relative abundance of agricultural resources (production of bananas for export, breadfruit, copra, goats, hens etc., government subsidies),

[1] I cannot vouch for the accuracy of all the criticisms listed above. Some were voiced by people interviewed by the Fisheries Adviser.

- consequently, very restricted subsistence fishing activities (four full-time fishermen, the others - there are almost 450 of them - fish only occasionally),

- as his report clearly shows, the project manager has become disinterested in the whole matter,

- the Director of Fisheries of the Cook Islands has never visited the project to gain an idea of the difficulties involved,

- the report by the SPC has never reached the Government representative, nor anyone else at Aitutaki.

- it is not possible to develop village-level fishing (the terms "development" and "village-level" are contradictory in all Polynesian islands, since maximum development has already been reached, as is shown by over-fishing);

- project considered too elaborate; the sophisticated equipment used such as reels and depth sounders (many fishermen are still convinced that depth sounders are used to detect fish!) was out of all proportion to the means available to the local fishermen,

- results bore no relation to the input (the local fishermen maintain that the large catches of the project were due only to the fact that the boats remained outside the reef for lengthy periods, whereas local craft venture only briefly outside the lagoon),

- in accordance with the agreement between SPC and the Government, the Cook Islands were committed to pay trainees; to avoid over-burdening his budget, the local representative appointed five of his banana planters (civil servants already receiving a salary) who were withdrawn for the duration of the project from the permanent team of twenty. The five have since returned to their bananas! As may readily be imagined, the experiment was devoid of any value, and very little information subsequently reached the remaining fishermen,

- team members were criticised by fishermen for failing to invite them to take part in sea-going fishing trips (island pride precluded them from asking),

- for the four professionals, there were never more than three trips per week outside the reef. They can scarcely be blamed - spending a night in the open sea is an uncomfortable and dangerous business,

3.2 Recommendations of the Fisheries Adviser

In order to avoid errors of this type in future,

I recommend:

(a) That the ORAFP never be moved to a Polynesian island. Waters are poor, outer-reef slopes are steep, and resources are overfished. The project can make no positive contribution.

(b) That where there is no alternative the project be geared to traditional methods, concentrating on pelagic species (trolling for skipjack with pearl-shell lures). In such cases, the project team should include someone who has professional training in this field.

(c) That endeavours be made before the project moves in, to determine the expectations of local fishermen and government (this approach is being applied at Gizo). A general meeting of all fishermen should be called.

(d) That a contract be signed with host governments in order to avoid misunderstandings such as accurred at Tuvalu.

(e) That the government contribution be diminished. The SPC could pay for fuel and house rental for example, the government being responsible for paying trainees, providing working premises and organizing the sale of fish to partially defray the cost of salaries.

(f) That the usefulness of the project be increased by adding a training course by the mechanic (engine maintenance, etc.) in which all fishermen would take part (evening classes for example) and by adding to the team a specialist in methods of conservation other than cold storage and deep-freezing (smoking, curing, salting, ensilage).

(g) That the project refrain from teaching fishermen what they have known for generations. A thorough prior survey of existing techniques would therefore have to be conducted.

(h) That in cases where the project has no educational function to fulfil (for example in Polynesia), the SPC concentrate not on development but on protection. In ancient times, some parts of the lagoon were taboo for several years at a time, thus forming a reserve for the renewal of stocks. The project would focus on the creation of reserves, the control of mesh size in certain forms of tackle, the prohibition of some methods, etc., in collaboration with the Regional Ecological Adviser. The Assistant Fisheries Adviser (cf. turtles) would be in charge.

(i) That in the specific case of the Cook Islands, as compensation for the twofold disappointment of the government (turtles and ORAFP), an affirmative response be made to the request of the Director of Fisheries for a consultant paid by SPC - Mr. Hinds in this case - who would attempt to draw up a fisheries development programme for the Cook Islands (skipjack, milk-fish (Chanos chanos) aquaculture, mussels, etc.).

(j) That a full report be submitted at the end of the project.

4. FISHERIES DEVELOPMENT IN FIJI AND THE COOK ISLANDS

4.1 Fiji

The approach of the Fijian Fisheries Department to development is that of a gradual shift from basic, village-level technology to an intermediate stage, avoiding the pitfalls of advanced technology. Its projects are reasonable, it seems to be getting results, and it has a very large budget. Projects have been classified as high, medium and low priority.

High priority projects

- Live-bait skipjack fishing
- Canning plant employing 100 women (25% Fijian interests)
- Deep fishing (fish, prawns)
- Development of stocks (Spanish mackerel - Scomberomorus commerson).

Medium priority projects

- Conservation techniques other than freezing (smoking, curing)
- Fresh-water aquaculture (carp, shellfish) as a means of re-stocking rivers and controlling their infestation by certain weeds.

Low priority projects

- Oyster farming (expert required)
- Mussel farming (expert required)
- Sea water aquaculture (Raviravi)
- Eucheuma (a thorough feasibility study is required; $F10,000 were allocated to this project for 1976, but nothing has been done).

On the basis of the above information, it would appear that greater co-operation with Fiji would perhaps be most benefical for the SPC.

4.2 Cook Islands

Resources are limited, the islands far apart, the people relatively apathetic (lack of motivation perhaps), there are serious political problems, and funds are limited as also is available capital. The Director of Fisheries has little idea where to start. In many fields, there is little to be gained from collaboration between the SPC and this territory. However, following the twofold failure in this territory (turtles and ORAFP), it is vital that the Commission show it is still ready and willing to help. It was for this reason that I suggested sending an expert to prepare a development programme. There appear to be reasonable prospects for skipjack fishing, and also in milk-fish farming - the latter is already undertaken on a fairly large scale on the island of Penrhyn, as a source of food and live bait. A pressing request for expert advice has been made by the Minister of Agriculture.

5. UNDP/FAO, USP

5.1 UNDP/FAO

My brief conversations with the representatives of these organization in Fiji may be summarised as follows:

- The Raviravi aquaculture programme (visited by the Fisheries Adviser) should resume more intensively. For Fiji, it is a tool of remarkable potential; eight hectares of ponds are already in operation, and the site would allow extension of the project. Mr. Tom Lichatowich is expected back, with expatriate status, in late December 1976, and continuation of the services of Mr. Dan Popper (FAO) has been requested. There should be closer collaboration between Fiji, the CNEXO and the SPC (fish now farmed: milk-fish, Siganus, Tilapia).

- According to Mr. Harry Sperling (FAO/UNDP), it is not possible to construct a small fishing boat suitable for use throughout the tropical Pacific area. Navigation conditions are much too variable from one territory to the next, one island to the next and sometimes even from one village to the next.

5.2 University of the South Pacific

Though some work has been undertaken, it is, as was previously mentioned, hampered by the fact that researchers must devote most of their time to teaching. It is recommended that no further projects be sub-contracted to the USP, except for short-term operations in which students may also participate.

Two projects - one on Caulerpa, and the other on Eucheuma - appeared to be of interest.

6. PERSONS CONTACTED

Fiji

Mr. Khan	Assistant to the Permanent Secretary of the Minister of Agriculture Suva
Mr. Stone	Chief Fisheries Officer, Suva
Mr. Travis	Principal Fisheries Officer, Suva
Mr. Marshall	Rhode Island University/USP, Suva
Mr. Mate	Acting Project Manager, Raviravi
Mr. Smalley	U.S. Volunteer, Raviravi
Mr. Honeyman	USP Planning Officer, Suva
Dr. Raj	Turtle Project Officer (USP/SPC)
Mr. Solly	USP (Eucheuma), Suva
Mr. ap Rees	UNDP Regional Representative
Mr. Goss	UNDP Regional Project Officer
Mr. Sperling	UNDP/FAO Regional Fisheries Coordinator
Mr. Blumenfeld	FAO Country Representative in the South Pacific
Mr. Lee	American Embassy, Suva

Cook Islands

Mr. Estall	Minister of Agriculture
Mr. Terepu	Secretary to the Minister of Agriculture
Mr. Sawtell	Head of Prime Minister's Cabinet
Mr. Marsters	Director of Fisheries and Marine Development
Mr. Brandon	SPC Turtle Project Officer
Mr. Mose	Chief Agriculture Officer, Aitutaki
Mr. Powell	Former SPC Fisheries Officer
Mr. Tavioni	Director of Horticulture
Mr. Gare	Conservation Adviser
Mr. Edwards	FAO Fisheries Adviser
Dr. Guinea	Former SPC Medical Officer
Mr. Beet	Mechanic and Fisherman

Rarotonga and Aitutaki fishermen

7. SUMMARY OF MAIN RECOMMENDATIONS

- Maintain the turtle project at USP for 1977
- Discontinue the Cook Islands turtle project
- Obtain the advice of a consultant for both projects
- Terminate the Cook Islands project by a protection campaign
- Appoint a consultant to draw up a development programme for the Cook Islands
- Conduct a survey in each territory before basing the ORAFP there
- Draw up a contract between the SPC and the government hosting the ORAFP
- Supplement the ORAFP by means of a course on engineering, and a specialist in conservation other than by deep freezing

- Recruit an assistant Fisheries Adviser to:
  + establish a protection programme for
    . turtles
    . fish
    . lobsters
    . bêche-de-mer, etc.
  + convene working groups on these problems
  + deal with fresh water fisheries and aquaculture, where appropriate
  + take part in the drafting of a newsletter to be published more frequently than in the past
  + work in collaboration with the Regional Ecological Adviser.

ANNEX 1 - TURTLE BUDGET - UNIVERSITY OF THE SOUTH PACIFIC

BUDGETARY YEAR 1977 [1]

	$F
Full-time assistant	2,000
6 hours daily, 7 day per week (feeding turtles, cleaning tanks, maintenance of pump and equipment, etc.: hourly rate 83 cents/hour 1976)	
Food	300
Purchase of fish, on-the-spot fishing if necessary, collection of seaweed from the reef	
Travel	800
Egg collection, gathering of information on laying places and seasons, survey of adult turtles in general, fisheries meetings	
Equipment [2]	
	3, 100

---

[1] in Fiji dollars

[2]

a 12-foot aluminium boat with a 5 h.p.	600
Seagull outboard were ordered on the 1976 budget	300

ANNEX 2 - TURTLE BUDGET - COOK ISLANDS 1/, 2/, 3/, 4/, 5/

BUDGETARY YEAR 1977

	$NZ	
Salary and emoluments	3,600)	3,960
+10%	360)	
Travel Noumea and per diem (?)	1,200	
Pens	500	
Internal travels	450	
2 at Penrhyn (boat)		
3 Raro-Aitutaki (plane)		
Fishing equipment	350	
nets		
hooks) sharks		
lines)		
Fuel	200	
Chemicals	100	

Postal: Communications and stationery	100
Local labour	250
Maintenance	200
	7,310
Contingency	1,000
	8,310

1/ In New Zealand dollars

2/ This budget provided for the unlikely eventuality of a transfer to Aitutaki.

3/ The budget does not include travel and subsistence expenses for the expert to visit the project in 1977.

4/ If the project is transferred to Aitutaki, this will be done free-of-charge by the fishing boat "Ravakai".

5/ Construction costs for the accommodation at Aitutaki (for two people) are estimated at $NZ2,600. The equipment has already been paid for and unloaded at Aitutaki. Labour costs will be approximately $NZ500, but this, according to the Director of Fisheries, is to be financed by the Government. Furthermore the Government provides a permanent counterpart in the form of a full-time project assistant.

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WILL AIRMAIL REPORT ON 26TH APRIL
BALAZS

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SPC/Fisheries 8/WP.23
20 October 1975

ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION

EIGHTH REGIONAL TECHNICAL MEETING ON FISHERIES
(Noumea, New Caledonia, 20-24 October 1975)

U.S.P.-BASED TURTLE RESEARCH : PROGRESS REPORT 1974-75 BREEDING SEASON

by

Dr Uday Raj
School of Natural Resources
University of the South Pacific
Fiji

A. Collection, Transportation, Incubation and Hatching of Eggs

Eggs were collected from a total of 8 nests on Makaluva, Nananu-i-Ra and Namara Is.(in Astrolobe) respectively. These islands lie several miles apart (see Figure 1). Six nests were immediately transported (via boat and road transport) in sand to the laboratory for incubation. One nest from Nananu-i-Ra was reburried on a nearby Dolphin island beach for incubation in natural conditions. A nest from Makaluva island was reburried higher up on the same beach and shifted to the laboratory 43 days thereafter. Essentially the aim was to correlate the hatching success with

(a) age of eggs at transportation
(b) distance of transportation via sea and road
(c) to compare the successful emergence rate in the laboratory with that of a nest set in natural conditions

and

(d) to monitor and study successful hatching requirements in artificial conditions.

Results

The information on location, transportation and incubation are summarized in Table 1. The data on nest size, incubation period and hatching success is presented in Table 2. Although the number of nests in this experiment are fewer than desirable for statistical analysis, it is possible to state that

(a) The hatching success does not depend on the age of eggs at transportation.

(b) The hatching success does not appear to depend on the distance of transportation.

(c) The hatching success in the laboratory in this study was higher than that in the field and certainly highest reported in literature (see Table 3).

(d) For successful hatching, there are no requirements other than care in transportation, construction of artificial nest and choice of moist but not very wet sand.

B. Observations on Hatchlings:

All hatchlings belonged to a single species, Eretmochelys imbricata (Hawksbill).

C. Outside Laboratory Experiments with Hatchlings:

(a) Experiments at Dolphin island:

30 hatchlings are being reared under village conditions by the caretaker of the island. This island is surrounded by high salinity, clear oceanic water and survival here is very good. Only 3 died in 6 months. The growth rate is also much better than in the laboratory, 80g in 6 months. The hatchlings are fed on fresh fish and shellfish.

(b) Experiments at Ravi Ravi:

80 hatchlings were transferred to Ravi Ravi aquaculture ponds. Mrs. Popper, a biologist, is assisting in the project (please see attached report from Mrs. S. Gundermann.

D. Adults and Subadults:

(a) Feeding and growth rate observations are continuing with a few Hawksbill and Green turtles.

(b) A number of green and Hawksbill turtles are being held at the Fisheries Department, pending the setting up of a breeding colony.

(c) Information on captured turtles obtained from questionnaires distributed by Fisheries Department) is being processed.

Future Programme:

1. Continue with rearing hatchlings from eggs in the laboratory for release and small-scale farms. The turtle hut (30 x 20) is almost complete. It will relieve congestion and provide ideal facilities for initial rearing. The construction of two concrete ponds (20' x 20', each) in the sea beside the turtle hut is regarded as desireable to rear hatchlings over 4 months old, in more suitable environment with less chances of infection. These tanks will be filled only at high water when salinity is high and water is clearer with less sediment, bacteria etc. The construction of such ponds will depend solely on financial support.

2. The hatchlings which have grown to a year lend themselves well for tagging hence this experiment will follow. Efforts will be made to find a method of tagging younger hatchlings.

3. Continue experimentation with weaning diets.

4. This season a more intensive search will be made for Green turtle nest. Information obtained suggests that they nest on islands off Taveuni and these areas will be visited.

5. Perhaps the most important aim this summer will be to establish an artificial breeding colony with breeding beaches. Indeed any turtle farming venture cannot and should not be encouraged if eggs are obtained solely from wild populations. In this regard, the Vuaqava lake will be investigated as a possible site for setting up a breeding colony. Other areas will be investigated in conjunction with the Fisheries Department. The success of this will depend on financial support.

6. Complete the Turtle Resource manual which is in preparation. Mrs. Vander Meer, a Bioillustrator, is assisting in the production of the manual.

CONCLUTION

The research programme at USP commenced on a full scale only last season, with the availability of adequate numbers of eggs. A project of this nature is seen as one of long duration since several factors governing the complex life of an animal so intimately associated with the cultures of the Pacific is little understood, inspite of numerous publications. It is therefore requested that this project be given continuing support. It is envisaged that with the new turtle hut, possibility of the construction of large concrete ponds outside the hut and setting up of a breeding turtle colony will see this project fully off the ground.

At present 120 hatchlings are present at USP aquarium.

PUBLICATION:

Raj, U. "Incubation and Hatching success in artificially incubated eggs of the Hawksbill Turtle, Eretmochelys imbricata." In press. Journal of Experimental Marine Biology and Ecology.

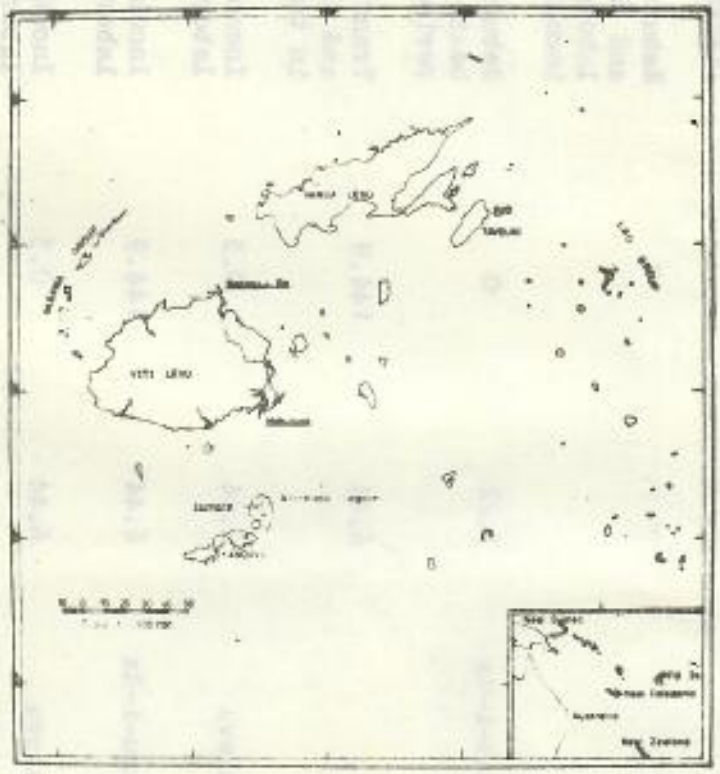

FIGURE 1. Map of Fiji Islands showing the islands from which turtle eggs were collected for incubation.

Table 1 : The location and transportation of Hawksbill Turtle eggs for incubation

Nest No.	Nesting Beach	Nesting Island	Distance Eggs Transported Boat (Km)	Road (Km)	Remarks
1	Unnamed	Makaluva	6.44	0.3	Incubated entirely in the laboratory
"	"	"	"	"	Reburied on Makaluva island and the nest shifted to the laboratory 43 days after incubation.
3	Muku tubutubu	Mananu-i-Ra	3.22	0	Reburied on Dolphin island beach for entire incubation period.
4	"	"	6.44	144.9	Transported in Cardboard box and incubated in the laboratory in the same container
5	Unnamed	Makaluva	6.44	0.3	Incubated entirely in the laboratory.
6	Mukutubutubu	Mananu-i-Ra	6.44	144.9	Incubated entirely in the laboratory.
7	Unnamed	Makaluva	6.44	0.3	Incubated entirely in the laboratory.
8	Unnamed	Namara (in Astrolobe Lagoon)	80.5	3.22	Incubated entirely in the Laboratory.

Table 2 : The Nest Sizes, Incubation Period and Emergence Rate of Hatchlings in Hawksbill Turtle

Nest No.	Date Collected	No. of Eggs	Age of Eggs	Date Hatched	Incubation Period in Lab (days)	No. Hatched	Emergence %
1	28.1174	125	undetermined	21. 1.75	54	120	96
2	3.12.74	140	Freshly laid	7. 2.75	66	139	99.29
3	11. 1.75	126	undetermined	2. 3.75	50	101	80.16
4	12. 1.75	114	undetermined	25. 2.75	44	99	86.84
5	12. 1.75	84	Freshly laid	16. 3.75	63	84	100.00
6	13. 1.75	110	undetermined	5. 2.75	23	104	94.55
7	15. 1.75	68	Freshly laid	18. 3.75	62	55	80.88
8	7. 2.75	168	Freshly laid	11. 4.75	61	128(+10)*	76.19

* See text

Table 3 : The Percentage Emergence of Turtle Eggs from Natural and Artificial Nests

Turtle Species	Locality	Artificial or Natural Nest	Percent Emergency	Authority	Comments
Chelonia mydas (Green turtle)	Tortuguero Costa Rica	Artificial	50	Carr & Hirth, 1962	-
"	Ascension Island	Natural	54	Carr & Hirth, 1962	-
"	Malaysia	Artificial	47	Hendrickson, 1958	-
"	"	"	53 - 55	Balasingham, 1965	-
"	Heron Island	"	67	Bustard & Greenham, 1968	-
Chelonia mydas and Caretta caretta (loggerhead)	"	"	67, 65, 62	Bustard (1972)	In 3 consecutive nesting seasons, 1965-6, 1966-7, 1967-8, respectively.
"	"	Natural	88, 85	Bustard (1972)	In 1966-7 and 1967-8 nesting seasons
Eretmochelys imbricata (Hawksbill)	Fiji Islands	Artificial	89.24	This study	-

CABLE ADDRESS:
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NOUMEA CEDEX
NOUVELLE-CALEDONIE

In reply, please quote..... PRO 7/14
PRO 84/ 1

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

19 December 1973
RHB/wp

Mr George H. Balazs
Jr. Marine Biologist
University of Hawaii at Manoa
P.O. Box 1346
Coconut Island
Kaneohe, Hawaii 96744.

Dear Mr Balzs,

Thank you for the copy of your letter to Dr Raj at USP, Suva.

As you may know, the South Pacific Commission has a small turtle farming project starting in 1974 (copy of project outline enclosed). I had discussed with Professor McInerney of USP the possibility of USP doing some basic work on feeding, with particular reference to use of coconut meal in the diet. John McInerney put me in touch with Dr Raj who has tentatively agreed to undertake some of this work with some funding by SPC. The main experimental farming will be done in the Cook Islands, with an Australian graduate volunteer as Project Officer.

I have tried several times to visit the Torres Straits turtle farms, but I find it rather difficult to get any communication from Dr Bustard. It may be possible that I will get there in January. In the meantime, I would be very grateful for copies of any publications that you may have on the work of turtle rearing that has been done at your University. I hope that we will be able to have a useful exchange of information in the future.

Yours sincerely,

R.H. Baird
Fisheries Officer

Encl.

SPConf.13/WP.11
17 July 1973
ORIGINAL - ENGLISH

SOUTH PACIFIC COMMISSION

THIRTEENTH SOUTH PACIFIC CONFERENCE

Date

SPECIAL PROJECT ON INSHORE FISHERIES DEVELOPMENT

(Reef, Lagoon and Mariculture)

[Budget Item 706(d)]

Introduction

1 With the increase in population of many of the Pacific islands and with consequent increase in pollution and in fishing pressure, in many cases the island populations can no longer maintain their fish requirements from lagoon sources, particularly not in areas close to centres of population. This is the reason for the SPC's emphasis on outer reef artisanal fishing developments.

2 However, there still are many possibilities for reef and lagoon fisheries developments.

Lobster (Panulirus spp.)

3 There is some considerable body of evidence that commercially exploitable stocks of lobsters are found on the reefs of most Pacific islands. Remarkably little is known of the vital population parameters such as growth rate, mortality, stocks and in consequence, optimum yield. Knowledge of all these is required in the long term in order to maintain maximum sustained yield.

4 However, it is known that there are many, at present unexploited or under-exploited stocks. The main difficulty is that of logistics. Widely scattered archipelagos, with remote islands with exploitable stocks of lobsters, are unable at present to market lobsters because of the irregularity of collection. One immediate, and fairly inexpensive partial solution of this problem would be live storage at island sites. Live storage of lobsters is practised extensively in Central America, Europe and Africa of Panulirus spp. and also Homarus spp. in N. America and Europe. There seems to be no reason why Panulirus spp. should not also be successfully stored alive on island sites in the Pacific. If this were possible pending collection for processing and marketing, it could make a substantial contribution to the cash income of many remote island villages.

5 Recommendations have already been made in reports to the Administrations of both the British Solomon Islands Protectorate and the New Hebrides, that this problem should be looked into and guide lines have been given for the initial approach. However, neither of these territories has the resources of personnel to conduct reasonable long-term experiments in depth. As the problem is one common to nearly all the territories of the Pacific, who would all stand to gain from a definitive answer, it would be desirable for the Commission to finance one or two years work into the solution of this problem.

Costs: 1 volunteer or secondment through New Zealand or Australian aid.

Volunteer	A$ 4,000 p.a.
Equipment	A$ 4,000
Travel and per diem.	A$ 3,000
	A$11,000

Bêche-de-mer (Holothurians)

6 There is at present a big demand at a good price for Bêche-de-mer. Many territories are at present exploiting this resource. A handbook prepared by the FAO Consultant to SPIFDA, Mr. Sachithananthan, on Bêche-de-mer is suffering some considerable delays in production due to doubts about identification of some species.

7 As with lobsters, little is known about growth rates, stocks and recruitment. Identification of the main commercial species is frequently a problem for out islanders. The volunteer working on lobsters above would often be working on an area of Bêche-de-mer. He could, incidentally, begin to make a study of stocks and methods of preservation (formalin injection) that would allow the main commercial species to be preserved in a recognisable form and distributed for species identification.

Extra costs over lobster programme: A$ 500.

Reef, Lagoon and Mangrove Fish

8 In General, Pacific islanders have a good knowledge and expertise in fishing within and on the reef. They also usually have the local knowledge necessary to determine which fish are toxic. Assistance in this field should take the form of assistance in the supply and loan of new specialised gear, provision for which is already made in the SPC estimates for 1974.
An example of the type of gear that might give excellent results is the capetchade net used in Southern France. This net, a fixed gear, has been tried in New Caledonia by Professor Doumenge of SPIFDA and has given some very promising results.

Aquaculture

Molluscs

9 Several interesting results are being obtained with the importation of Japanese oyster (Crassostrea gigas) seed in at least 4 territories. The main justification for this work is that it can result an import substitution where there is a substantial demand (local or tourist) for the product.

10 Although oysters are generally considered to be a luxury food, this need not necessarily be the case. In the Philippines for instance, a very successful oyster, Crassostrea iredalei, which although not a basic diet, provides a good protinaceous change diet for a large part of the population in Manila.

11 Similarly, the green Bay Mussel, Mytilus smaragdinus, makes a useful contribution to the economy and to the diet of the inhabitants of Manila. Support in the introduction of such successful exotic species into territories with current programmes of mollusc culture could provide initial information upon the feasibility of more wide-spread introduction.

12 At present mollusc hatcheries are the only commercially feasible and successful hatcheries for marine species. Bivalve molluscs can, because of their role of primary converters of plankton into usable protein, make a substantial contribution to protein requirements. In the long term it could perhaps be considered worthwhile to establish a mollusc hatchery serving the needs of mollusc seed for the Pacific territories. This would be dependent upon the success and acceptance of introduced species. Support costs for this introduction: A$ 1,000.

Turtle Farming

13 In areas where nesting turtles occur, turtle farming by means of hatcheries and rearing has been shown to be a congenial and effective operation at the village level, producing both protein food and cash, while at the same time contributing substantially to conservation of turtle stocks.

14 An investigation of the feasibility of this operation in one or two Pacific islands is considered a well worthwhile low cost project. A reasonably successful farming operation could be used as a demonstration centre and a substantial industry could be built up in the Pacific area for turtle products.

15 Turtles have the advantage, like Bêche-de-mer and possibly lobsters, of being able to be held in remote areas awaiting collection for processing and marketing without the need for high cost freezing equipment.

The cost of such a project would be, initially:

	Consultant	A$ 1,000
thereafter	one Volunteer	A$ 4,000
	Travel	A$ 2,000
	Equipment	A$ 4,000
	Fellowships	A$ 4,000
		A$15,000 first year.

Thereafter A$14,000 per year for 3 years.

Fish

16 Successful marine fish farming has been practised commercially for many years in intertidal ponds by such countries as Taiwan, Philippines and Indonesia. However, the main production has been milkfish (Chanos chanos) a species which appears not to have a ready acceptance in many territories of the South Pacific. Incidental crops are of mullet and shrimp (Penaeus monodon).

17 Rabbitfish (Siganus spp.) are a highly acceptable fish which are marine herbivores. (See paper nº 6/WP.1 by D. Popper). Culture of this species is still in an experimental stage. Work is being done in Hawaii, Palau and New Caledonia (SPIFDA). No commercial production has so far been successfully undertaken. In view of the experimental nature of this work, it is perhaps outside the scope of the SPC to finance present projects, but as the work has considerable promise in the long term, full counterpart support should continue to be given by the SPC to the New Caledonia project at Baie St. Vincent.

Costs. (These will be estimated at the Sixth Fisheries Technical Meeting - but for the purposes of Budget preparation have been set at A$10,000 p.a.).

RESTRICTED

SPConf.13/WP.11
17 July 1973

ORIGINAL = ENGLISH

SOUTH PACIFIC COMMISSION

THIRTEENTH SOUTH PACIFIC CONFERENCE

SPECIAL PROJECT ON INSHORE FISHERIES DEVELOPMENT

(Reef, Lagoon and Mariculture)

[Budget Item 706(d)]

SUMMARY

Although the reefs and lagoons, especially near centres of population, have been subjected to heavy fishing and in addition, there is some evidence that productivity has declined due to pollution, there are still large areas of reefs that could possibly sustain useful fisheries.

Two species in particular can probably sustain fisheries that can contribute to cash flow of islanders: Lobster and Bêche-de-mer.

Lobsters

One of the main problems of developing lobster fisheries in the out islands is the difficulties encountered with intermittant collection for marketing. Simple live storage in ponds or cages could assist greatly in the resolution of the problem of marketing. A two year study by a volunteer or secondment of a research worker could resolve this question.

Costs:-

1 volunteer	A$ 4,000 p.a.
Equipment	A$ 4,000
Travel and per diem	A$ 3,000
	A$11,000

Bêche-de-mer

The same worker could assist in the identification of commercial species of Beche-de-mer and prepare specimens in a preserved form for circulation. Additional cost: A$ 500.

Lagoon and Mangrove Fisheries

Assistance would take the form of provision or loan of specialised gear that has proved successful in some territories. Provision for equipment supply is already made in the SPC estimates for 1974.

Mariculture

Molluscs

Bivalve molluscs, as primary plankton converters, could in the long term make a substantial contribution to protein requirements in some areas of the Pacific. In areas of local demand and/or tourist demand, oysters could provide income. Certain species, if successful, could also make a protein contribution as they do at present in, for instance, Manila. Similarly mussels and various species of clams could also make contributions to the economy and food requirements.

Support costs for experimentation with exotic species of molluscs: A$1,000.

Turtle farming

Some considerable success has been achieved with Green Turtle farming in the Torres Straits and with Hawksbill Turtle rearing in Western Samoa. In many territories where there is no great tradition of fishing but some considerable tradition of farming, such culture could produce satisfactory results in terms of protein and cash. The possibilities should be investigated in one or two territories.

Costs:-

Initially:	Consultant	A$ 1,000
Follow up: Trial turtle farm		
	One Volunteer	A$ 4,000
	Equipment	A$ 4,000
	Travel	A$ 2,000
	Fellowships	A$ 4,000
per annum for 3 years		A$14,000

Fish

While development of cultivation of acceptable marine species of fish is still in the experimental stage, considerable promise is held out for cultivation of herbivorous species such as rabbitfish (Siganus spp.); the SPC should continue to give the maximum amount of counterpart support to installations such as that at Baie St. Vincent as a long-term project.

Costs. (These will be estimated at the Sixth Fisheries Technical Meeting - but for the purposes of Budget preparation have been set at A$ 10,000 p.a.)

RESTRICTED
SPConf.13/WP.11
17 July 1973

RESTRICTED
SPConf.13/WP.11/Add.1
3 August 1973

ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION

THIRTEENTH SOUTH PACIFIC CONFERENCE

SPECIAL PROJECT ON INSHORE FISHERIES DEVELOPMENT
(Reef, Lagoon and Mariculture)
[Budget Item 706(d)]

A D D E N D U M

1. The proposal set out in SPConf.13/WP.11 was examined in detail by the SPC Sixth Fisheries Technical Meeting which was held from 23 to 27 July 1973.

2. The proposal was strongly supported by the Meeting.

3. However, the Meeting considered that effort under this Project should be concentrated on:

(a) The Development of Lobster Fisheries.

(b) Turtle Farming.

4. The Meeting recommended that:

(a) in view of the great importance placed upon turtle conservation and the prospective value of turtle farming, the turtle sub-project should be expanded to ensure that consultant services should be made available throughout the duration of the project, to permit visits to interested territories;

(b) because lobster potential is considered as an under-developed resource in most of the territories of the region, the lobster sub-project should be considerably expanded, and consultant services should be available to supervise the project and to advise interested territories;

(c) additional support should be given to the bêche-de-mer sub-project by providing for inter-territorial study visits to facilitate development of this industry.

Secretariat Comments

5. The Secretariat recommends that the views of the SPC Sixth Fisheries Technical Meeting be adopted, and proposes the following revised Budget for the Project:

	Per annum $A
Lobster Sub-project	
Consultant - Travel Costs	5,000
Research Officer (on secondment or Volunteer) - Allowances :	4,000
Travel Costs :	3,000
Equipment and materials	4,000
Total Annual Cost	16,000
Bêche-de-mer	
Costs as previously outlined	500
Inter-territorial Study visits	2,500
Total Annual Cost	3,000
Turtle Farming Sub-project	
Consultant - Travel Costs	5,000
Research Officer (on secondment or Volunteer) - Allowances :	4,000
Travel Costs :	2,000
Equipment and materials	5,000
Training Fellowships	4,000
Total Annual Cost	20,000

6. It should be noted that $30,000 was provided in the original project for further work on fish farming. Although not specifically mentioned in the recommendations of the SPC Sixth Fisheries Meeting, the Secretariat view is that all necessary work in this field would be included in the proposed FAO Aquaculture Project. For this reason no provision is made for similar work in this revision of the Project.

7. The total cost of the Project over a period of three years would therefore be as follows:

1974	:	$A 39,000
1975	:	$A 39,000
1976	:	$A 39,000
Total		$A117,000 - (As against the figure of $108,000 in the original paper.)

CABLE ADDRESS:
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"SOUTHPACOM," NOUMEA

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NEW CALEDONIA

COMMISSION DU PACIFIQUE SUD
BOITE POSTALE D.5
NOUMEA CEDEX
NOUVELLE-CALEDONIE

In reply, please quote PRO 7/14

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

25 June 1974

Dr George H. Balazs,
Jr. Marine Biologist,
University of Hawaii at Manoa,
Hawaii Institute of Marine Biology,
P.O. Box 1346,
KANEOHE,
Hawaii 96744.

Dear George,

The articles and reports that you have sent me have been most useful. The Carr and Main report, of which we now have copies, is particularly useful but is a fairly severe indictment of the Torres Straits work.

I had occasion to visit Honolulu twice recently en route to and from New York. I phoned your office as you may have heard. I was very sorry to hear that you were away and so missed the opportunity of meeting you. I hope that another opportunity will present itself.

I have not heard from Uday Raj since our PEACESAT discussions, but hope to meet him next month at the Fisheries Meeting in Tonga. I hope that he has continued to correspond with you.

Best wishes.

Yours sincerely,

Dick Baird

R.H. Baird
Fisheries Adviser

RHB/wp

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NOUVELLE-CALEDONIE

In reply, please quote PRO 7/14
PRO 84/1

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

17th January, 1974
RHB/wp

Dr George H. Balazs
Jr. Marine Biologist
University of Hawaii at Manoa
Hawaii Institute of Marine Biology
P.O. Box 1346
Kaneohe, Hawaii 96744

Dear Dr Balazs,

Thank you for your very helpful letter of January 4th and the copies of your papers. I am glad to know that you approve of the SPC plans for turtle farming.

Your information on the foods you have already tried is particularily useful at this time. We would hope to find a food that is readily available at the village level in Pacific islands, including perhaps household scraps. Mr Bewg, our animal production officer, has told me for instance that water hyacinth, which is something of pest in Fiji, has been used successfully in the diet of pigs. The details of the experiments will of course be worked out in detail in discussions with Dr Raj at the University of the South Pacific. Any other information that you may have, for example details of floating cages, will be very useful.

Yours sincerely,

R.H. Baird
Fisheries Officer

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In reply, please quote..... PRO 84/1
PRO 7/14

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

8 April 1974

Dr. George H. Balazs
Jr. Marine Biologist
Hawaii Institute of Marine Biology
University of Hawaii
P.O. Box 1346
KANEOHE, Hawaii 96744
United States of America.

Dear Dr. Balazs,

Thank you for your letter of 15 February and the interesting enclosures. We have been following the drama of Applied Ecology Ltd. with considerable interest. Your extract from the National Times I had not in fact seen. A rather severe indictment of the management.

For your information I enclose a copy of a letter that I have just written to Uday Raj and also a photocopy of the records of growth of turtles in Rangiroa.

With regard to the PEACESAT discussion, will you be available in the next two or three weeks to take part in short discussion if I succeed in setting them up?

Yours sincerely,

Rick Baird

R.H. Baird
Fisheries Officer

Enclosures.
RHB/wp

CABLE ADDRESS:
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NOUVELLE-CALEDONIE

In reply, please quote PRO 84/1
PRO 7/14

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

8 April 1974

Dr. Uday Raj
School of Natural Resources
The University of the South Pacific
P.O. Box 1168
SUVA
Fiji.

Dear Dr. Raj,

I am sorry to have been such a long time in writing to you but since my return on the 21 March after five weeks absence I have been inundated with catching up work.

Referring back to our discussions in Suva, I confirm that we can make available immediately $A1,000 for the preliminary work necessary for the construction of tanks for hatchling turtles as discussed. I spoke to Hubert Squires after talking to you and he said that he would be happy to administer the money on our behalf. I thought that this might save you from the necessity of having to keep day to day accounts.

I am most anxious to know if you did succeed in getting some hatchlings in time. I don't know whether you are familiar with the workings of PEACESAT which is a satellite communications link for discussions upon educational and scientific matters. I would like to set up a three way discussion between you, George Balazs in Honolulu and myself. If you could find out in the meantime where your PEACESAT centre is, you will be contacted for the time and date of the discussion. I hope you will be able to manage it.

I don't know when I will have time to visit Fiji again but will let you know in good time before I do come. In the meantime I would be very glad of any information on progress that you may have.

During my last trip I visited Rangiroa in the Tuamotus Islands where they have a small turtle project operating. These turtles, *Chelonia mydas*, are saturation fed with fish - there is a small fish filleting operation going on there so that there are plenty of fish frames and heads available. I enclose some growth figures which will give you at least some standard of comparison.

./...

Whilst on Rangiroa I came across a plant which grows profusely, known in French as False Tobacco, Messerschmidia argentea (Boraginacees). Do you know it and do you have the facilities to make an analysis? Also there is Lucaena leucocephala, Mimosa, which has a high protein content. I mention these because I have no doubt that, except on remote islands with a surplus supply of fish, feeding is going to be a major problem when you have a large biomass.

We have now offered the post of Turtle Project Officer to a Mr. Silberstein at present working at the New York Ocean Science Laboratory. When he comes to join us in late May, I will arrange for him to stop-off at Suva for a day or two to talk to you.

He will be setting up the field trials in the Cook Islands, probably on Aitutaki.

Yours sincerely,

R.H. Baird
Fisheries Officer

Enclosure.
cc. Dr. G.H. Balazs.
RHB/wp

Service de la Pêche

Centre Frigorifique

AVATORU - RANGIROA - Tuamotus

CHELONIA MYDAS

Budget - none

18 November 1971 : 20 egges are taken from a nest at FURUMAI (Secteur of Avatoru - Rangiroa) on the Ocean side) and transported to the village; distance about 4 km.

16 December 1971, 6.oo h.
20 little turtles were crawling in the enclosure,
4 babies were taken by Pari for his time.
Survival : 20/20.

Note : Those egges were picked up and placed in the box very carefully; the same position as they were in the nest, and without shock.

16 December 1971 : Measurement of the young ones - average weight.

Date	Weight gr.	Carapace Length cm	Large cm		
16.12. 1971	19	4,5	3,5	average	Fed 3 times a day: 7.30 a.m., 11 a.m. 16.p.m. - with fish choped finely, careful, very careful the first month.
	20	4,8	3,9	biggest	
	15	3,8	2,7	smallest	
16. 1. 1972	97	7,8	6,6	average	This is important after the 4th day, they start eating, it's important to check that the stomach will be full - plastron pushed out - not curved in the opposite way.
	115	8,5	7,4	biggest	
	80	7,2	5,6	smallest	
16. 2. 1972	167,5	9,5	7,5	average	
	250	11	9	biggest	
	85	8	6,5	smallest	
16. 3. 1972	325	12	9,5	average	This month 1 dead: stomach air in the stomach. The first dead - observation: cannot dive for food (save 3 others by pocking very tender herbs through the annus to let the air out. Fermentation of food, other cure preferable, but we are not equipped.
	450	13,5	11	biggest	
	200	10,5	8	smallest	

./...

Date	Weight gr	Carapace Length cm	Carapace Large cm	Head Widest part cm	Girth length cm	Plastron length cm		Notes
16. 4. 1972	447 530 390	14,0 15,1 12,7	11,1 12,3 10,2	2,9 3,2 2,8	28,2 29,8 24,8	11,1 12,6 10,3	average biggest smallest	This month - Fungus neck clean with Bleu de Methylene, good result (rub in).
16.9. 1972	2,850 3,400 2,100	26,4 29,2 20,0	22,9 24,0 20,0	4,7 5,2 4,5	50,8 54,6 46,1	21,2 23,6 19,1	average biggest smallest	Two disappeared between April and Sept. no comment - health is good.
16.10. 1972	3,640 4,000 3,000	28,9 30,8 26,2	25,2 26,8 23,2	5,5 5,9 5,1	52,8 58,4 51,5	23,5 25,3 21,5	average biggest smallest	no comments.
16.11. 1972	4,592 5,000 3,900	31,1 33,0 27,9	27,0 29,4 25,2	5,6 5,9 5,2	60,8 63,8 56,5	25,8 27,0 23,9	average biggest smallest	Good health.
16.12. 1972	5,620 6,400 4,800	33,6 35,5 32,0	28,6 30,0 26,7	5,8 6,4 5,3	63,9 66,5 60	27,1 29,0 25,4	average biggest smallest	This month the turtles were not fed properly and a showing lost of weight curve in the plastron noted on some turtles.
25.6. 1973	11,800 13,000 9,800	43,5 44,8 41,3	37,6 38,2 35,5	7,3 7,6 7,2	84,4 87,0 83,2	35,2 36,4 34,5	average biggest smallest	
16.12. 1973	18,700 21,800 16,000	50,5 52,0 47,6	43,0 45,6 40,0	7,8 8,0 7,4	99,5 107,0 93,3	40,8 43,2 38,5	average biggest smallest	

Food first year per turtle per day in 1972

Month	gr
January	25
February	50
March	65
April	65
May	70
June	70
July	75
August	80
September	100
October	120
November	120
December	150

Other notes on weight

		Weight	Length	Large	Head	Girth	Plastron
16 Dec. 1973	- no. 1028	20,000 gr	51,0	44,0	8,0	100,5	42,0
21 Fevr.1974	- no. 1028	24,000 gr	54,0	47,3	8,8	105,5	44,0

- Note : Fungus on few turtles, need to be cured.

PRO 7/3/7
PRO 84/5/1

Noumea, 19 March 1974

Draft

by Mr. R. Stone (?)
Dept. of Fisheries - FIJI

Nov - Dec. 1970

THE TURTLE AND RESEARCH IN FIJI

During the last month a Turtle survey has been carried out to investigate,

(1) Turtle species occuring in Fiji,

(2) Nesting season,

(3) Nesting beaches and number of nests/beach,

(4) Presence, identification and abundance of the turtle grass, Vutia.

There appear to be 5 species of turtle nesting in Fiji. They are:

The Green - Vonu dina, Chelonia mydas ;

The Hawksbill - Taku, Eretmochelys imbricata ;

The leathery turtle - Dermochely coriacea ;

The loggerhead - Curetta curetta ;

The Ridley - Lepidochelys coriacea .

Of the 5 species the Green and the Hawksbill are easily the most common; the green turtle can be seen in September in large numbers at night in the passages around Suva where they sleep under ledges. On the night of September 19th, over 20 large greens were seen outside Namuka passage. The Hawksbill, although not seen at night can be readily seen during the day feeding just off the reef in about 5 fathoms of water.

The leathery and loggerhead turtle have been reported in Fiji but were not seen during the turtle survey. A Ridley was reported from the Great Sea Reef near Noli passage on November 17th.

NESTING BEACHES

Since the 1st week in November visits have been made to Islands that are known for nesting beaches. These were Namena lala, Vatu-i-cake, Komo, Ogea, Nana, Tavarua, Islands of the Astrolabe lagoon and Namotu. On Vatu-i-cake two old Hawksbill nests were seen and on Tavarua five nests were seen. Only one recent nest was seen on the 4th of December on Tavarua and this again was a hawskbill.

Islands where Hawksbill x turtles are reported to nest, and were not visited are : Caqalai, Leleuvia, Nakautabu, Lau, Nairai, Fulanga, Vatoa, Islets of Vanua Mbalabu, Nanuku levu and Nanukulailai, Wailangilala. Islets off the Drekoti[redacted] river, Naiviti, Vomo and Yabu. There is no doubt a large number of other islands, especially in the Lau and Namanuca groups support hawksbill nesting.

2/...

The Green turtle appears to be a little more elusive. It's nesting habits are more selective than the Hawksbill, preferring to nest on the beach rather than in the vegetation. Beaches that would permit a Green turtle must nesting need a high and broad beach platform, so that the eggs will not get wet. This sort of beach is usually associated with high energy wave systems of the open ocean so that the Islands where Greens nest are usually exposed and adjacent to deep Oceanic waters.

e.g. Kono, Wailangilala, Nanukulailai and Tavarua.

NESTING SEASON.

From observations it appears that the nesting season begins early in December with a peak at the very end of December trailing off into January. Hatching no doubt occurs toward the end of January and during February.

RESEARCH.

Initial research into the turtle population's should be concentrated first on an assessment of the following factors :

(a) Green turtle nesting beaches in Fiji;

(b) The abundance, locality, relative biomass of the turtle grass pastures in Fiji;

(c) A tagging programme should be started immediately using turtle-tag pliers and tags already available and it it is recommended that, a reward of $5.00 be offered for the return of any tags. Statements to this effect should be stamped on the tags (As a guide, W. Samoa, Carribean, Arabia and other countries are already paying $5.00).

(d) S.P.I.F.D.A. will be used to co-op the assistance of the consultative services of Hawaii's Bureau of Commercial Fisheries, blood testing group, for the setting up of an Immunological tagging programme. Testing of blood groups of turtles will help elucidate sub-population structure of marine turtles in the South Pacific.

(e) An experiment turtle hatchery programme for re-stocking purposes should be commenced. Turtle eggs collected at Nanuku-Lailai, or Tavarua could be transferred by boat to Natai or Nadi and flown by Fiji Airways to Nausori. A boat could pick the eggs up at Wainibokasi and transfer them to Makaluva where it is proposed to set up a turtle hatchery. Makaluva has the advantages of:
(1) being an old turtle nesting beach;
(2) uninhabited;
(3) close to Suva;
(4) close to deep water for release of turtles;
(5) near the university.
This would invlove legislation to designate Makaluva as a sanctuary.

3/...

In conjunction with the Tuna programme and Oceanographic work on the Eddie Structure formed behing oceanic islands, all reports and observations on turtles found should be measured, weighed and located. This will help world turtle research workers in their quest to discover more about the so called 'lost year' of the turtle.

In 1971 "Broadcast to Schools" should be run explaining the need for conservation and re-stocking of turtle populations. Emphasis should be placed on prohibiting the eating of turtle eggs and turning of female turtles on the beaches.

Pamphlets, (in Fijian and English and Hindustani) will be distributed to all Fiji Marine boats, especially the light house tenders, and to outlying Fijian schools, and fishermen emphasising conservation and the benefits of re-stocking.

The second phase will be directed towards schools in the Lau group with the object of running re-stocking programmes. This could be done as part of a native study programme eggs will be transferred to a beach near the school, the hatchlings kept in shaded aquaria located on the beach and then released at sea when a week or two old.

what the Commissioner of Labour calls "growing concern". He said that measures were being taken to bring to the notice of employers the need for better safety training.

The three accidents—at three different sites—involved falling trees.

Turtle farming for Islands?

Marine biologists are paying increasing attention to that benign old shellback of the sea, the turtle.

With the growing need to find new sources of food for the world's population, turtle "farming" could become an important industry in future—particularly in the South Pacific.

The first step of a large-scale survey of turtle and crayfish resources in the area has been undertaken by the South Pacific Islands Fisheries Development Agency. Questionnaires have been sent to fisheries departments in all member countries, seeking data on turtle and crayfish populations and habitats.

In Fiji alone, more than 70 Peace Corps volunteers will assist the local fisheries division to complete the questionnaires.

The turtle survey is of special interest because turtles live directly on plant life, thus creating a source of red-meat protein from carbohydrates in the sea.

If turtle "farming" became a reality, it would do much to increase the world's source of protein.

Turtles were also in the news in Fiji recently when a Nadi cruise operator, Mr. Brian Dean, captured 20 newly-hatched ones on Vunivadra Island.

While rearing them until they're big enough to ensure survival, he intends to sound a gong at a set time each day while feeding them. After they have been freed into the sea, he hopes they will return to the island at the sound of the gong.

"It's just an experiment. But if it works it could be as unique an attraction as the turtle-calling carried out by Fijians at Koro," he said.

Offer for Sangara shares

Pacific Acceptance Corporation Pty. Ltd., a New Guinea-registered company, has made an offer of 32 cents for 50 cent shares in Sangara (Holdings) Ltd., nominal owner of four NG hotels and two rubber-cocoa plantations in Papua. Directors of Sangara in May recommended acceptance of the offer.

Sangara is the registered owner of Rabaul's Cosmopolitan Hotel, the Goroka and Wau Hotels and the Hotel Cecil, Lae. It owns Sangara and Wijo Plantations, in Papua's Northern District.

The last time the company's shares changed hands was in 1964—when they did so for about 12 cents. Since then the company's shares have not been listed.

The delisting followed complex disputes reported in *PIM* (Feb., 1965, p. 125) over ownership and profitability of the company's hotels. From 1965 new management of the company was introduced.

Pacific Acceptance is in no way related to Pacific Acceptance Corporation Ltd., at present under official management.

Taxes up in the Cook Islands

In an effort to raise Cook Islands' revenue by $NZ100,000, Mr. Albert Henry, Premier of the Cook Islands, has introduced new taxes and increased others—though he has not increased income tax.

Mr. Henry announced 11 new provisions to the Cooks income tax bill.

The provisions include one unprecedented tax to discourage overseas exporters (NZ dominates this trade) to the Cooks.

"Overseas suppliers of goods to the Cook Islands are subject to tax on income derived from the sale of such goods to the Cook Islands," the provision states.

"In the first instance the assessment will be issued to the person importing the goods who is now deemed to be Cook Island agent of the overseas supplier. The agent then recovers from the overseas supplier the tax paid."

The NZ Trade Commission Sydney office told *PIM* that this tax was "most unusual". Because two tax payments had to be made, it was probably designed to put off people exporting to the Cooks, so the goods involved could either be produced locally or not bought at all.

A lower import bill for the Cooks would save valuable exchange sent to Britain, the US, Australia and Japan, the territory's major suppliers after NZ (the Cooks are in the NZ currency zone and use NZ money).

NZ customs duties have operated generally in the Cooks but with amendments to suit local conditions. Where goods have not been subject to duty, sales taxes have previously been imposed (goods in this category include such items as ci and beer).

Mr. Henry's other clude:

- Company taxes, minimum rate of six c dollar to 20 cents for $5,000, f 30 cents t every dollar for income
- A "working tax" come earned by visitor 30 days, with tax rat "visitors" stayed over
- A 15 per cent. ta dividends paid after paid by the companie dends are distributed to
- A tax on bonus pany shares.
- A 2.5 cents in the exports of all produce and pearl shell which subject to a 5 per cent
- A new rate of 37. dollar on all income de panies not resident but the Cooks.
- Tax exemption children to be reduced 16 years and for payr and accident insurance be raised from $400 to
- Late payment pen to go up from 5 per ce cent. and the maximum be three times the am deficient tax.

Late bid for Tongan oil rig

It's a small world, t Tongans in May when Grover became the four permits to search for oil dom. He made it on beh

Last November, Mr. "Nukualofa is sitting on bearing rock for miles. real McCoy. It's 'live the same oil that is mine (*PIM*, Dec., 1968, p. 36).

Earlier, in his capaci Director of Geological S Grover had travelled to confirmed the kingdom's on the island of Eua 1968, p. 27).

Mr. Grover left Fiji ea and became general Kathleen Investment Ltd., a profitable Austr and investor with only terests in oil.

In his new capacity, has applied for prospe with an unofficial prop

LIST OF OVERSEAS PASSENGER VESSELS TO VISIT FIJI BETWEEN DECEMBER 1976 AND DECEMBER 1977. THIS LIST IS SUBJECT TO ALTERATIONS WITHOUT NOTICE AND INTERESTED PARTIES SHOULD CHECK IN THE PRESS SHIPPING NEWS.

DATED 1/12/76

DATE	DAY	SHIP	PORT	MOVEMENT	ARRIVAL	DEPARTURE	AGENT
DECEMBER 1976.							
30/1ST	TUE/WED	ARCADIA	SUVA	CRUISE	9.00AM	8.00AM	USS
1ST	WED	MARIPOSA	SUVA		9.00AM	5.00PM	BP
3RD	FRI	FAIRSKY	SUVA	CRUISE	6.00AM	7.00PM	BP
4TH	SAT	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	1.00AM	BP
7TH	TUE	FAIRSTAR	SUVA	CRUISE	8.00AM	7.00PM	BP
10TH	FRI	ARCADIA	LAUTOKA°	CRUISE	8.00AM	11.00PM	USS
11TH	SAT	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
15TH	WED	ORIANA	SUVA	SOUTHBOUND	9.00AM	4.00PM	USS
22ND	WED	FAIRSTAR	SAVUSAVU	CRUISE	7.00AM	6.00PM	BP
23RD	THU	FAIRSTAR	SUVA	CRUISE	7.00AM	7.00PM	BP
23/24TH	THU/FRI	SHOTA RUSTAVELI	SUVA	CRUISE	5.00PM	5.00PM	BP
24TH	FRI	FAIRSTAR	LAUTOKA°	CRUISE	5.00PM	5.00PM	BP
26TH	SUN	ARCADIA	LAUTOKA°	CRUISE	8.00AM	11.00PM	USS
26/27TH	SUN/MON	AUSTRALIS	SUVA	CRUISE	9.00AM	10.00PM	WG
27TH	MON	FEDOR SHALYAPIN	LAUTOKA°	CRUISE	8.00AM	8.00PM	BP
27TH	MON	ARCADIA	SUVA	CRUISE	8.00AM	11.59PM	USS
27TH	MON	ORIANA	LAUTOKA°	CRUISE	8.00AM	11.00PM	USS
28TH	TUE	ORIANA	SUVA	CRUISE	8.00AM	11.00PM	USS
28TH	TUE	AUSTRALIS	LAUTOKA°	CRUISE	7.00AM	6.00PM	WG
28/29TH	TUE/WED	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	2.00AM	BP

JANUARY 1977.

DATE	DAY	SHIP	PORT	MOVEMENT	ARRIVAL	DEPARTURE	AGENT
01 - 3RD	SAT - MON	MARCO POLO	SUVA	CRUISE	12NOON	5.30AM	WG
2ND	SUN	LEONID SOBINOV	SAVUSAVU	CRUISE	8.00AM	7.00PM	BP
3RD	MON	LEONID SOBINOV	SUVA	CRUISE	7.00AM	9.00PM	BP
3RD	MON	FAIRSKY	SUVA	CRUISE	8.00AM	7.00PM	BP
3RD	MON	MARCO POLO	BEQA	CRUISE	8.30AM	6.00PM	WG
4TH	TUE	LEONID SOBINOV	LAUTOKA	CRUISE	8.00AM	3.00PM	BP
4TH	TUE	FAIRSKY	LAUTOKA	CRUISE	7.00AM	7.00PM	BP
7TH	FRI	MONTEREY	SUVA	CRUISE	9.00AM	5.00PM	BP
10TH	MON	FELIX DZERJUNSKY	LAUTOKA	CRUISE	8.00AM	10.00PM	BP
10TH	MON	FAIRSTAR	SUVA	CRUISE	8.00AM	11.00PM	BP
10TH	MON	SHOTA RUSTAVELI	SUVA	CRUISE	9.00AM	10.00PM	BP
11TH	TUE	SHOTA RUSTAVELI	LAUTOKA	CRUISE	9.00AM	8.00PM	BP
11TH	TUE	ORIANA	SUVA	CRUISE	8.00AM	11.59PM	USS
11TH	TUE	ARCADIA	LAUTOKA	CRUISE	7.30AM	11.00PM	USS
12/13TH	WED/THU	ARCADIA	SUVA	CRUISE	8.00AM	5.00PM	USS
14TH	FRI	LEONID SOBINOV	SUVA	CRUISE	7.00AM	10.00PM	BP
15TH	SAT	LEONID SOBINOV	LAUTOKA	CRUISE	9.00AM	8.00PM	BP
19/20TH	WED/THU	MARCO POLO	SUVA	CRUISE	10.00AM	4.00PM	WG
19/20TH	WED/THU	AUSTRALIS	SUVA	CRUISE	3.00PM	6.00PM	WG

Continued Overleaf/.....

23 (13) 2

JANUARY (Cont....

DATE	DAY	SHIP	PORT	MOVEMENT	ARRIVAL	DEPARTURE	AGENT
JANUARY (Cont....							
20TH	THU	FAIRSKY	SAVUSAVU+	CRUISE	7.00AM	7.00PM	BP
21/22ND	FRI/SAT	FAIRSKY	SUVA	CRUISE	7.00AM	9.00PM	BP
23RD	SUN	FAIRSKY	LAUTOKA°	CRUISE	8.00AM	6.00PM	BP
23RD	SUN	ARCADIA	SUVA	CRUISE	9.00AM	11.59PM	USS
23/24TH	SUN/MON	FEDOR SHALYAPIN	SUVA	CRUISE	5.00PM	8.00PM	BP
24TH	MON	FAIRSTAR	LAUTOKA°	CRUISE	7.00AM	7.00PM	BP
25TH	TUE	FEDOR SHALYAPIN	SAVUSAVU+	CRUISE	8.00AM	8.00PM	BP
25TH	TUE	FAIRSTAR	SUVA	CRUISE	8.00AM	6.00PM	BP
25/26TH	TUE/WED	SHOTA RUSTAVELI	SUVA	CRUISE	3.00PM	9.00PM	BP
26TH	WED	ORIANA	SUVA	CRUISE	8.00AM	6.00PM	USS
26/27TH	WED/THU	MAXIM GORKY	SUVA	CRUISE	6.30PM	6.00PM	BP
27TH	THU	SHOTA RUSTAVELI	LAUTOKA°	CRUISE	8.00AM	7.00PM	BP
FEBRUARY							

Continued overleaf/.....

19/20TH	WED/THU	AUSTRALIS	SUVA	CRUISE	3.00PM	6.00PM	WG
19/20TH	WED/THU	MARCO POLO	SUVA	CRUISE	10.00AM	4.00PM	WG
15TH	SAT	LEONID SOBINOV	LAUTOKA°	CRUISE	9.00AM	8.00PM	BP
14TH	FRI	LEONID SOBINOV	SUVA	CRUISE	7.00AM	10.00PM	BP
12/13TH	WED/THU	ARCADIA	SUVA	CRUISE	8.00AM	5.00PM	USS
11TH	TUE	ARCADIA	LAUTOKA°	CRUISE	7.30AM	11.00PM	USS
11TH	TUE	ORIANA	SUVA	CRUISE	8.00AM	11.59PM	USS
11TH	TUE	SHOTA RUSTAVELI	LAUTOKA°	CRUISE	9.00AM	8.00PM	BP
10TH	MON	SHOTA RUSTAVELI	SUVA	CRUISE	9.00AM	10.00PM	BP
10TH	MON	FAIRSTAR	SUVA	CRUISE	8.00AM	11.00PM	BP
10TH	MON	FELIX DZERJUNSKY	LAUTOKA°	CRUISE	8.00AM	10.00PM	BP

FEBRUARY

2ND	WED	MARIPOSA	SUVA	-	9.00AM	5.00PM	BP
7TH	MON	FAIRSTAR	LAUTOKA°	CRUISE	7.00AM	7.00PM	BP
7TH	MON	ARCADIA	SUVA	CRUISE	8.00AM	5.30PM	USS
8TH	TUE	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP
8TH	TUE	ORIANA	SUVA	CRUISE	8.00AM	11.00PM	USS
9TH	WED	ORIANA	LAUTOKA°	CRUISE	8.00AM	6.00PM	USS
10/11TH	THU/FRI	SHOTA RUSTAVELI	SUVA	CRUISE	5.00PM	9.00PM	BP
10/11TH	THU/FRI	MIKHAIL LERMONTOV	SUVA	-	8.00AM	4.00PM	BP
11/12TH	FRI/SAT	FAIRSKY	SUVA	CRUISE	5.00PM	7.00PM	BP
12TH	SAT	SHOTA RUSTAVELI	LAUTOKA°	CRUISE	8.00AM	10.00PM	BP
12TH	SAT	CANBERRA	SUVA	WORLD VOYAGE	8.00AM	6.00PM	USS
13TH	SUN	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	6.00PM	BP
18TH	FRI	FEDOR SHALYAPIN	LAUTOKA°	CRUISE	8.00AM	8.00PM	BP
19TH	SAT	MARCO POLO	SUVA	CRUISE	8.00AM	10.00PM	WG
20TH	SUN	MARCO POLO	LAUTOKA°	CRUISE	9.00AM	8.00PM	BP
19TH	SAT	ORIANA	SUVA	CRUISE	8.00AM	11.59PM	USS
19TH	SAT	FEDOR SHALYAPIN	SAVUSAVU+	CRUISE	8.00AM	8.00PM	BP
20/21ST	SUN/MON	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	6.00PM	BP
25TH	FRI	FAIRSTAR	LAUTOKA°	CRUISE	8.00AM	7.00PM	BP
26/27TH	SAT/SUN	FAIRSTAR	SUVA	CRUISE	8.00AM	12NOON	BP

MARCH

1ST	TUE	FAIRSKY	SUVA	CRUISE	7.00AM	7.00PM	BP
2ND	WED	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	6.00PM	BP
4TH	FRI	ORIANA	SUVA	CRUISE	8.00AM	11.00PM	USS
5TH	SAT	ORIANA	LAUTOKA°	CRUISE	8.00AM	6.00PM	USS
5TH	SAT	FEDOR SHALYAPIN	SUVA	CRUISE	7.00AM	5.00PM	BP
11TH	FRI	FAIRSTAR	SUVA	CRUISE	7.00AM	9.00PM	BP
11TH	FRI	MONTEREY	SUVA	CRUISE	9.00AM	5.00PM	BP
12TH	SAT	FAIRSTAR	SAVUSAVU+	CRUISE	7.00AM	7.00PM	BP

Continued.....

DATE	DAY	SHIP	PORT	MOVEMENT	ARRIVAL	DEPARTURE	AGENT
M A R C H Cont.....							
15/16TH	TUE/WED	LEONID SOBINOV	SUVA	CRUISE	4.00PM	9.00PM	BP
17TH	THU	LEONID SOBINOV	LAUTOKA°	CRUISE	8.00AM	6.00PM	BP
19TH	SAT	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	5.00PM	BP
26TH	SAT	FAIRSKY	SUVA	CRUISE	7.00AM	7.00PM	BP
27TH	SUN	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	3.00PM	BP
29/30TH	TUE/WED	ORLANA	SUVA	CRUISE	5.00PM	11.00PM	BP
31/01ST	THU/FRI	LEONID SOBINOV	SUVA	CRUISE	2.00PM	4.00PM	BP
A P R I L							
12TH	TUE	ORLANA	SUVA	NORTHBOUND	9.00AM	5.00PM	USS
15TH	FRI	FAIRSKY	SAVUSAVU+	CRUISE	8.00AM	6.00PM	BP
16TH	SAT	FAIRSKY	SUVA	CRUISE	7.00AM	11.00PM	BP
16TH	SAT	LEONID SOBINOV	SAVUSAVU+	CRUISE	8.00AM	7.00PM	BP
17/18TH	SUN /MON	LEONID SOBINOV	SUVA	CRUISE	7.00AM	MIDNIGHT	BP
17/18TH	SUN/MON	FEDOR SHALYAPIN	SUVA	CRUISE	4.00PM	MIDNIGHT	BP
19TH	TUE	MARIPOSA	SUVA	-	8.00AM	4.00PM	BP
19TH	TUE	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	USS
20TH	WED	ARCADIA	LAUTOKA°	CRUISE	7.30AM	6.00PM	USS
26TH	TUE	MAXIM GORKY	SUVA	CRUISE	8.00AM	6.00PM	BP
M A Y							
1ST	SUN	LEONID SOBINOV	LAUTOKA°	CRUISE	12NOON	MIDNIGHT	BP
02/3RD	MON/TUE	FAIRSKY	SUVA	CRUISE	7.00AM	11.00PM	BP
3RD	TUE	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	BP
4TH	WED	ARCADIA	LAUTOKA°	CRUISE	7.30AM	6.00PM	USS
14/15TH	SAT/SUN	LEONID SOBINOV	SUVA	CRUISE	8.00AM	2.00AM	BP
17TH	TUE	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
18TH	WED	ARCADIA	LAUTOKA°	CRUISE	7.30AM	5.00PM	USS
18TH	WED	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP
24TH	TUE	FAIRSKY	LAUTOKA°	CRUISE	12NOON	7.00PM	BP
25TH	WED	FAIRSKY	SUVA	CRUISE	7.00AM	9.00PM	
J U N E							
1ST	WED	ARCADIA	SUVA	CRUISE	8.00AM	MIDNIGHT	USS
4TH	SAT	FAIRSTAR	LAUTOKA°	CRUISE	7.00AM	7.00PM	BP
05/6TH	SUN/MON	FAIRSTAR	SUVA	CRUISE	7.00AM	12NOON	BP
14TH	TUE	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	USS
15TH	WED	ARCADIA	SAVUSAVU+	CRUISE	8.00AM	6.00PM	USS

26TH	SAT	FAIRSKY	SUVA	CRUISE	7.00AM	7.00PM	BP
27TH	SUN	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	3.00PM	BP
29/30TH	TUE/WED	ORIANA	SUVA	CRUISE	5.00PM	11.00PM	BP
31/01ST	THU/FRI	LEONID SOBINOV	SUVA	CRUISE	2.00PM	4.00PM	BP

A P R I L

12TH	TUE	ORIANA	SUVA	NORTHBOUND	9.00AM	5.00PM	USS
15TH	FRI	FAIRSKY	SAVUSAVU+	CRUISE	8.00AM	6.00PM	BP
16TH	SAT	FAIRSKY	SUVA	CRUISE	7.00AM	11.00PM	BP
16TH	SAT	LEONID SOBINOV	SAVUSAVU+	CRUISE	8.00AM	7.00PM	BP
17/18TH	SUN /MON	LEONID SOBINOV	SUVA	CRUISE	7.00AM	MIDNIGHT	BP
17/18TH	SUN/MON	FEDOR SHALYAPIN	SUVA	CRUISE	4.00PM	MIDNIGHT	BP
19TH	TUE	MARIPOSA	SUVA	-	8.00AM	4.00PM	BP
19TH	TUE	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	USS
20TH	WED	ARCADIA	LAUTOKA°	CRUISE	7.30AM	6.00PM	USS
26TH	TUE	MAXIM GORKY	SUVA	CRUISE	8.00AM	6.00PM	BP

M A Y

1ST	SUN	LEONID SOBINOV	LAUTOKA°	CRUISE	12NOON	MIDNIGHT	BP
02/3RD	MON/TUE	FAIRSKY	SUVA	CRUISE	7.00AM	11.00PM	BP
3RD	TUE	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	BP
4TH	WED	ARCADIA	LAUTOKA°	CRUISE	7.30AM	6.00PM	USS
14/15TH	SAT/SUN	LEONID SOBINOV	SUVA	CRUISE	8.00AM	2.00AM	BP
17TH	TUE	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
18TH	WED	ARCADIA	LAUTOKA°	CRUISE	7.30AM	5.00PM	USS
18TH	WED	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP
24TH	TUE	FAIRSKY	LAUTOKA°	CRUISE	12NOON	7.00PM	BP
25TH	WED	FAIRSKY	SUVA	CRUISE	7.00AM	9.00PM	

J U N E

1ST	WED	ARCADIA	SUVA	CRUISE	8.00AM	MIDNIGHT	USS
4TH	SAT	FAIRSTAR	LAUTOKA°	CRUISE	7.00AM	7.00PM	BP
05/6TH	SUN/MON	FAIRSTAR	SUVA	CRUISE	7.00AM	12NOON	BP
14TH	TUE	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	USS
15TH	WED	ARCADIA	SAVUSAVU+	CRUISE	8.00AM	5.00PM	USS
19TH	SUN	FAIRSTAR	LAUTOKA°	CRUISE	7.00AM	7.00PM	BP
20TH	MON	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP
20TH	MON	ARCADIA	LAUTOKA°	CRUISE	7.00AM	5.00PM	USS
30TH	THU	ARCADIA	LAUTOKA°	CRUISE	7.30AM	11.00PM	USS

DATE	DAY	SHIP	PORT	MOVEMENT	ARRIVAL	DEPARTURE	AGENT
JULY							
1ST	FRI	ARCADIA	SUVA	CRUISE	8.00AM	6.00PM	USS
04/5TH	MON/TUE	FEDOR SHALYAPIN	SUVA	CRUISE	1.00PM	10.00PM	BP
6TH	WED	FEDOR SHALYAPIN	LAUTOKA	CRUISE	8.00AM	10.00PM	BP
14/15TH	THU/FRI	FAIRSTAR	SUVA	CRUISE	8.00AM	12NOON	BP
22ND	FRI	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	USS
23RD	SAT	ARCADIA	SAVUSAVU	CRUISE	8.00AM	5.00PM	USS
27/28TH	WED/THU	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	12NOON	BP
29TH	FRI	FAIRSTAR	LAUTOKA	CRUISE	1.00PM	7.00PM	BP
30TH	SAT	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP
AUGUST							
4TH	THU	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
4TH	THU	AUSTRALIS	SUVA	CRUISE	7.00AM	9.00PM	WG
5TH	FRI	ARCADIA	LAUTOKA	CRUISE	7.30AM	6.00PM	USS
14TH	SUN	FEDOR SHALYAPIN	LAUTOKA	CRUISE	10.00AM	8.00PM	BP
15TH	MON	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	6.00PM	BP
15TH	MON	FAIRSTAR	LAUTOKA	CRUISE	7.00AM	7.00PM	BP
16/17TH	TUE/WED	FAIRSTAR	SUVA	CRUISE	7.00AM	7.00PM	BP
18/19TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	6.00PM	BP
20TH	SAT	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
21ST	SUN	ARCADIA	LAUTOKA	CRUISE	7.00AM	5.00PM	USS
SEPTEMBER							
01/2ND	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	7.00PM	BP
02/3RD	FRI/SAT	FEDOR SHALYAPIN	SUVA	CRUISE	4.00PM	MIDNIGHT	BP
2ND	FRI	ARCADIA	LAUTOKA	CRUISE	7.30AM	11.00PM	USS
3RD	SAT	FAIRSKY	LAUTOKA	CRUISE	7.00AM	6.00PM	BP
3RD	SAT	ARCADIA	SUVA	CRUISE	8.00AM	11.59PM	USS
13/14TH	TUE /WED	FAIRSTAR	SUVA	CRUISE	7.00AM	12NOON	BP
15/16TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	6.00PM	BP
20TH	TUE	ARCADIA	SUVA	CRUISE	8.00AM	6.00PM	USS
21ST	WED	FEDOR SHALYAPIN	LAUTOKA	CRUISE	10.00AM	8.00PM	BP
29/30TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	7.00PM	BP
OCTOBER							
1ST	SAT	FAIRSKY	SUVA	CRUISE	7.00AM	6.00PM	BP
1ST	SUN	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
2ND	SUN	ARCADIA	LAUTOKA	CRUISE	7.30AM	5.00PM	USS
05/6TH	WED/THU	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	12NOON	BP

14/15TH	THU/FRI	FAIRSTAR	SUVA	CRUISE	8.00AM	12NOON	BP
22ND	FRI	ARCADIA	SUVA	CRUISE	9.00AM	11.00PM	USS
23RD	SAT	ARCADIA	SAVUSAVU+	CRUISE	8.00AM	5.00PM	USS
27/28TH	WED/THU	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	12NOON	BP
29TH	FRI	FAIRSTAR	LAUTOKA@	CRUISE	1.00PM	7.00PM	BP
30TH	SAT	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP

A U G U S T

4TH	THU	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
4TH	THU	AUSTRALIS	SUVA	CRUISE	7.00AM	9.00PM	WG
5TH	FRI	ARCADIA	LAUTOKA@	CRUISE	7.30AM	6.00PM	USS
14TH	SUN	FEDOR SHALYAPIN	LAUTOKA@	CRUISE	10.00AM	8.00PM	BP
15TH	MON	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	6.00PM	BP
15TH	MON	FAIRSTAR	LAUTOKA@	CRUISE	7.00AM	7.00PM	BP
16/17TH	TUE/WED	FAIRSTAR	SUVA	CRUISE	7.00AM	7.00PM	BP
18/19TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	6.00PM	BP
20TH	SAT	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
21ST	SUN	ARCADIA	LAUTOKA@	CRUISE	7.00AM	5.00PM	USS

S E P T E M B E R

01/2ND	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	7.00PM	BP
02/3RD	FRI/SAT	FEDOR SHALYAPIN	SUVA	CRUISE	4.00PM	MIDNIGHT	BP
2ND	FRI	ARCADIA	LAUTOKA@	CRUISE	7.30AM	11.00PM	USS
3RD	SAT	FAIRSKY	LAUTOKA@	CRUISE	7.00AM	6.00PM	BP
3RD	SAT	ARCADIA	SUVA	CRUISE	8.00AM	11.59PM	USS
13/14TH	TUE /WED	FAIRSTAR	SUVA	CRUISE	7.00AM	12NOON	BP
15/16TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	6.00PM	BP
20TH	TUE	ARCADIA	SUVA	CRUISE	8.00AM	6.00PM	USS
21ST	WED	FEDOR SHALYAPIN	LAUTOKA@	CRUISE	10.00AM	8.00PM	BP
29/30TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	7.00PM	BP

O C T O B E R

1ST	SAT	FAIRSKY	SUVA	CRUISE	7.00AM	6.00PM	BP
1ST	SUN	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
2ND	SUN	ARCADIA	LAUTOKA@	CRUISE	7.30AM	5.00PM	USS
05/6TH	WED/THU	FEDOR SHALYAPIN	SUVA	CRUISE	8.00AM	12NOON	BP
06/7TH	THU/FRI	FAIRSTAR	SUVA	CRUISE	7.00AM	12NOON	BP
11TH	FRI	ARCADIA	SUVA	CRUISE	8.00AM	6.00PM	USS
13/14TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	6.00PM	BP
15TH	SAT	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
16TH	SUN	ARCADIA	LAUTOKA@	CRUISE	7.30AM	5.00PM	USS

Continued.....

DATE	DAY	SHIP	PORT	MOVEMENT	ARRIVAL	DEPARTURE	AGENT
OCTOBER(cont...							
27/28TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	7.00PM	BP
29TH	SAT	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	6.00PM	BP
NOVEMBER							
10/11TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	6.00PM	BP
22ND	TUE	ARCADIA	LAUTOKA°	CRUISE	7.30AM	11.00PM	
22ND	TUE	ELLINIS	SUVA	CRUISE	8.00AM	11.59PM	WG
23RD	WED	ARCADIA	SUVA	CRUISE	8.00AM	6.00PM	USS
23RD	WED	ELLINIS	LAUTOKA°	CRUISE	9.00AM	10.00PM	WG
24/25TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	7.00PM	BP
26TH	SAT	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	6.00PM	BP
DECEMBER							
4TH	SUN	FAIRSTAR	LAUTOKA°	CRUISE	10.00AM	7.00PM	BP
5TH	MON	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP
5TH	MON	ARCADIA	SUVA	CRUISE	8.00AM	6.00PM	USS
08/9TH	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00AM	6.00PM	BP
10TH	SAT	ELLINIS	SUVA	CRUISE	9.00AM	9.00PM	WG
18TH	SUN	ARCADIA	SUVA	CRUISE	8.00AM	6.00PM	USS
20TH	TUE	FAIRSTAR	LAUTOKA°	CRUISE	7.00AM	7.00PM	BP
21ST	WED	FAIRSTAR	SUVA	CRUISE	7.00AM	11.00PM	BP
22/23RD	THU/FRI	FAIRSKY	SUVA	CRUISE	6.00PM	7.00PM	BP
24TH	SAT	FAIRSKY	LAUTOKA°	CRUISE	7.00AM	6.00PM	BP
26/27TH	MON/TUE	ORIANA	SUVA	CRUISE	5.00PM	6.00PM	USS
26TH	MON	ELLINIS	SUVA	CRUISE	7.00AM	6.00PM	WG
30TH	TUE	AUSTRALIS	LAUTOKA°	CRUISE	7.00AM	9.00PM	WG
30TH	FRI	ARCADIA	SUVA	CRUISE	8.00AM	11.00PM	USS
31ST	SAT	ARCADIA	LAUTOKA°	CRUISE	8.00AM	11.00PM	USS
31ST	SAT	AUSTRALIS	SUVA	CRUISE	8.00AM	8.00PM	WG

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In reply, please quote PRO 84/10/1

PLEASE ADDRESS REPLY TO
THE SECRETARY-GENERAL

9 February 1977

Mr George H. Balazs
Jr Marine Biologist
Hawaii Institute of Marine Biology
University of Hawaii
Coconut Island
P.O. Box 1346
KANEOHE.
Hawaii. 96744

Dear Mr Balazs,

I have pleasure in enclosing a cheque for US$467.64 covering your subsistence and consultant allowances for your assignment with the Commission.

2. The original of the enclosed travel claim should be signed and returned to us. The carbon copy if for your retention.

3. Any extra expenses such as taxi fares (over $0.50), insurance policy, airport tax, should be claimed on termination of the assignment.

I wish you a pleasant journey to Fiji and the Cook Islands.

Yours sincerely,

S. Exbroyat (Miss)
Conference/Travel Officer

Encl.

SOUTH PACIFIC COMMISSION

TRAVEL CLAIM

TO : Secretary-General
South Pacific Commission
P.O. Box D5
NOUMEA CEDEX
NEW CALEDONIA

FROM : Mr G. Balazs . . . . . .

In respect of my ~~attendance~~ expertise advise on SPC Turtle . . . . projects . . . . . I set out hereunder details of my travel itinerary and would be pleased if you would credit me with allowances as per arrangements set out in . . . . . .

PLACES	Arrival		Departure		Office use only	
	Date	Time	Date	Time	Rate	Amount
Suva	22/2/77		28/2/77		6d.xA$23	138
Rarotonga	27/2/77		7/3/77		8d.xA$24	192
Nandi	8/3/77		9/3/77		1d.xA$23	23
Consultant allowance	21/2/77		9/3/77		16d.xA$5	80
						A$433
						US$ 467.60

. . . . . .
(Signature)

. . . . . .
(Date)

224/74

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Winchester, R. V.

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Leaf amino acids in Psidium guajava.

N.Z. J. Sci. 18 : 237 : 1975.

PEACESAT Sea Turtles

Manoa: George Balazs, John Hall, Ernest Ross

Suva: John Ackerman, Subadra Ramaiya

QUESTIONS FROM SUVA:

1. What important sea turtles are found in Hawaii?
2. Nesting grounds? (Hawaii and Pacific in General)
3. What characteristics are necessary? (reference article by J.J.Parsons)
4. Any definite nesting season? (data for Pacific area?)
   Are there differences north and south of the equator?
5. Are turtles eaten by man in Hawaii? What is local demand?
6. Are turtle eggs eaten and what is demand?
7. Do you have turtle hatcheries in Hawaii? How do they operate? Are the young released to sea as wild stock? How large when this happens?
8. Are there rookeries or ranches raising turtles to market size in Hawaii
9. What predations important in Hawaii?
10. Do some local people regard turtles as sacred?
11. What types of legislation concerning turtles?
12. What is the attitude of local people towards protection?

Peter Holness
Fisheries Division
Dept. of Agriculture
Fiji

Meldrum
Robert A Stone
Fisheries officer
c/- International student Affairs office
4 Toft Hall
Univ. R.I.
Kingston, R.I. 02881

Vatuvia Road
Lami, Suva, Fiji

January 4, 1974

Dr. R. H. Baird
Fisheries Officer
South Pacific Commission
Post Box D. 5
Noumea Cedex
New Caledonia

Dear Dr. Baird:

Many thanks for your letter of December 19th in reference to green turtle nutrition studies and captive culture. I was pleased to learn that SPC has limited its activities to University level experiments and low keyed native projects similar to the Torres Straits work. I have been in contact with Dr. Bustard, however have not yet discussed the successes or failures of his venture.

I am in strong agreement with Carr, Ehrenfeld and others who feel that premature large scale commercial farms will do nothing but hasten the green turtle down the road to extinction. In my opinion sea turtles belong to the indigenous peoples of where they occur and not to the consumer of high priced luxury items in the more developed countries.

As you are aware, the animals true value rests in its ability to convert marine plants and algae into edible protein. Our work here in Hawaii is presently aimed at evaluating the growth promoting abilities of land roughages. Coconut meal, obtained from Philippe Siu in Tahiti, has been used in several trials, however it appears that yearlings are not able to handle in excess of 30% (meal-21% C. protein) in their diets.

Further work is of course required for different life stages. Our work also includes diets consisting of tilapia meal, sun dried koa haole (Leucaena leucocephala) duck weed (Lemn minor), and Sudex (a cross between sorghum and sudan grass). Tests will be run with several levels of sugar cane waste, however this will probably be a poor feed ingredient for turtles. The utilization of high levels

of a single ingredient is always a problem therefore corn, soybean meal and high quality fish meal are often included in the diets out of necessity. I should emphasize that although we have well constructed floating pens that allow up to ten duplicate treatments per experiment, progress has been slower than originally predicted due to the limited availability of funds for student assistants.

No formal reports have been prepared on the turtle nutrition studies however as they become available I will forward copies. I have enclosed several papers on other aspects of my work which you may find interesting. I look forward to a continuing exchange of information as I am greatly interested in Pacific sea turtle populations.

Sincerely,

George H. Balazs
Jr. Marine Biologist

GHB:ah

encs

December 11, 1973

Dr, Uday Raj
The University of the South Pacific
P. O. Box 1168
Suva, FIJI

Dear Dr. Raj:

John Ackerman has written me of your interests in marine turtle nutrition studies in Fiji. Hopefully John will contact me during his visit to Hawaii so that he will have the opportunity to tour our Institute and learn of my nutrition work on the green turtle (Chelonia sp.) and Hawksbill (Eretmochelys sp.). For the past two years I have conducted research on the captive rearing of marine turtles here in Hawaii. In particular, this work has dealt with attempting to determine nutritional requirements using compounded water stable diets prepared from common feed ingredients. I have also been greatly concerned with the life history and conservation of Pacific populations of marine turtles. During June and July of this year an intensive survey of the green turtle breeding colony at French Frigate Shoals, Northwestern Hawaiian Islands was conducted. As you may be aware, this is the only nesting site of any consequence left in the entire Hawaiian Archipelago. Attempts are now underway to obtain protection for these reptiles around our eight major inhabited Islands as they are presently very much exploited for commercial purposes.

I look forward to hearing from you and hearing of your planned research.

Sincerely,

George H. Balazs
Jr, Marine Biologist

cc: J. Bardach, Director HIMB
South Pacific Commission
BPD 5
Noumea CEDEX
New Caledonia

GHB:bd

YAQONA

Kava, or yaqona, is Fiji's National drink. It is made from the root of a plant called Piper methysticum, which is a species of pepper. The most common type is about 12 feet high with pale green heart shaped leaves and black, knobby stems. In the villages the root is dried, chopped into small pieces and placed in a cylindrical container. It is then pounded into powder (a similar action to dollying gold). Already prepared grog can be bought by the pound in the market. The powder is put in a butter-muslin bag and this is squeezed in a container full of water until all the "goodness" has dessolved. The traditional container is a wooden bowl, or tanoa, made from vesi wood. Nowadays an enamel or plastic basin is just as likely to be used. The yaqona is served in a half-coconut shell, or bilo, and should be quaffed without pause. The mixed yaqona looks like milk coffee, with a slightly pungent taste. It leaves the inside of the mouth with a slightly numb feeling. If the root is chewed, like betel nut, the numbing affect is stronger. Yaqona is non-alocholic, but produces a feeling of placid tranquility, even sleeping in some cases, and a slowing down of general nervous activity.

Yaqona is supposed to be good for kidneys, but that is probably because it is mixed with water and great quantities are drunk. Some say it makes the drinker sweat more profusely. It's most harmful effect is on the skin. If it is drunk regularly, say each night between 5p.m. and midnight, and in quantity, as much as 12 pints in an evening then a skin complaint known as "kani" develops. The skin all over the body becomes patchy and scaley. It is thought that the excess yaqona inhibits the absorption of vitamins, and so actually "kani" is a vitamin deficiency.

Some say that yaqona effects the legs, but it is more probable that sitting cross legged for many hours causes the shakiness and numbness.

The kava ceremony is an intergral part of the national life. It is the traditional form of welcome.

Usually the guests are seated on one side of the bowl, with the cowrie shells and magimagi rope pointed towards the main guest. The welcoming party sits opposite. The "grog" is mixed and speech made. Then the cup bearer offers a drink to each individual in turn, according to rank and protocol. A full ceremony, such as that staged for the Queen, is much more complicated.

If you are the guest at a Fijian yaqona ceremony it is one of the highest honours that the people can afford you. But grog is also served during tea breaks, and as a thirst quencher at dances and festivals.

Our attendant, Isoa (from the biblical Isau) Toribau, served yaqona to visitors at Government House for ten years before he came to the Fiji Museum. He is happy to give you a chance to try yaqona for yourself.

FIJI MUSEUM.

SPC/Fisheries 9/WP.24
17 January 1977
ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION

NINTH REGIONAL TECHNICAL MEETING ON FISHERIES
(Noumea, New Caledonia, 24 - 28 January 1977)

TURTLE FARMING FOR THE SOUTH PACIFIC

by

Dr. U. Raj
The University of the South Pacific,
Suva, Fiji.

1. Turtle farming concept has been interpreted in several ways, particularly in relation to the SPC Project. A true turtle farm must include a breeding stock of turtles; that is, not relying on wild population for eggs or young hatchlings for rearing in captivity. Until now, turtle rearing activity in the South Pacific and throughout the world (except in Grand Cayman) has been dependent on a supply of eggs and hatchlings from the nesting beaches of the wild. In this regard the practice has been one of turtle ranching rather than turtle farming. Also, when discussing turtle farming, it must be clearly understood whether the venture is of a commercial scale or a village-level subsistence activity. Again, there appears to be some confusion over this issue in relation to the SPC Project.

2. Reviewing the turtle farming/turtle ranching activities of various organisations and isolated populations of oceanic peoples around the world, one is led to conclude that nearly all efforts have been directed towards ranching turtles on small, non-commercial scales. However, attempts are now being made to systematize utilisation of the turtle resource in various places. For example, in Australia, the Government organisation, Ecology Property Limited, is now largely involved with research and support for the aboriginal population of the Torres Strait in the utilisation of marine turtles. Similarly, Government agencies in the Middle East, Papua New Guinea and the Caribbean are in the process of formulating policies, through research, to realise the full potential of the marine turtle. The only turtle farm now operating on a commercial scale, exists on the Grand Cayman Island in the West Indies.

3. In the South Pacific it is clearly evident that scientific information on the turtle resource is meagre in spite of the traditional place of this animal in the Oceanic societies. Two general reviews on South Pacific Islands marine turtle resources have been published by Hirth (1971) and Hendrickson (1972) respectively. Subsequent to these reports, no other reviews have appeared. At the 7th Technical Meeting on Fisheries, held in Tonga in 1974, it was agreed that information on marine turtles should be forwarded by the fisheries agencies of each country to SPC/USP in order to centralise data and enable periodic

reviews on this resource. It was also recommended that the SPC project should permit visits to interested territories for consultation. Apart from Tonga, no other country forwarded any information on turtles and except for a visit to Cook Islands, where the turtle project is based, wider consultation on marine turtle resource of the South Pacific has not been achieved. In order to provide a worthwhile review on this resource it is absolutely essential that up-to-date information is gathered and processed centrally for distribution.

4. From the little data available, it appears that the South Pacific Islands do not have enormous breeding colonies of turtles. Five species of marine turtles have been recorded from the South Pacific. These are *Chelonia mydas* (green turtle), *Eretmochelys imbricata* (hawksbill turtle), *Caretta caretta* (logger head turtle), *Lepidochelys olivacea* (Pacific ridley) and *Dermochelys coriacea* leatherback turtle). Amongst these, the green turtle and the hawksbill turtle are the commonest but the other species are rarely encountered. Although these two species nest widely in the South Pacific, the numbers of individuals visiting the nesting sites are not very large compared to those in Northern and North-East Australian islands or in the Caribbean. For this reason alone, utilisation of wild eggs and hatchlings must be viewed with care. Therefore, the most logical approach appears to be to establish a breeding colony of turtles. Experience shows that the green turtle is the most profitable choice. It grows faster and produces more likeable flesh than the hawksbill. Also, it is a herbivorous species whereas the hawksbill clearly prefers animal flesh for food.

5. The technique of breeding the green turtle in captivity has been evolved in the Grand Cayman Island (see Simon, Ulrich and Parkes, 1975). It therefore seems worthwhile to learn this technique and apply it in our own situation in the South Pacific. The main effort will be to set up a breeding pool and to stock it with adult turtles. The breeding pool on the mariculture farm in the Grand Cayman Island is 200' (60.5 m) x 86' (26.5 m) with an area of about 0.4 acres (< 0.2 ha). It is about 10' (3.1 m) deep on one end and shelves up to an artificial beach about 35' (10 m) on the other side. The capacity of this pool is quoted as 0.75 million gallons of seawater and the rate of change is given as 18 changes per day. The cost of construction and proper maintenance of such a pool located on a South Pacific Island would appear, at first sight, to be expensive, but by utilising some natural beaches and shores to enable natural flushing at each tide, the task can be accomplished with ease and relatively cheaply. The capture of breeding females can be carried out during a nesting season but the capture of mature males which normally do not come up on the beaches may prove difficult, although not impossible. Indeed, the experience in the Cayman Island shows that it is almost necessary to introduce wild males in the breeding pool to induce courtship and mating, otherwise males and females co-habiting the pool become too familiar with each other to mate. It is possible that in the near future frozen sperms may be obtainable from the Cayman farm for artificial insemination. In any case, an early personal contact, preferably on site, with mariculture personnel in the Cayman would be most advantageous. Thus, by actually producing farmed eggs and hatchlings we can ensure that the wild population is not in any danger of depletion, should turtle farming become a reality. Indeed, by releasing

a percentage of farm-produced hatchlings we can help conserve and increase the wild population. It is therefore recommended that research effort must be directed to actually breeding turtles in captivity, not only from egg stage but inducing mating and egg laying in artificial situations.

6. The South Pacific Commission's own research programme on turtles has contributed to greater success rate in incubation and hatching in artificial situations (see Raj, 1976). According to our own studies, the hatching and emergence rates of about 100% are possible compared to about 50%, respectively, in nature. From these figures it is apparent that by doubling the hatching success of wild eggs one can remove 50% of the hatchlings for artificial rearing and allow the same number of young to enter wild population.

7. Rearing the hatchlings in artificial ponds and fenced areas of sea has been widely practised in the South Pacific. Nevertheless, the stocking and feeding rates have been very variable. Our own research indicates that there is an optimum stocking rate. The stocking rate depends on the quality of pond water, size of hatchlings and availability of food. Increase in density of individuals leads to constant biting, not unlike pecking in chickens. Also the constant rate of renewal of pond water or treatment of standing water is essential to avoid fungal infection, particularly in hatchlings up to a year in age. The fungal infection responds to treatment by 1% of potassium permanganate. The other common problem encountered in the rearing of hatchlings is *Pseudomonas* infection, particularly in ponds with depressed salinities. The most effective cure is Chloromycetin given orally, in solution. However, unless the pond is flushed and cleared of *Pseudomonas*, this infection is persistent and usually fatal. Therefore, research on the disease problems and search for effective cures must continue. It is pertinent to note here that the Cayman farm is also experiencing widespread fungal and bacterial infections amongst the hatchlings (personal communication).

8. Research on diet of green turtles has been extensive. The composition of an artificially prepared and a good balanced diet has been published by Simon, Ulrich and Parkes, 1975 (see appendix). Manufacture of such a feed on small scale appears expensive and inappropriate. We must continue to evolve a diet similar to this but from inexpensive regional food sources. In this regard, research must be encouraged on further analysis of the natural foods of green turtles in the South Pacific (example, *Syringodium isoetifolium, Halodule uninervis, Halophila ovalis, Deplanthera wrighti , Thallasia testidunum, Caulerpa* spp.). Also, a blend of other possible sources of food, example, coconuts, mangrove leaves, tropical fruits and succulent plants must be investigated as alternate diet. From the increasing demand for fish for human consumption and the rising costs of fish capture, it would appear uneconomical to feed turtles largely on fish, although some form of animal protein, such as fish meal, may well be used as supplementary diet.

9. If a true turtle farm is established in the South Pacific it is most likely that the first individuals will take at least two to three years to breed. It is well-known that mature females breed only every second or third year. Therefore, husbandry of adults and

sub-adults must be understood. In this regard, stocking rate and hygiene will form the main areas of study. A substantial part of this information may be obtained from the Mariculture Farm.

10. In conclusion, it would seem most appropriate to concentrate research efforts on establishing a breeding colony of green turtles for the South Pacific. It is quite feasible that this will become a central agency in supplying farm eggs and hatchlings to all interested Island territories. Research must continue on the diet and disease problems of rearing hatchlings and sub-adults. At the same time an up-to-date review of the turtle resource of the South Pacific is required, while a study of the supply and demand of turtle and turtle produce, locally and overseas, will prove valuable. Island governments of the region must formulate a joint and effective policy, possibly through similar legislations, to govern the turtle resource of the South Pacific.

APPENDIX

COMPOSITION OF GREEN TURTLE DIET

GENERAL

Moisture content	8.6%
Crude protein	40.6%
Ether extract	6.3%
Crude fibre	5.86%
Ash	13.27%
Nitrogen - free extract, by difference	25.4%

ESSENTIAL AMINO ACIDS

Lysine	1.85
Histidine	0.732
Arginine	2.03
Valine	1.67
Methionine	0.59
Iso-leucine	1.44
Leucine	2.62
Phenylalanine	2.48
Tryptophane	0.18
Threonine	

FATTY ACIDS

	(mg/%)
Saturated	
Palmitic (C 16)	24.4
Stearic (C 18)	8.8
Unsaturated	
Palmitoleic (C 16 : 1)	4.5
Oleic (C 18 : 1)	26.7
Linoleic (C 18 : 2)	25.7
Linolenic (C 18 : 3)	3.2
Erucic	1.3
Total fat	10.0% dry wt.

VITAMINS

Vitamin A (i.u./g)	3.1
Vitamin B1 (µg/g)	3.1
Vitamin B2 (µg/g)	28.5
Vitamin B12 (µg/g)	0.038
Vitamin C (mg/100 g)	14.56

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Days 3 and 4 — TUE and WED ... DENARAU BEACH. Early morning arrival in NADI, FIJI. After clearing immigration and customs, you will be met by our representative who will **transfer** you to the **REGENT OF FIJI RESORT** located on Denarau Beach just outside of Nadi. Your room has been pre-registered for your immediate occupancy. The balance of today as well as tomorrow are at leisure. Relax and enjoy the Regent's private beach, fresh water swimming pool with its unique swim-up bar or a game of tennis at the adjoining John Newcombe Tennis Club! For those who wish, tours into the highlands can be arranged. Wednesday evening, the hotel features a performance of FIJIAN FIREWALKERS as an optional event.

Days 5 thru 7 — THU thru SAT ... BLUE LAGOON CRUISE. Morning transfer to LAUTOKA, one of Fiji's major sea ports, where you will board your cruise vessel for an unforgettable experience aboard a **BLUE LAGOON CRUISE,** through the Yasawa Islands. You'll explore a tiny corner of the world untouched by time and tourism. Days of luxury and relaxation are ahead of you to enjoy limitless blue sky, white sandy beaches, unspoiled villages and palm-fringed lagoons. Your Fijian crew offers first-class service and entertainment. Living aboard is relaxed, casual and very Fijian! All cabins are air-conditioned with private facilities and shower. **All meals are included as well as nightly entertainment, dancing and special on shore Fijian 'Lovo' dinners.** Saturday afternoon you will return to Lautoka where your transfer service will be waiting to take you back to the Regent of Fiji Resort for the night.

Days 8 thru 10 — SUN thru TUES ... CORAL COAST. Mid-morning departure via the Coral Coast Express, air conditioned deluxe motorcoach, for the drive down the Queen's Road, along the Coral Coast. Arrive at the beautiful, new **HYATT REGENCY.** This resort, newest of the Hyatt Regency family, will be **your home for the next three nights.** Located on a three mile white sand beach, with its own private island just off shore, you can relax and let time slip by as you enjoy the tropical atmosphere. Hotel facilities include a 9 hole golf course, lighted tennis courts for night playing, fresh water swimming pool, horseback riding and excursions to nearby native villages. Enjoy a light meal in the informal coffee shop or dine at Hugo's Restaurant, known world-wide as an outstanding Hyatt Regency feature.

Day 11 WED ... SUVA. Afternoon departure from the Hyatt Regency **aboard the Coral Coast Express** for the drive through the hills and rainforest to **SUVA,** Fiji's capital city. Accommodations at the **SUVA TRAVELODGE.**

Days 12 thru 14 — THU thru SAT ... TOBERUA ISLAND. This morning you will be transferred to Nakelo Landing on the banks of the Rewa River. **Board your motor-launch** for the hour's journey **to TOBERUA ISLAND.** Before yor reach the open sea, you'll pass Fijian villages on the banks of the river ... keep your camera ready! Stepping from the boat onto the sunny sands of Toberua, you'll get the distinct impression that the Fijians who sing you welcome are genuinely pleased to see you ... and you're right, they are! Accommodations will be in your own personal bure with a living/sleeping area and private facilities. The unusual aspect of these bures is the construction of the walls in traditional woven mats — an art which has been passed from father to son for centuries. You stay on **TOBERUA ISLAND for three nights, with meals included.**

During your stay on this beautiful 4 acre island, you can just relax and enjoy the serene beauty, or, if you feel like doing other things you can select from reef fishing and coral viewing in the glass bottomed boat, snorkelling, a visit to nearby Bird Island, visit a traditional Fijian village, go sailing in the takia, water skiing, collect incredibly fine shells, share in the experience of a native 'fish drive' or meke, join in the fun of a lovo or feast night, scuba dive or enjoy a swim in the pool. The evenings are filled with the gentle music of the native Fijians singing and strumming their guitars as you enjoy the tropical sunset and dinner especially prepared from your request earlier in the day.

FIJI—LOS ANGELES

Day 15 SUN ... Bid farewell to this island paradise and **return to SUVA** where you will **board your flight back to NADI** this afternoon. Upon arrival in Nadi, you will be met and transferred to the **MOCAMBO HOTEL** where a room has been reserved for you. Late **this evening, transfer** to the Nadi International Airport **for departure on AIR NEW ZEALAND'S Jet Service** home. Cross the International Dateline and gain back the day lost on our outbound flight. Arrive in **LOS ANGELES early this evening** with connections to your home town.

TOTAL TOUR COSTS

Land Arrangements	
Per Person Sharing	$725.00
Single Room Supplement	$455.00
Air Fares-Los Angeles/Los Angeles	
Group Air Fare-Low Season-March/June	$550.00
Group Air Fare-High Season-July/Feb	$700.00

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- All Transfers
- Coral Coast Express
- Motor Launch Between Islands

LOS ANGELES—FIJI

Day 1 SUN ... Departures every Sunday evening aboard **AIR NEW ZEALAND'S Jet Service** to the **"Fantastic Fiji Islands."**

Day 2 MON ... Cross the **International Dateline** and lose this day. You will gain it back on your return flight home.

Days 3 and 4 — TUE and WED ... DENARAU BEACH. Early morning arrival in NADI, FIJI. After clearing immigration and customs, you will be met by our representative who will transfer you to the **REGENT OF FIJI RESORT** located on nearby Denarau Beach. Your room has been pre-registered for your immediate occupancy. The balance of today as well as tomorrow are at leisure. Relax and enjoy the Regent's private beach, fresh water swimming pool with its unique swim-up bar or a game of tennis at the adjoining John Newcombe Tennis Club! For those who wish, tours into the highlands can be arranged. On Wednesday evenings, the hotel features a performance of the famous FIJIAN FIRE-WALKERS as an optional activity.

Days 5 thru 7—THUR thru SAT ... MANA ISLAND. Morning departure via motorcoach for the short **drive to LAUTOKA,** one of Fiji's main ports. Here you will board your motor-launch for the excursion to **MANA ISLAND, your home for the next three days.** Mana Island is an unspoiled tropical playground, isolated from crowds and the outside world. Accommodations are in the comfortable private "bure" with king size beds, private baths and all the modern facilities. On Mana, you can relax on the beautiful white sand beaches and/or enjoy the many water activities including sailing in the reef protected lagoons, snorkelling, canoeing and water skiing. The resort's facilities include a lovely open air restaurant and two cocktail lounges from which you can relax and watch a glorious South Pacific sunset.

OPTIONAL BLUE LAGOON CRUISE

For those who wish, in place of Mana Island, for a supplement of $125. you can enjoy a 3 day 2 night cruise through the beautiful Yasawa Islands. You will board your cruise vessel in Lautoka on Thursday, Day 5, and begin your exploration of a tiny corner of the world untouched by time and tourism. Your Fijian crew offers first-class service and entertainment. Living aboard is relaxed, casual and very Fijian! All cabins are air-conditioned with private facilities and shower. All meals are included as well as nightly entertainment, dancing and special on shore Fijian 'Lovo' dinners. Saturday, Day 7, return to Lautoka where you will be met and transferred back to the Regent of Fiji Hotel for the night. Single supplement $128.

Day 8 SUN ... Return to Nadi and the REGENT OF FIJI Resort Hotel for the night.

Days 9 thru 12 — MON thru THU ... CIRCLE ISLAND TOUR. Depart the Regent Hotel this morning aboard your deluxe air-conditioned motorcoach for your **Circle Island Tour** of **Viti Levu Island.** Drive northward through Lautoka where you will join the Kings Road as you head for the town of Ba. Drive through the rich cane fields to the Ba Gap for a panoramic view of the coastline and reefs. On the road from Ba to Tavua you will see the Indian women in their colorful saris and the delightful Fijian children going to school. On reaching Tavua, a detour will be made to the Vatukoula Goldmines, a substantial export earner for Fiji. The first day ends at **Raki Raki** with accommodations at the **Raki Raki Hotel,** one of Fiji's oldest established country hotels which has retained a family atmosphere and prides itself on home cooking.

Tuesday morning, the drive continues along the Kings Road to Viti Levu Bay, one of the prettiest on the coast. Continue on to Wainbuka Gorge where for 20 miles you travel through picturesque countryside with rapids on one side and Fijian farms on the other. Descend into the Tailevu plains, rich dairy farming country then on to Nausori, an old sugar town. Late morning arrival in Suva. **Enjoy two nights in Suva at the Courtesy Inn.** Included in the tour is a **half-day city sightseeing excursion of this capital city** visiting the Fiji Museum, Botanical Gardens, and Tamavua Ridge for a panoramic view of the city and harbor. Wednesday is at leisure for independent activities. Optional tours to Orchid Island or the Coral Sea Cruise can be arranged through your hostess.

Thursday morning depart Suva aboard your air-conditioned motorcoach for the drive along the Queen's Road through the hills and rainforest to the beautiful Coral Coast. **Mid-day arrival at the HYATT REGENCY HOTEL** which will be your home for the next three nights.

Days 13 and 14 — FRI and SAT ... CORAL COAST. The **HYATT REGENCY RESORT** is the newest in the Hyatt Regency family and has everything one would expect for a Deluxe Resort. Located on a three mile white sand beach, with its own private island just off shore, you can relax and let time slip by as you enjoy the tropical atmosphere. For those who wish more action, the hotel does have a 9 hole golf course, lighted tennis courts for night playing, fresh water swimming pool, horseback riding and excursions to nearby villages and off shore islands. For your comfort and dining pleasure, you will find an informal coffee shop, the elegant Hugo's Restaurant, several cocktail lounges and a disco.

FIJI—LOS ANGELES

Day 15 SUN ... Depart the Hyatt Regency just after lunch today for the return drive, **via the Coral Coast Express,** to Nadi where **a room has been reserved for you at the MOCAMBO HOTEL.** Late this evening, you will be transferred to the Nadi International Airport for departure aboard **AIR NEW ZEALAND'S Jet Service** back to Los Angeles. Enroute, cross the International Dateline and gain back the day you lost on your outbound flight. **Arrive in LOS ANGELES early this evening** where you can connect to your flight back home.

TOTAL TOUR COSTS

Land Arrangements	
Per Person Sharing	$580.00
Single Room Supplement	$280.00
Air Fares-Los Angeles/Los Angeles	
Group Air Fare-Low Season-March/June	$550.00
Group Air Fare-High Season-July/Feb	$770.00

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii, 96812

28 July 1980

Dear Ms. Preston:

Mark Gentle asked me to provide comments on the draft "Turtle Data Sheet" for Fijian markets. First, let me say that I think this is a superb idea and I will be very happy to provide you with whatever assistance you may request. My suggestions on the draft sheet (attached) are as follows:

1. The "overlapping scales" on the shell of the hawksbill is very distinct in small animals, but disappears somewhat in the adults. This could be confusing, therefore I recommend that the question be dropped from the data sheet.
2. The length of the front flipper would probably not be a very useful measurement because, few, if any, other researchers have recorded this - there would be no basis for comparison.
3. The length of the tail should be measured from the end of the plastron (belly plate).

The presence of eggs should be recorded.

The head width, rather than length, should be recorded. However, this will be the most useful if it can be measured with calipers for straight line distance. A curved measurement over the top will only be of limited value for comparative purposes because other researchers have taken straight line.

(OVER)

6. The general location of capture would be exceedingly valuable, if the fisherman would give this information.

7. The name of the fisherman would be also be worthwhile so that interviews can be carried out at a later date.

8. The Fijian name for "other species" should be requested.

There are, of course, other data that could be recorded, but I am assuming that you would not want the sheet to become too long and troublesome to fill out.

Sincerely,

George H. Balazs

cc M. Guinea - USP

PS I wonder if the decline in total catch from 1977 - 1979 actually represents a decline in the Fiji turtle population?

MINISTRY OF AGRICULTURE
AND FISHERIES

TEL. NO
361122

PO Box 358, Suva, Fiji

REF. NO. 3414/7

DATE

6th August, 1980

Mr G H Balazs
National Marine Fisheries Service
Southwest Fisheries Centre
Honolulu Laboratory
PO Box 3830
Honolulu
Hawaii 96812

Dear Mr Balazs,

Many thanks for your letter of 28th July in which you offer some helpful advice concerning the 'Turtle Data Sheet' designed by Mark Gentle. As Mark has now left Fiji, I have been unable to discover exactly how he represented the aims or methods of the proposed project to you but I think I should explain a couple of points which are likely to severely restrict the amount of useful information we can gather.

Currently, Fisheries Division staff monitor all of Fiji's municipal markets and most unofficial markets, retail outlets, etc in order to assess the quantities and types of marine products being offered for sale. Important markets are visited more frequently than minor ones and during a visit, every Fisherman who brings his produce to the market has his catch weighed by species or type and, if time permits, is interviewed as to his fishing locality, method etc. From this information we extrapolate to find annual production and try to discover significant changes or trends in the pattern of sales, species composition, cpue, etc.

The collection of specific turtle data would need to be tied in to this work. Up to now, the category 'turtles' has been adequate for our purposes and the only information collected has been the total weight of the animals brought through the market. This is not only for convenience but largely a matter of necessity: turtles are seldom brought as whole animals, being dismembered to varying degrees at some time before delivery. Shells have often been sold to collectors or tourists previously: belly plates are frequently brought along to serve as trays for the meat but are not usually attached to any other bits. Nor is it possible, when a fisherman brings in more than one animal (which is quite

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greatest head width

..2//

Information concerning capture method, locality, etc is easy enough to gather: the name of the fisherman is also available but we do try to allow people to remain anonymous as often as possible. Cooperation on the part of the Fisherman is extremely important and if he feels that permanent records of his activities are being kept, suspicion tends to arise that the information is for tax or law enforcement purposes. It would in any case be of doubtful value as it is unlikely that a fisherman will be able to recall specific details of the capture of an individual turtle at some later date.

Our market survey staff are currently attempting a 'pilot' collection of data just to see what problems are likely to be encountered: we will await your further comments before finalising the format of the procedure.

Your suggestion of a regional turtle newsletter is warmly welcomed here; it would be of great interest to us to be kept informed of activities in other parts of the region and could well serve as a vehicle for the development of overall data collection and stock evaluation.

Looking forward to hearing from you.

Yours sincerely,

Gary Preston

G. L. Preston
for: Chief Fisheries Officer
for: Permanent Secretary for Agric & Fisheries

The happy couple in Fiji's wedding of the year. Photo: AAP.

Married: In Fiji's "wedding of the decade" uniting two of the country's noblest families, **Ratu Epinisa Cakobau** and **Adi Frances Loloma.**

The wedding took place on Bau, the traditional home of Fiji's paramount chiefs. The bridegroom, a 26-year-old civil servant, bears one of the most famous names in South Pacific history and is the eldest son of paramount chief and former governor-general **Ratu Sir George Cakobau** by his second marriage.

The bride, 23, is third of six daughters of **Ratu Josaia Loloma** of the island of Batiki.

More than 1,000 official guests (and several hundred unofficial ones) made their way to Bau by motor canoe.

A fleet of more than 20 of the "water taxis" were on stand-by on the wedding day earning up to A$260 apiece for their owners which resulted in a boatmen's party later. It was reported to have outlasted the official one.

Up to a dozen dignitaries, perspiring in suits and ties, crammed into each of the tiny, leaking canoes for the rocky 12-minute voyage from the mainland.

The official guests included the governor-general, prime minister, ambassadors, high commissioners and a veritable Who's Who of Fiji society.

The 45-minute service was traditional Wesleyan and was conducted wholly in Fijian. The stone and brick church on Bau seats only about 500 and many guests sat outside on chairs and mats to hear the service relayed by loudspeaker.

Later, the official guests sat down to a wedding feast for which five cattle, eight turtles, 12 pigs, 150 chickens, 150 crabs and about 300 fish were cooked in a "lovo".

The 24-dish meal was washed down by bottles of Australian white wine.

However, the feast was staid compared with the eve-of-wedding party on Bau when the island rocked to the boisterous singing of the Bau and Batiki clans each trying to outdo the other.

The ceremony of *Tevuteuu* or the giving of wedding gifts by the bride's and groom's families, preceded the party.

The result was three Bau buildings filled with a vast variety of gifts, enough to last the happy couple a lifetime on their return from a honeymoon in Australia, New Zealand and Hawaii. — *Jim Shrimpton, AAP.*

Appointed: Secretary-general of the SPC, **Palauni M Tuiasosopo** for many years assistant to the American Samoa governors.

Tuiasosopo was a contender for the secretary-general's position in 1971 but lost out when **Fred Betham** of Western Samoa and **Oala Oala Rarua** of PNG tied in the voting.

Rarua later withdrew in favour of Betham. Tuiasosopo has had a long association with the SPC as American Samoan delegate.

Installed: As chief of Ulawa, Solomon Islands Governor-General **Sir Baddeley Devesi.**

The ceremony took place on the last day of Sir Baddeley's tour of the islands of Makira and Ulawa.

Training: As a sumo wrestler in Japan, Tongan-American **John Fele'unga.**

He is known in Inazawa by his sumo name, Takamioo. Fele'unga, from Hawaii, is the son of **Semisi Fele'unga** formerly of Vaotu'u.

His interest in sumo came from watching it on television in Honolulu. However, he did not know he would have to undergo the initiation rite of *matawari* in which apprentice wrestlers must sit with their legs wide

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

September 5, 1986 F/SWC2:GHB

Mr. Alanieta Niumatasere
Drue
Tavuki
Kadavu, Fiji

Dear Niumatasere,

We were most pleased to read your letter dated August 4, 1986, which just arrived here yesterday. Thank you very much for taking the time to report the capture of one of our tagged sea turtles, Numbers 3504 and 3505. I tagged this animal at Rose Island in American Samoa on November 10, 1980, while it was ashore laying eggs. Rose Island is about 125 miles to the east of Pago Pago. The island is a wildlife refuge for seabirds and sea turtles.

Your recovery of this tagged turtle represents the first such report we have ever received for Rose Island. We are therefore most anxious to hear from you again regarding further information about the turtle, exactly where and how it was captured, and the condition it was in. Your assistance will be most valuable in helping us to learn more about the biology of these interesting and important animals. My questions are as follows:

1. How was the turtle captured? By hand, net, harpoon, or what fishing method?

2. Was the turtle in good health when captured? Did it seem normal, or did it show signs of sickness, disease, or injury?

3. Was the turtle caught in an area where other turtles of this same kind regularly live? What was the turtle doing when captured? Feeding, sleeping, or laying eggs?

4. If the turtle was butchered and cleaned to be eaten, what kind of food material did you find in its stomach?

5. Have you ever heard of anyone else in your area catching a turtle with a tag on it?

I am sorry that it has taken so long for me to respond to you, but your letter to us must have been delayed in the mail. You mailed it to the correct address shown on the tag. However, my current direct mailing address is:

National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822-2396

over

Please write to me at this address, sending your letter by airmail. I have enclosed U.S. $2.00 to cover the cost of your airmail postage. Also, in my next letter, I will be sending you a large color poster showing all the different kinds of sea turtles, as well as several booklets and other literature about sea turtles.

Again, we greatly appreciate receiving your important letter, and anxiously look forward to hearing from you again.

Sincerely,

George H. Balazs
Zoologist

Enclosure

cc: Richard Wass, U.S. Fish and Wildlife Service

GHB:vi

bc: Balazs
HL

Riverside, California Press-Enterprise October 3, 1982

A clear day in clean Fiji town

Around the World

Stan Delaplane

SUVA, Fiji — A bright blue breezy day beside Suva Bay. A little river ran alongside my house into the sea. On the reef, Fijian women netted fish.

Suva is a clean and neat little town. Lawns are trim. Great splashes of hibiscus flowers are everywhere. Shade trees spread giant umbrellas over the roads. A constant cool trade wind rustles the coconut palms.

The open-air market is the shopping center. There are modern supermarkets — but the native market is more fun.

Piles of squirming crabs and lobsters in green baskets woven of coconut fronds. Little piles of shrimp. Banana leaves piled with fish caught fresh this morning.

☆ ☆ ☆

Long ropes of tobacco in neat coils. Five-gallon tins of powdered yagona — the pepper root that makes Fiji's popular kava drink. Great bunches of bananas. Piles of oranges. Chinese cabbage. Spices piled like little sandhills. Brown curry powder. Green and red pepper and coarse-ground salt.

Big woven baskets to carry home the groceries. Straw hats and slippers. Carved bowls from the Lau islands. Dark translucent tortoise shell cut into pins and earrings.

There is a chatter in Fijian and Hindustani. The clank-clank of winches loading the schooners alongside for island ports: Moce and Levuka, Savusavu, Lautoka, and the villages of fire walkers on Bega island.

☆ ☆ ☆

Morning in Suva is the Fijian women far out on the bay, magically walking on water. The reef water is only ankle deep, and the reef is a poor man's supermarket. (Fishing is women's work in the Fiji Islands.)

Morning in Suva is the parade of Indian women in saris. The big muscular Fijian in khaki shorts and a shoulder patch: "Provincial constabulary."

Morning in Suva is a bushy-haired policeman in a white wraparound skirt — the sulu. A navy-blue tunic with red piping. In the British fashion, they don't carry pistols.

Morning in Suva is Anglo-Saxon businessmen in crisp white shirts and shorts with knee-length socks. Colonial balconied buildings lean over the street. In Indian shops, sewing machines are whirring up tailor-made suits. The best English worsteds. Rows of shops selling Japanese pearls. Binoculars. Transistor radios. Suva is a free port. No tax or duty.

☆ ☆ ☆

Coffee and snacks in the morning in a glass-bottom boat, skimming over the brown coral heads. The depth indicator reads 10 feet. In these clear waters you can see bottom at 30 feet.

The Fijian boy goes over the side and breaks water with a great chunk of coral. (A tourist souvenir.)

Little fish live in the coral. They pry them out and drop them in a tank of water. A gunmetal blue starfish. Two-inch fish with zebra stripes. A little golden fish with fan wings. He's a stinger. The fans have little needles.

The dangerous one is an innocent looking cone shell, the size of your little finger.

The Fijian boy said: "The animal inside puts out a sting like a wasp. Two native children in the Hebrides have been killed by picking them up."

☆ ☆ ☆

We sit in the sun and read the tabloid Fiji Times, founded in 1869. It's the first paper published each day in the world. The international dateline is just east of here.

When it's Saturday 100 miles east, it's Sunday in Suva.

The dateline is the 180-degree line — almost. Some years ago they bent the dateline eastward so that it includes all the Fiji Islands and Tonga.

☆ ☆ ☆

"There was a chap who ran a grog shop on the island of Taveuni," said a British hotel man here, "as you'll see on the map, the dateline runs right through the island — right through the grog shop as a matter of fact.

"There were Sunday closing laws. When it was Sunday in front of his shop, it was Saturday at the back door, and he served quite legally out the back. When it became Sunday at the back it was Monday at the front door, so he served out of there.

"That's one reason they say, 'The line was bent.' "

☆ ☆ ☆

On the island of Koro, the women call turtles. "They sing a kind of chant." And I swear you'll see these big sea turtles popping up to the surface all over the place. Hundreds of them.

"Now, if there's anyone around from a nearby island — an island they used to war with — those turtles absolutely will not come up."

Every village has its devil. "They don't have gods, just devils. And the village of Sigatoka has a shark devil. Nobody from that village EVER kills a shark. If they did, something bad would happen to them.

"You'll see men swim right through the water with big sharks around. There are lots of taboos. You mustn't have been with a woman before diving on the reef, or you'll be a shark's sandwich.

"They sprinkle kava root and tobacco on the water for the shark devil, and they chant a thing that says, 'We dive in your waters today. We carry spears, but not to harm sharks. Spears are for barracuda.'

"Then they go right in the water with absolute confidence the sharks will never touch them.

"But you can't eat coconut or the charm doesn't work."

Chronicle Features

January 15, 1987 F/SWC2:GHB

Mr. Robert Gillett
Fisheries Development Advisor
UNDP Private Mail Bag
Suva, Fiji

Dear Bob,

Many thanks for your letter of 23 December asking for information on the conservation value of moving turtle egg nests and undertaking the short-term headstarting of hatchlings. Without knowing more details of the particular situation facing Mr. Mercer, it is difficult to offer firm guidance. In general, the translocation of eggs is not recommended, unless it is impossible to protect them from excessive predation (both human and natural) at the site where they were laid. Headstarting carries even greater risks because we simply don't know what adverse changes may occur that could affect the turtles ability to survive and breed in the wild. In any event, I am not aware of existing headstarting efforts involving only one week of captive rearing. Almost no growth occurs in hatchlings during their first few weeks of life. The immediate release of hatchlings (at night) is usually recommended because, if imprinting occurs for navigational purposes, it will most likely take place during this time.

I really would like to see some conservation activities with sea turtles undertaken in Fiji. I'm willing to help in any way that would be appropriate and possible. In order to give Mr. Mercer a more comprehensive background, I am sending him a copy of the "Manual of Sea Turtle Research and Conservation Techniques (1983). I co-edited this publication, so feel it is fairly well prepared.

Thank you for your assistance and encouragement in the Tokelau project. I am anxious to hear of the outcome from Mr. Toloa.

Sincerely,

George H. Balazs
Zoologist

Enclosure

cc: Mr. R. Mercer
P. O. Box 244
Savu, Savu, Fiji

bc: HL, Balazs

SOUTH PACIFIC REGIONAL FISHERIES DEVELOPMENT PROGRAMME
UNDP PRIVATE MAIL BAG
SUVA, FIJI

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

UNITED NATIONS
DEVELOPMENT PROGRAMME

CABLE: UNDEVPRO SUVA
TELEX: 2512 FAOFIS FJ
TELEPHONE: 22469

PROJECT NO: RAS/85/004
LETTER NO: 3421
YOUR REF:
OUR REF: RAS 1.6

23 December, 1986

Dear George,

Thanks for your efforts in the project to release turtle shell for traditional use in Tokelau.

I recall speaking to you about the value of turtle head starting programmes and you offered the opinion that it has not been possible to demonstrate positive results.

Recently I was speaking to a person in Fiji who is interested in turtles and in a position to take action on turtle conservation. He feels that a very short-term turtle head start programme, say one week, would be worthwhile. The idea would be to collect eggs from various parts of Fiji (many of which might otherwise be taken for human consumption) and hatch them on an island which is a dedicated government quarantine station. The hatchlings would be kept for a week then released. What is your initial reaction to such an idea? Is it likely to be more beneficial than conventional head starting ?

Yours sincerely,

Bob

Robert Gillett
Fisheries Development Adviser

Mr. George Balazs
National Marine Fisheries Service
P. O. Box 3830
Honolulu, Hawaii 96812
U.S.A.

cc: Mr. R. Mercer, P. O. Box 244, Savu Savu.

Drue
Taweki
Kadavu
29.9.86.

Mr G. Balazs,
National Marine Fisheries Service.
2570 Dole St.,
Honolulu.

Dear Sir,

We received your letter dated Sept, 8, 1986 on the 14th of this month and have been unable to answer it sooner, I Hope that you will forgive us for it.

Refering to the questions which you want answered is this..

1.) The turtle was caught by net. ← nesting?
2.) It was in good health and did not show signs sickness, disease or injury.
3.) We have caught a lot of turtles in the same area where this one was caught as it is a feeding ground for turtles.
4.) The turtle was butchered for eating, it had seaweed and small fishes in its stomach. ←
5.) We have not heard of anyone so far in Kadavu catching a turtle with a tag on it.

I Hope Sir that you are satisfied with the answers that I have told you concerning the tagged turtles which you said that were caught and tagged in Pago Pago on the 16th

SIZE?

of November 1980. We have caught hundreds of turtles along our seashore as it is a feeding ground for them, but this is the first one with a tag on it so far, but if we do hear of anyone catching another turtle with a tag we will inform you of it.

Mr Balazs, I would like you to know that the writer of the first letter no longer resides in Kadavu, but you can post it to her father as it was he who caught the turtle and his name is VONIANI NIUMATASERE with the same address, so until we hear from you and anxiously looking forward to the colour booklet and poster of different kinds of sea turtles as we are fishermen here in Drue, Kadavu.

Sincerely,
Voniani Niumatasere.

VONIANI NIUMATASERE.
DRUE
TAVUKI
KADAVU.
Fiji.


VIA AIR MAIL
PAR AVION · CORREO AERO
FIJI
25c
fiji
15c
MR. GEORGE. H. BALAZS,
NATIONAL MARINE FISHERIES SERVICE,
2570 DOLE STREET.
HONOLULU.
HAWAII 96822-2396.

Drue
Tavuki
Kadavu
Fiji Island.
4th Agust, 1986.

Write Hmb.
University,
Hawaii.

Dear Sir,

I am so grateful to write to you that we had caught a turtle. Two stamps or a pin was pinned on both of its arms.

It was such a big turtle. One of the pins number is 3504 and another one is number 3505.

We had got the pin or a stamp which may ever you would call. If you would like a pin we would be grateful to send it over.

Your sincerely
Alanieta Niumataisere

3504 LFL; 3505 RFL
11/10/80
CCL-111cm photos
ROSE IS., AM. SAMOA


OPENED IN ERROR
AIR MAIL
PAR AVION
FIJI
40c
1986
To,
Write Himb
University
Hawaii
96744
Balagas

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

September 5, 1986 F/SWC2:GHB

Mr. Alanieta Niumatasere
Drue
Tavuki
Kadavu, Fiji

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National Marine Fisheries Service
2570 Dole Street
Honolulu, HI 96822-2396

Please write to me at this address, sending your letter by airmail. I have enclosed U.S. $2.00 to cover the cost of your airmail postage. Also, in my next letter, I will be sending you a large color poster showing all the different kinds of sea turtles, as well as several booklets and other literature about sea turtles.

Again, we greatly appreciate receiving your important letter, and anxiously look forward to hearing from you again.

Sincerely,

George H. Balazs
Zoologist

Enclosure

cc: Richard Wass, U.S. Fish and Wildlife Service

GHB:vi

bc: Balazs
HL

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

October 15, 1986 F/SWC2:GHB

Mr. Voniani Niumatasere
Drue
Tavuki
Kadava, Fiji Islands

Dear Mr. Niumatasere:

Thank you for your letter of 29 September 1986. I was very pleased to hear from you and receive the excellent answers to the questions I asked about the tagged turtle you captured. This information is valuable to our research program. Thank you also for offering to report any other tagged turtles that are caught in your area. In addition to Samoa, we have also tagged turtles in Pohnpei, the Marshall Islands, the Cook Islands, and here in Hawaii.

As promised, I am sending you an assortment of literature about sea turtles. You may want to share some of this information with your local school. The children of your village may especially enjoy the color poster showing the different kinds of sea turtles.

I wonder if you would mind answering a few more questions concerning turtles in your area.

1. Do turtles ever come ashore to lay eggs near Drue?

2. Are your nets made especially to catch turtles, or was the tagged turtle caught in a net used mainly to catch fish?

3. What is the size of most of the turtles you catch? Are they large ones like the tagged turtle, or much smaller (under 100 lbs)?

Again, thank you for your help. Perhaps sometime, I will be able to visit your island and have the pleasure of meeting you in person.

Sincerely,

George H. Balazs
Zoologist

TURTLE - COUNTRY REPORT
FIJI -1991

Fiji has 4 species of turtles of which 2 are quite important and also quite common to Fiji waters. Hawksbill locally known as Taku is the most common and the green turtle also found in large numbers known as Vonudina are both consumed locally.

Export

Both raw and worked turtle shells have been exported for a long time. Though no reliable export data is available figure 1 shows the trend of the export for last 10 years.

Since the beginning of 1991 detailed export records of all marine resources are compiled at Fisheries Division (a permit from Fisheries Division is required for each consignment exported). Out of the 1044 kg of turtle shells exported till end of July this year 944 kg was still unworked (raw) shells even though there was a total ban on export of raw shells from the beginning of this year. This was due to the fact that shell exporters held a large stock of raw shells when the regulation came into effect. There is still some shells left (in fact 148 kg) with one exporter who may export unworked shells since the division has already given him approval. As one would expect any turtle shell exported from this month will all be in the processed form.

Meat Consumption

Turtle meat is widely consumed in Fiji both for traditional and commercial use. It has a special place in the Fijian traditional customs. Both of the commonly found species are consumed and both of them command a similar price for its meat.

Figure 1 shows the volume of turtle meat that moved through the commercial trading for the last 12 years. It should be anticipated that subsistence consumption of turtle meat would be similar to or even more than the volume moved through the commercial sector. At the moment there is no accurate estimate of the subsistence utilization of turtles in Fiji. In 1990 the average price for turtle meat was $3.64 per kg, sold mostly on roadside stalls and municipal markets and compares very well with top grade fish.

Turtle Sightings

During the this season (1990-1991) the following information were gathered:

- Atleast 4 nesting sites were observed at Mokogai. 450 eggs were moved into cages were all have hatched and are now held at the hatchery on the island and are

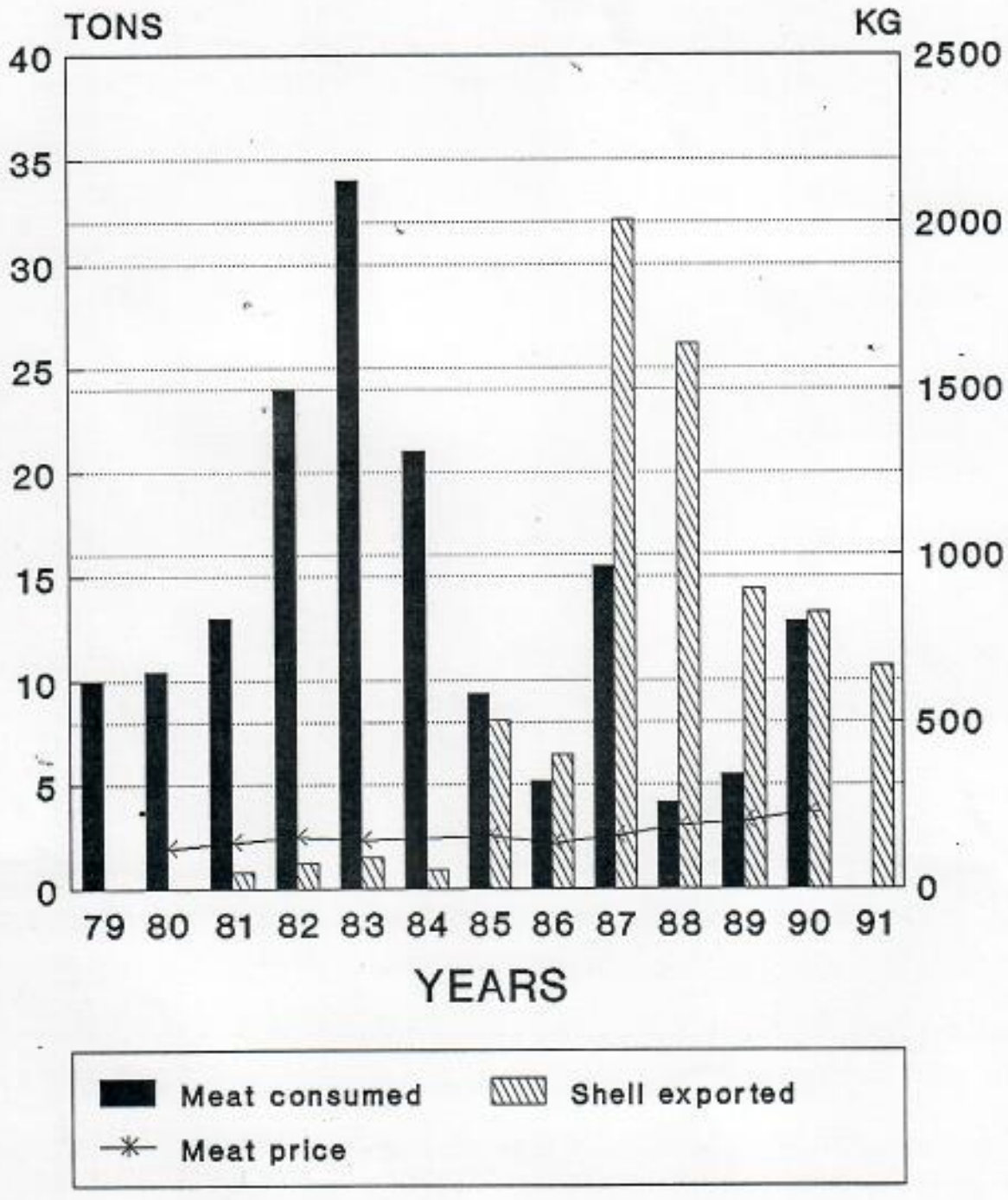
doing very well, growing 1 to 2 cm a month and would be released before the end of the year.

- At Namena Island at least 18 nesting sites were located this season of which, one was in danger of being washed away by heavy swells. With the help of the owner of the island 104 eggs were moved to higher grounds of which 100 of those hatched out successfully. The eggs hatched within 60 days after nesting. All the nestings were of Hawksbill turtle. Fewer turtles nested this season than the previous years. The owner also claimed that a green turtle nested at the island a few years back but there has no further nestings of green turtle.

- The first nesting of this season at Namena Is. was reported on 22nd December.

- One leatherback turtle was captured on 7th Dec at Yaro Passage near Kia Is, by a commercial fisherman, measuring 1.9m and weighing 220 kg (without guts). Since the turtle was caught during closed season it was confiscated, thus getting a lot of publicity on turtles. The huge size and being seen for the first time in the area, brought attention to the news media.

FIJIAN TURTLE INDUSTRY



Export data not available for other year

It is prohibited to join two such nets together. Such nets may not be used to take fish other than sardines or whitebait.

Meshes of other nets

16. The meshes of wading nets and of all nets not specifically mentioned in these Regulations shall in no part be less than 2 inches, wet and stretched.

Fish fences

17. In every fish fence constructed with cane or reed screens there shall be at the inmost point in each terminal trap or pan a section not less than 3 feet in length, and of the full height of the fence wherein the cane or reeds shall be placed not less than 2 inches apart, or wherein the cane or reed screen shall be replaced by netting or cord, galvanised wire or expanded metal, the mesh of which shall measure not less than 2 inches across the smallest diameter. In fences constructed entirely of wire netting or of expanded metal, the mesh of the netting in the traps or pans shall measure not less than 2 inches along the shortest diameter.

PART V—SIZE AND LIMITS OF FISH AND PROHIBITIONS

Fish

18. No person shall kill, take, sell or offer or expose for sale, any fish listed in the Sixth Schedule of less than the lengths therein set out, measured in each case from the point of the snout to the middle of the tailfin when the fish is laid flat:

Provided that this regulation shall not apply to fish caught by children under the age of sixteen years when fishing with hook and line from the shore or wading near the shore and not offered or exposed for sale.

Crabs

19. No person shall kill, take, sell or offer or expose for sale any crab of the species Scylla serrata (Swimming Crab or Qari Dina) of less than 5 inches measured across the widest part of the carapace or shell.

Turtle

20.—(1) No person shall at any time dig up, use, take or destroy turtle eggs of any species or in any way molest, take or kill any turtle the shell of which is less than 18 inches in length. No person during the months of January, February, November or December in any year shall in any way molest or take or kill any turtle of any size. This regulation shall not apply to turtles kept as pets or in aquaria.

(2) No person shall be in possession of, sell, offer or expose for sale or export any turtle shell the length of which is less than eighteen inches.

(Inserted by Regulations 8th June, 1966.)

Trocas

21. No person shall take, be in possession of, sell, offer or expose for sale or export any shell—

(a) of the species Trochus niloticus (sici) (trocas shell) measuring less than 3½ inches across the whorl;

(b) of the species Pinctada margaratifera (civa) (pearl oyster shell) of which the nacre or mother-of-pearl measures less than 4 inches from the butt or hinge to the opposite edge or lip.

(Amended by Regulations 8th June, 1966.)

Davui

*22. No person shall take, sell or offer or expose for sale, or export any shell of the species Charonia tritonis (davui).

Giant helmet shell

*23. No person shall take, sell or offer or expose for sale, or export any shell of the species Cassis cornuta (giant helmet shell).

Application of regulations 22 and 23

*24.—(1) The prohibition on taking shells contained in each of regulations 22 and 23 shall come into force on the 13th day of February, 1970.

(2) The prohibition on selling, offering or exposing for sale or exporting shells contained in each of regulations 22 and 23 shall come into force on the 13th day of April, 1970.

Porpoises and dolphins

25. No person shall kill, take, sell or offer or expose for sale any porpoise or dolphin of the genera Phocaena or Delphis (babale). For the purpose of avoiding doubt, the expression "dolphin" used in this regulation shall not be deemed to refer to the fish commonly known as a dolphin but of the genus Coryphaena.

(Inserted by Regulations 8th June, 1966.)

Export of fish

26. No person shall export from Fiji—

(a) live fish of any kind whatsoever;

(b) turtle flesh.

PART VI.—EXEMPTIONS

Exemptions by public officers

27. The Permanent Secretary for Agriculture and Fisheries or any person appointed by him may exempt any person, in writing, from any of the provisions of regulations 8, 10, 14, 15, 16, 18, 19, 20, 21, 25 and 26.

Exemption relating to Fijians

28. Any Fijian assisting a licensed fisherman in a traditional or customary fish drive shall not require a licence to take fish by way of trade or business by reason of the fact that such assistance is given, whether free of charge or on payment.

Exemption relating to punts or skiffs

29.—(1) Where open unpowered punts or skiffs, each not exceeding 24 feet in length, are employed in fishing by way of trade or business in conjunction with and

* Inserted by Regulations 4th February, 1970.

FIJI REPUBLIC GAZETTE SUPPLEMENT

No. 19 FRIDAY, 19th JULY 1991

[LEGAL NOTICE NO. 140]

FISHERIES ACT
(CHAPTER 158)

FISHERIES (AMENDMENT) (NO. 1) REGULATIONS, 1991

IN exercise of the powers conferred on me by section 9 of the Fisheries Act, I have made the following Regulations:

Short title, interpretation

1.—(1) These Regulations may be cited as the Fisheries (Amendment) (No. 1) Regulations, 1991.

(2) In these Regulations the Fisheries Regulations are referred to as the "principal Regulations".

Amendment to Part V—Regulation 20 amended

2. Paragraph (1) of Regulation 20 of the principal Regulations is amended as follows:

(a) by inserting the words, "sell, offer or expose for sale" after every occurrence of the word "take"; and

(b) by deleting the last sentence.

Amendment to Part V—Regulation 26 amended

3. Regulation 26 of the principal Regulations is amended by inserting the following paragraph after paragraph *(b)*:

"*26(c)* turtle shell unless worked into jewellery or otherwise processed into a form approved by the Permanent Secretary for Primary Industries and Co-operatives."

Comming into force

4. These Regulations shall be deemed to have come into force on the 1st day of January 1991.

Made at Suva this 9th day of July 1991.

V. S. J. GONELEVU
Minister for Primary Industries
and Co-operatives

Price: 15c S. T. RAVONO, Government Printer, Suva, Fiji—1991 67/FRG/91—1,400

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center Honolulu Laboratory
2570 Dole St. • Honolulu, Hawaii 96822-2396

August 23, 1990

Dr. Tim Adams
Fisheries Division
P.O. Box 358
Suva, Fiji

Dear Tim,

It was good to meet you in Noumea and discuss common regional interests in sea turtles. As promised, I am sending you an assortment of copied letters and other somewhat "historical" literature contained in my file on Fijian sea turtles.

GREEN TURTLE

The tagged turtle (T755), recovered on Christmas Day 1980 by Mr. Bale at Ono-I-Lau was likely tagged in Tonga, sometime after May 1975. Unfortunately, as the enclosed letters indicate, no firm records exist of the date tagged, exact location, size of the turtle, and if it was on the beach nesting when tagged. The records were apparently lost, as inquiries made to Tongan fisheries turned up nothing. They responded, but were unable to provide any information. I personally also recall spending several unsuccessful hours telephoning around the United States attempting to locate the Peace Corps personnel that served in Tonga (William Zoochie and a married couple by the last name of Brady). This sort of situations is exactly what we don't want to happen under the SPREP sea turtle initiative! There are easy safeguards that can be taken.

The large green turtle that I tagged (No. 3504, 3505) nesting on Rose Island in American Samoa during November 1980 was captured by net and eaten during July 1986 on Kadavu, Fiji. The village name was "Drue, Tavuki". The person that wrote to me was "Alanieta Niumatasere". I subsequently sent a formal thank you with the date and location of original tagging. A color poster displaying sea turtles was also sent.

I look forward to hearing from you regarding the enclosures when new information becomes available.

Best regards.

Sincerely,

George H. Balazs
Zoologist and Leader,
Marine Turtle Research

FIJI TIMES 16/10/91

Waterfront

Turtle slaughter

The Ministry of Primary Industries Fisheries Division has once again reminded people to take extra care when catching turtles — since the turtle breeding season starts from next month till February next year.

The warning comes after recent survey indicated that the slaughter of turtles at Suva's Nubukalou Creek has increased.

A report indicated more than seven turtles being killed for meat weekly, on Saturdays alone and tourists are complaining about what they see as inhumane methods of slaughter.

The division says that the prohibition of the export of raw turtle shell from Fiji has been gazetted and under the Fisheries Regulations:

No person shall export from Fiji:

- Turtle flesh
- Turtle shell unless worked into jewellery or otherwise processed into a form approved by the permanent secretary for Primary Industries and Co-operatives.
- No person shall at any time dig up, take, sell, offer or expose for sale or destroy turtle eggs of any species or in any way molest, take or kill, sell, offer or expose for sale any turtle shell of which is less than 18 inches in length.
- No person during the months of January, February, November or December in any year shall in anyway molest or take or kill, sell, offer or expose for sale any turtle of any size.

NOT for the cooking pot. This 15 year-old turtle is kept at Orchid Island outside Suva.

Fisheries officers have been requested to put some effort in trying to inform fishermen and traders of the new law which means, in effect, that it is now an offence to sell turtle meat or eggs during the closed season, or to export turtle shell (including taku scutes or scales) at any time.

Also, since the breeding season of turtles is just around the corner, information on the location of turtle breeding and their nesting grounds would be of great value to the Fisheries Division to carry out its research program.

Turtle meat is fetching $5 to $8 per kilogram. The meat is widely consumed in Fiji both for traditional and commercial purpose. It also has a special place in the Fijian traditional system.

During the 1990-91 turtle breeding season several turtle nests were sighted.

Some sighting were reported as follows: — At least four nesting sites were observed at Makogai. The 450 eggs that were removed and put into cages successfully hatched. These are being kept all at the Makogai hatchery and are reported to be growing one to two cm a month.

The hatchlings are expected to be released into the ocean by the end of the year.

Aust, Japan, NZ to maintain catch quotas

CANBERRA, Oct 11, AAP — Australia, Japan and New Zealand have agreed not to raise their global catch of southern bluefin tuna (SBT) for 1991-92 above quotas for the previous year, Federal Primary Industries Minister Simon Crean announced.

The global limit of 11,750 tonnes was set at the annual voluntary trilateral negotiations for management of SBT in Wellington, New Zealand, recently.

Mr Crean said the latest decision meant individual allocations would remain at last year's levels of 6065 tonnes for Japan, 5265 for Australia and 420 tonnes for New Zealand.

Scientific evidence indicated there were unacceptable risks associated wi any increase in cat levels.

"The parties accept the approach of maintai ing these levels for o further year while new i formation about t nature of the stocks collected and assessed."

Mr Crean also said th had reaffirmed the need move gradually towar

warning

Eighteen nesting sites were located at Namena Island in Savusavu of which one was in danger of being washed away by heavy swells.

However, with the help of the owners of the island and the Namena Island Resort, 104 eggs were moved to a higher ground of which 100 eggs successfully hatched. Reports indicated eggs hatched within 60 days after nesting.

All the nesting were of Hawksbill species. The lessee of the island also reported a green turtle nesting on the island before, however, no sighting has occurred since.

Other outer-reef nesting sites are known, including nesting sites for the green turtle, but these are being kept confidential for obvious reasons.

A leatherback turtle was captured on December 7, 1990 by a commercial fishermen at Yaro Passage near Kia Island.

At the time of capture the turtle measured 1.9m in length and weighed 220kg. Because the turtle was caught during off-season, it was confiscated.

This was first leatherback turtle seen near the island, and leatherbacks are rarely sighted in Fiji.

targeting larger fish.

"This should help to reduce the impact of catches which scientific evidence shows is still in a depleted state. The parties have also recognised the need for a formal agreement for the international management of SBT which would include countries outside the informal trilateral framework."

[my underscores – GiffBalazs]

COPIES

the university of the south pacific

School of Natural Resources
P.O. BOX 1168 - SUVA, FIJI.

CABLE: UNIVERSITY, SUVA
TEL. SUVA 27131

OUR REF:-
YOUR REF:-

29th January 1980

Dear George,

Just a short note to accompany some slats of a male green turtle that was darker than the usual Queensland greens. I mentioned it to you in Noumea as a possible agassizi. I found this turtle on the beach at Heron Is late at night. It hadn't crawled there, for as you can see from the photographs there are no tracks. Having obtained permission from the Fisheries Dept, I dissected it and found no visible cause of its illness. It was thoroughly checked for parasites as well by a visiting parasitologist at the research station. Col has a full report as well as copies of these photos so if you require more information, I suggest that you contact him. It was in 1975 or 6 I'm not sure which at the moment.

Also I've enclosed a copy of a Mauri Ora article dealing with a N.Z. leatherback.

I've just returned from Nanumea Is. (of Bustards 1970 fame). I spent 9 days there over the new moon and saw no nesting nor hatchlings. There were 24 body pits on the island - 9 green and 14 hawksbill. Fifteen of the nests had been broken into by Fijians and just before Christmas 2 Hawksbills and one green were killed on the beach before they laid. I'll have to write a full report and send you a copy. I think if a large green rookery

the university of the south pacific

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OUR REF:-
YOUR REF:-

still exists in Fiji it will be on a remote, uninhabited island in rough seas. I have my hopes for Nukumbasanga Is. but I've yet to get there.

I hope that your 1980 season goes well

Regards
Michael Guinea

University of Hawaii at Manoa

Hawaii Institute of Marine Biology
P.O.Box 1346 • Coconut Island • Kaneohe, Hawaii 96744
Cable Address: UNIHAW

February 4, 1980

Mr. Michael Guinea
School of Natural Resources
The University of the South Pacific
P. O. Box 1168
Suva, Fiji

Dear Michael:

Many thanks for your letter of January 29 which was mailed about the same time as the letter that I posted to you.

I appreciated receiving the photographs of the heavily pigmented male green turtle found dead at Heron Island. From the fat folds present in the pelvic region, I would say that the animal was in a good nutritional state of health. Although a portion of the tail has been freshly amputated (presumably by a shark), it is highly unlikely that this was the cause of death. Such amputations are a fairly common occurrence at the Hawaiian rookery of French Frigate Shoals. It is indeed curious that there were no tracks left in the sand by this turtle. Was it your impression that someone had carried the turtle up the beach? The dorsal pigmentation of this turtle is certainly indicative of agassizi (or carrinegra, as per Caldwell). However, the marginal indentations over the hind flippers are only slight. I wonder if dark pigmentation in the plastion was present, as is always the case for adult agassizi? Also, all of the adult black turtles that I observed at Maruata Bay in Mexico during October of last year were very small, rarely exceeding 80 cm in straight carapace length. What was the size of your Heron Island turtle? Again, based on my knowledge, this is a very interesting occurrence for Australia and I appreciate being made aware of the case.

When you are in the Nadi area, you should visit the boathouse at the Regent Hotel. I was told that divers regularly bring in small greens and hawksbills to sell to tourists. If this is the case, some valuable information might be obtained (stomach contents, etc.).

Sincerely,

George H. Balazs
Assistant Marine Biologist

mk

copy

TEL. NO. 361122

MINISTRY OF AGRICULTURE
AND FISHERIES

PO Box 358, Suva, Fiji

REF. NO. 34/4/7

DATE 6th August, 1980

Richard Fiji

Mr G H Balazs
National Marine Fisheries Service
Southwest Fisheries Centre
Honolulu Laboratory
PO Box 3830
Honolulu
Hawaii 96812

Dear Mr Balazs,

Many thanks for your letter of 28th July in which you offer some helpful advice concerning the 'Turtle Data Sheet' designed by Mark Gentle. As Mark has now left Fiji, I have been unable to discover exactly how he represented the aims or methods of the proposed project to you but I think I should explain a couple of points which are likely to severely restrict the amount of useful information we can gather.

Currently, Fisheries Division staff monitor all of Fiji's municipal markets and most unofficial markets, retail outlets, etc in order to assess the quantities and types of marine products being offered for sale. Important markets are visited more frequently than minor ones and during a visit, every Fisherman who brings his produce to the market has his catch weighed by species or type and if time permits, is interviewed as to his fishing locality, method etc. From this information we extrapolate to find annual production and try to discover significant changes or trends in the pattern of sales, species composition, cpue, etc.

The collection of specific turtle data would need to be tied in to this work. Up to now, the category 'turtles' has been adequate for our purposes and the only information collected has been the total weight of the animals brought through the market. This is not only for convenience but largely a matter of necessity: turtles are seldom brought as whole animals, being dismembered to varying degrees at some time before delivery. Shells have often been sold to collectors or tourists previously: belly plates are frequently brought along to serve as trays for the meat but are not usually attached to any other bits. Nor is it possible, when a fisherman brings in more than one animal (which is quite frequent) to be sure which organs come from which individual. Heads are usually included and probably represent the only consistent source of biological data. As identification appears to be possible from the head, this is a good start: as you state, it should also be possible to use this as an index of size and I would be grateful if you could let me know where, for purposes of comparison with other researchers work, the measurement would best be taken.

Information concerning capture method, locality, etc is easy enough to gather: the name of the fisherman is also available but we do try to allow people to remain anonymous as often as possible. Cooperation on the part of the Fisherman is extremely important and if he feels that permanent records of his activities are being kept, suspicion tends to arise that the information is for tax or law enforcement purposes. It would in any case be of doubtful value as it is unlikely that a fisherman will be able to recall specific details of the capture of an individual turtle at some later date.

Our market survey staff are currently attempting a 'pilot' collection of data just to see what problems are likely to be encountered: we will await your further comments before finalising the format of the procedure.

Your suggestion of a regional turtle newsletter is warmly welcomed here; it would be of great interest to us to be kept informed of activities in other parts of the region and could well serve as a vehicle for the development of overall data collection and stock evaluation.

Looking forward to hearing from you.

Yours sincerely,

G. L. Preston
for: Chief Fisheries Officer
for: Permanent Secretary for Agric & Fisheries

Ban takes turtle off Fijian menu

Fearing the Extinction of Sea Turtles

SUVA, Fiji (AP) — Worried that turtles could be hunted to extinction, the government will ban sales of the seafaring reptile whose meat is regarded as a delicacy in this South Pacific island nation.

Acting Director of Fisheries Simone Tuilaucala said Tuesday the Cabinet has decided to outlaw turtle sales for 12 months from March.

A permanent ban would be possible after that, he said.

Islanders will still be able to kill turtles for ceremonial, customary or subsistence purposes as they have done for centuries.

Environmentalists warn that six turtle species are in severe decline from over exploitation.

They say many of the slow breeding creatures are being killed as they migrate across the South Pacific — between northern Australia and French Polynesia — to feed, breed and nest.

Fiji is one of the region's biggest consumers of turtle meat. Turtles are sometimes sold in markets alive as they lie helplessly on the back of their shells. Meat is also sold on roadsides where vendors scoop it out of upturned shells.

Latest available figures show that about 20 tons of turtle meat was sold in Fijian markets in 1984. This is estimated to represent about 800 adult turtles.

Tuilaucala said an education campaign would attempt to teach Fijians that if they continued to kill turtles at the current rate, there would soon be none left.

Samoa News Feb. 7, 1995

80 copy

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

February 5, 1980 F/SWC2:RSS

Michael Guinea
School of Natural Resources
The University of the
South Pacific
P. O. Box 1168
Suva, Fiji

Dear Michael,

Thank you very much for your letter of 29 January and for the enclosed map showing the nesting localities of marine turtles in the Fiji area. Richard Uchida is starting to pull the report together and will undoubtedly be happy to have your contribution.

I am currently in the process of trying to get George Balazs on "loan" from the University to carry out our turtle research at the Honolulu Laboratory. If I am successful, I do anticipate considerably more intereaction with South Pacific Islands with reference to future research on turtles. We will be preparing the background document for a cooperative turtle tagging program in the Pacific Islands area soon. I will keep you posted on our progress in this regard.

Best personal regards.

Sincerely,

Richard S. Shomura
Director, Honolulu Laboratory

cc: G. Balazs
R. Grandperrin

2-1-80

RSS
RNU
Hoy
Do

the university of the south pacific

P.O. BOX 1168 - SUVA, FIJI.

School of Natural Resources

CABLE: UNIVERSITY, SUVA
TEL. SUVA 27131

29th. January 1980

OUR REF:-
YOUR REF:-

ROT

Mr Richard Shomura
Director
Southwest Fisheries Center
P.O. Box 3830
Honolulu, Hawaii 96812

Dear Richard,

As I promised at the SPC-NMFS Workshop on Marine Turtles in Tropical Pacific Islands in Noumea, I've enclosed a map of Fiji showing the nesting localities of the green and hawksbill turtles as wellas the sites of the few leatherback nestings. As you can see the greens frequent only the remote, uninhabited islands. The question marks on the map indicate islands which I have not been to yet, but I have it on good authority that greens do nest there. I have no idea of numbers at the moment.

The hawksbill nests on just about any beach, but usually don't live to repeat it if the site is anywhere near a village. The overall impression is that turtles are few and far between near the inhabited islands. There are however still enough turtles on the remote reefs and sea grass beds to support a tagging programme. The villagers can still catch a couple of greens each night that they venture out fishing off the Northeast coast of Taveuni. I'm still hopeful of finding green nesting beaches in the Lau Group, but I probably won't get there until December.

I hope that this map isn't too late for your report.

Regards

M L Guinea

Michael Guinea

All phonological reconstructions presented in following sections are based on regular Polynesian sound correspondences. For an outline of these and the proto-segments they reflect, consult Biggs (1978).

ZOOLOGICAL LIFE-FORM ACQUISITION

In the following sections, referential histories of Polynesian terms for folk zoological life-forms are reconstructed. In three cases, contemporary terms are derived from ancestral stems, which labelled animal life-forms in Proto-Polynesian. In other cases, however, life-forms have been acquired by languages since Proto-Polynesian times. Acquisition has involved both borrowing and innovation. Most, if not all, life-form terms acquired through borrowing have come from languages outside of the Polynesian group.

Polynesian languages have often innovated zoological life-forms by adapting old terms. As in Mayan (Brown and Witkowski 1981), this has primarily involved three mechanisms of lexical change: (a) use of metaphor, (b) expansion of reference, and (c) restriction of reference. Innovation through metaphor entails drawing parallels between animals and other objects (sometimes other animals), whereby terms for the latter are used to denote the former. An example of a metaphorical equation used by Polynesians in constructing life-forms is "snake" = "eel". Expansion and restriction of reference involve respectively increasing and decreasing the designative ranges of terms, e.g., extending the referential range of a term for a certain kind of insect, to bugs in general ("wug"), or the reverse, restricting the range of a term for all nonsea creatures (mammals, reptiles, birds and bugs), to just bugs in general ("wug"). Both of the latter example changes have occurred in Polynesian languages.

A fourth method of innovation sometimes employed by Polynesian languages, involves production of descriptive labels for life-form classes. "Wug", for example, in one language is denoted by an expression translating literally "small alive thing".

POLYNESIAN "FISH" TERMS

All "fish" terms listed first in the "fish" column of Table 2 are cognate, demonstrating regular sound correspondences. These attest to a Proto-Polynesian term for "fish" which reconstructs **ika* (Biggs 1979).[4]

Reflexes of **ika* in many Polynesian languages are expanded in reference beyond true fish to include other sea creatures such as whales, porpoises, turtles, eels, octopus, etc. This expanded range is rarely the same in any two languages. For example, Mele-Fila *ika* encompasses whales

and porpoises in addition to fish, but not turtles and octopus. On the other hand, Tahitian *i'a* includes turtles and octopus in addition to whales, porpoises and fish. In one language, Easter Island, an **ika* reflex is even occasionally used in reference to creatures in general. Whatever its exact extension in any one language, the semantic focus of the form always seems to be true fish, a focus which almost certainly pertained to the Proto-Polynesian term. It is, of course, possible that Proto-Polynesian **ika* had an expanded referential range similar to that of some daughter language reflexes.

Six Polynesian languages have acquired alternative "fish" labels (Table 2). Two of these, Tahitian and Tuamotuan, share an alternative term, *paru*. This label traces to Proto-Polynesian **palu* (Biggs 1979), which designated some particular fish species. Reflexes of **palu* are found in most Polynesian languages and usually denote some specific kind of fish (see Biggs 1979 for reflexes and referents). Use of a reflex of **palu* as a term for fish in general, developed through expansion of reference. This may have occurred independently in Tahitian and Tuamotuan. It is, of course, possible that these languages share *paru* as "fish" label as a result of language contact.

Expansion of reference may also account for another alternative "fish" term, i.e. Nukuoro *mamu*. An identical term, *mamu*, designates a variety of fish in Tuamotuan. Possibly related forms denoting specific types of fish occur in several other languages: Tongan *mamo* "kind of fish", Samoan *mamo* "small coral fish", Hawaiian *mamo* "fish . . . about seven inches long" and Tahitian *mamo* "a small fish". (It is, however, difficult to motivate a change from stem final *o* to *u* or vice versa.) If the range of Nukuoro *mamu* is not expanded from some fish species, it is possible that the term and its meaning are borrowed from outside the Polynesian group. Carroll and Soulik (1973), in their dictionary of Nukuoro, note that neighbouring Ponopean (Micronesian) uses *mam* in reference to fish in general and suggest this as the source of the Nukuoro term.

The second Mangaia "fish" term, *mangaika*, apparently combines words for "food" *manga*, and "fish", *ika*. I have been unable to determine probable origins of other alternative "fish" terms listed in Table 2.

POLYNESIAN "BIRD" TERMS

A "bird" label, **manu* (Biggs 1979), unambiguously reconstructs for Proto-Polynesian.[5] Reflexes of this term in contemporary daughter languages either stand on their own as labels for "bird", or as constituents of compound terms for "bird" (Table 2).

Reflexes of **manu* in some Polynesian languages label broad