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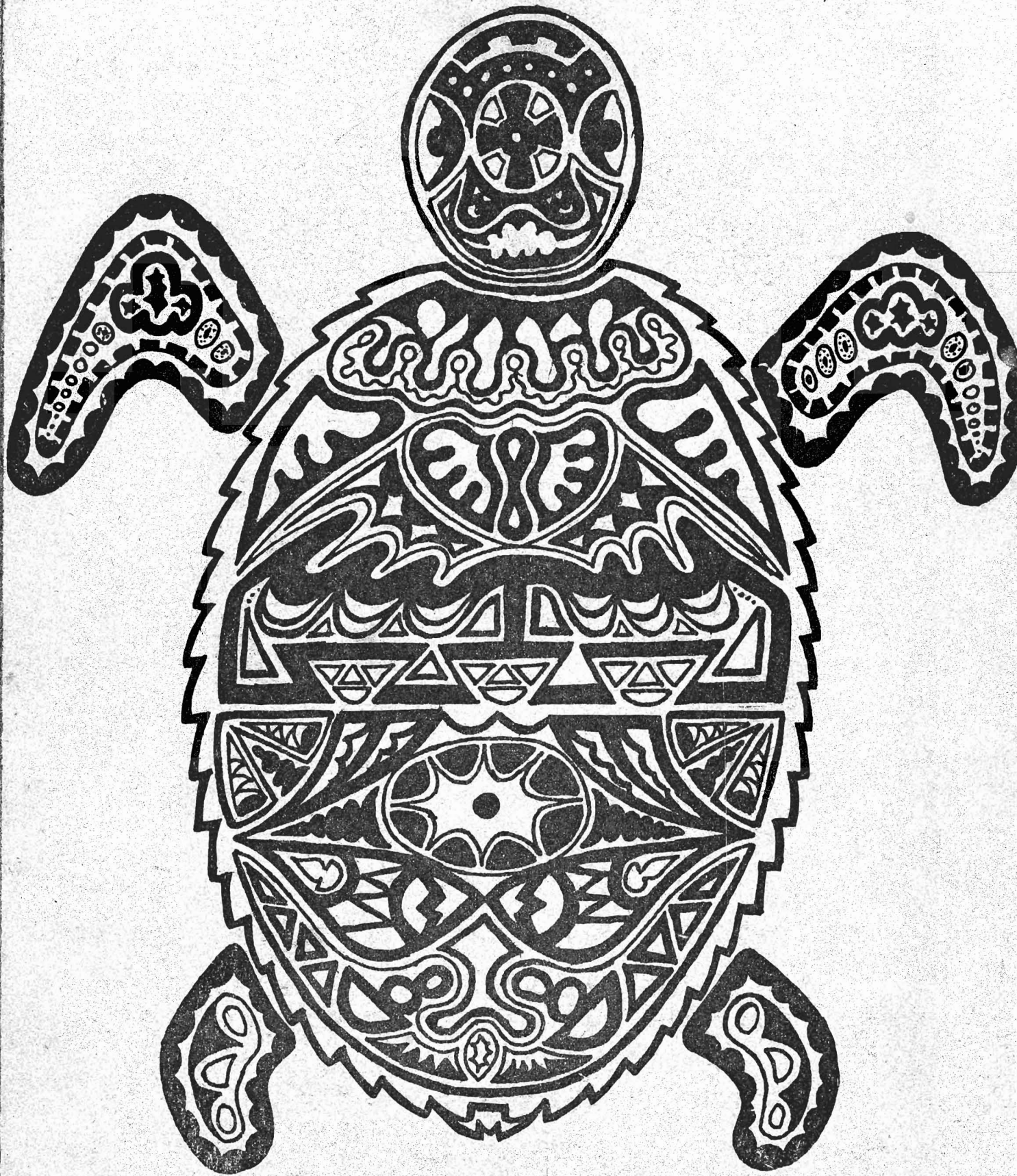


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MARINE TURTLES  
OF PAPUA NEW GUINEA

R LOCKHART

**THE PAPUA NEW GUINEA  
UNIVERSITY OF TECHNOLOGY**

**DEPARTMENT OF  
MATHEMATICS & STATISTICS**

To Bob,  
love Angela

(A novel idea [excuse the  
pun] - sending the author's  
work to him as a present!)

**Departmental Report  
1-89**

## Acknowledgements

Successive heads of the department of Mathematics at the University of Technology have supported my work on turtles. I must thank Professor Kathleen Collard and Associate Professor Glendon Lean who both have had the attitude that they would encourage any useful research even if it were not directly to do with Mathematics. Without the considerable financial support of the department of Mathematics, this survey could not have been conducted on such a scale, and this report could not have been written.

I am indebted to Sogadi Idagaela and Ginom Naya, the department's printers, for printing this document and the questionnaires.

My friend, Charlie Levi (who is the departmental administrative officer) has helped with just about everything - and done a fine job in translating my suggestions about turtle reserves into pidgin. Many of my colleagues have aided me with advice and helped to circulate the questionnaires, and the same people have been working with me on the turtle reserve at Labu Tale - I should particularly like to mention Steve & Ann Bedding, Graham Baird, and Jean Cole.

I am grateful to the University of Miami press for permission to use the line drawings of turtles which appeared in the forms. These were originally taken from the book: "Sea Turtles" by Thomas P Rebel (published in 1974).

Mr Arnold Topai, who is a surveying student of the University of Technology, contributed the drawings of turtles which decorate the cover of this report. They are in the style of the Sepik. I should thank my respondents. Students from Unitech went in some fear when I was on the prowl for information. So far, almost fifty percent of my information has come from those students. I am just as grateful to those who sent me postal information.

The University librarian, Mr Deveni Temu, was very cooperative in allowing me to advertise for, and to collect, completed forms in the University library.

My colleague Angela Balkwill should really be a co-author of this report. She has done a lot of work on the survey and made a start on analysing the data. I record her findings here.

I really hope that this information will do something to aid the conservation of sea turtles in Papua New Guinea. Conservation is desperately needed and very many of my respondents express their acute concern for the future of turtles here.

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## Introduction

At least six species of marine turtle are found in Papua New Guinea (PNG). The only survey of their distribution known to me was done by Sylvia Spring, ten years ago [1].

This report records the results of a survey on turtles which I conducted between February and June 1989. More than 3000 forms were circulated. 320 replies have been received and I expect to get at least 200 more. I hope to write a short paper on what I have found. However, I am not a biologist, and so it is likely that my results will be of more interest than my conclusions. Angela Balkwill has had a preliminary look at some of the data and her work is reported here, but in this report I am chiefly concerned with recording what I have been told. Here it is.

## Methodology

I concentrated on four species: *Eretmochelys imbricata* (the hawksbill turtle), *Chelonia mydas* (the green turtle), *Caretta caretta* (the loggerhead turtle) and *Dermochelys coriacea* (the leatherback turtle). Hereafter, turtle species are described using their popular names.

Three versions of the form were printed. Four hundred copies of form 1 were circulated, mainly to students at the University of Technology. An improved version of this form was then designed on the basis of how people had reacted - this is form 2. Fifteen hundred copies of it were given to students at Unitech and education centres throughout PNG, and to individuals whom I thought might be able and willing to help. Finally, a further version was printed (form 3) and eleven hundred copies circulated. I tended to use this, the best version of the form, to fill the gaps in my original coverage. So, for example, I sent it to such places as Thursday Island, in Queensland, in an attempt to get information from the Torres Strait.

A special form (4) was used to get additional information from respondents who had given particularly interesting data in the first three trawls.

Few copies of form 3 or form 4 have yet been received.

The next pages show the four forms that I circulated.



TURTLES QUESTIONNAIRE.

We are seeking information about the sea turtles which nest in Papua New Guinea. We hope that this will help us to increase their numbers. You should only fill in this form if you can give us information about sea turtles.

1. Please give the name and province of the place you are going to tell us about, if it is small, give the nearest big town as well.

.....

2. When do turtles nest in your area? (if there are peak periods, please say when these are).

3. Does more than one kind of turtle nest in your area? (If you don't know, just say you don't know).

4. Are your turtles:

- (a) As long as a man? .....
- (b) As long as a dog? .....
- (c) Good to eat? .....
- (d) Bad to eat? .....

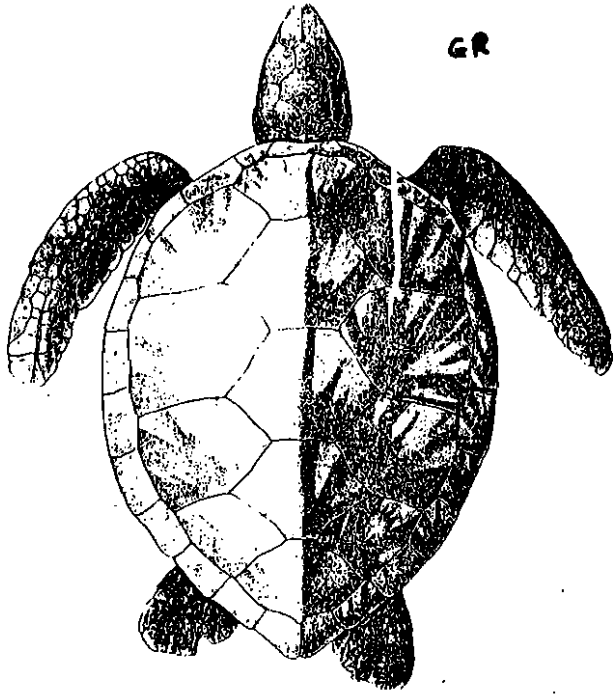
5. How many eggs do the turtles lay on average?

- (a) 100 - 120 ? .....
- (b) 80 - 100 ? .....
- (a) less than 80? .....

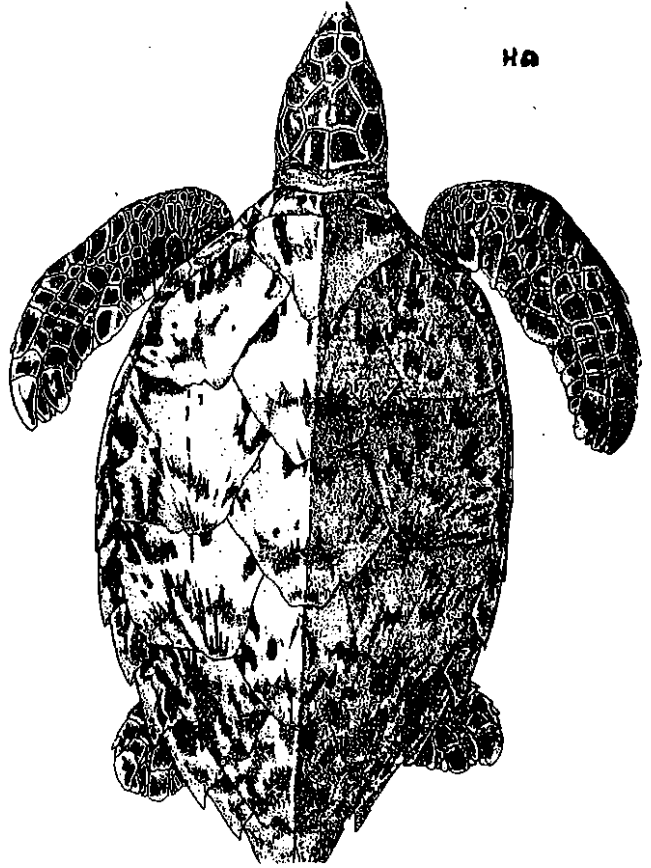
6. On the other side of this paper you will find some drawings of turtles. If you can, please mark the ones that nest in your area (just use a small cross on the drawing).

7. If you are prepared to give us your name and address so that we can contact you if we need more information, please do that here.

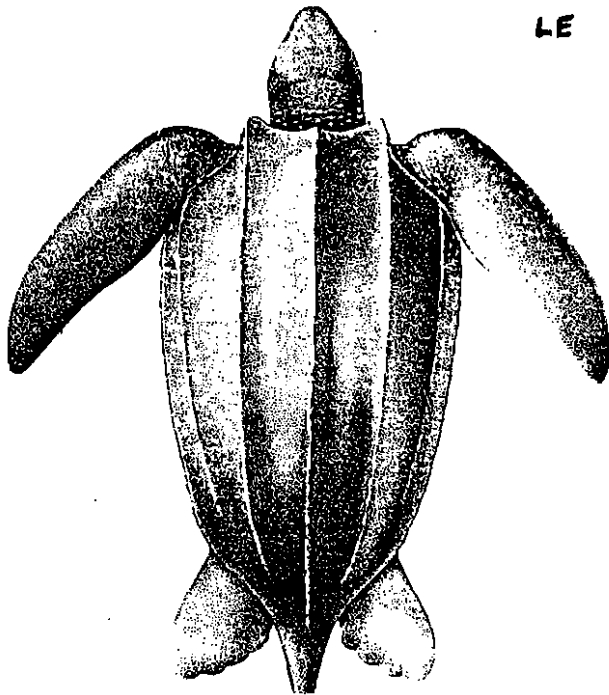
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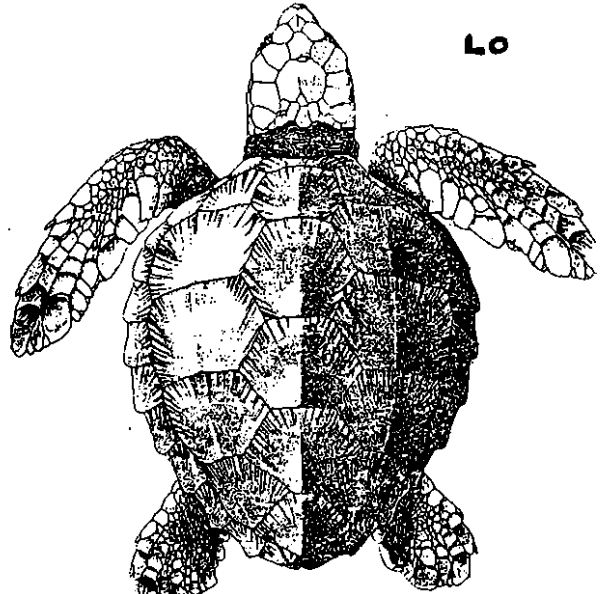
GR



HA



LE



LO

9. Do you have any further comments that you would like to record?

.....  
.....

Thank you very much for your help.

(Return to: Bob Lockhart, Steve Bedding, Luke Wangi : Unitech).

Form 2.

### TURTLES QUESTIONNAIRE.

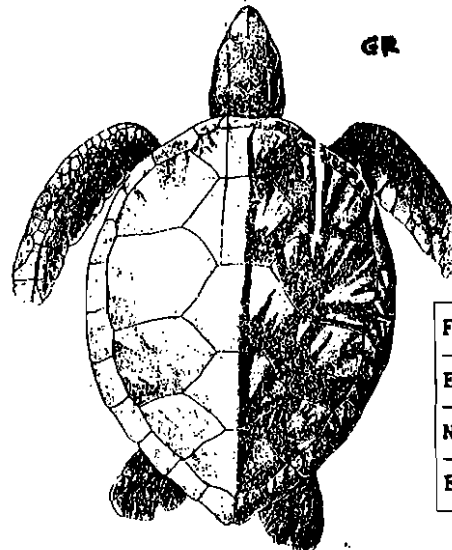
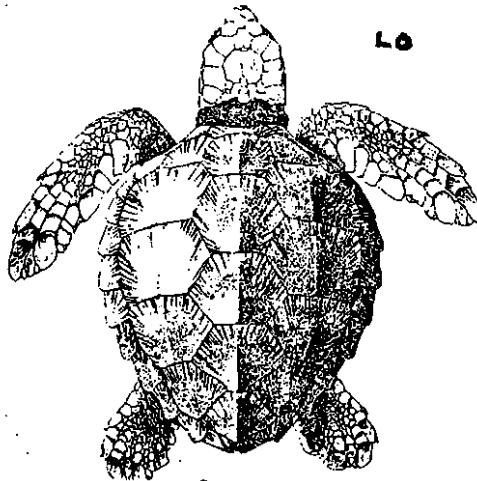
We are seeking information about the sea turtles of Papua New Guinea. We hope that this will help us to increase their numbers. Please fill in this form if you can help us. We would like any information you can give us about sea turtles.

1. Please give the name and province of the place you are going to tell us about. If it is small, give the nearest big town too.  
 .....

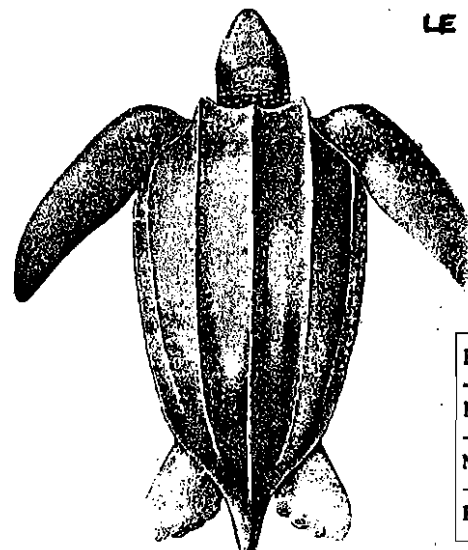
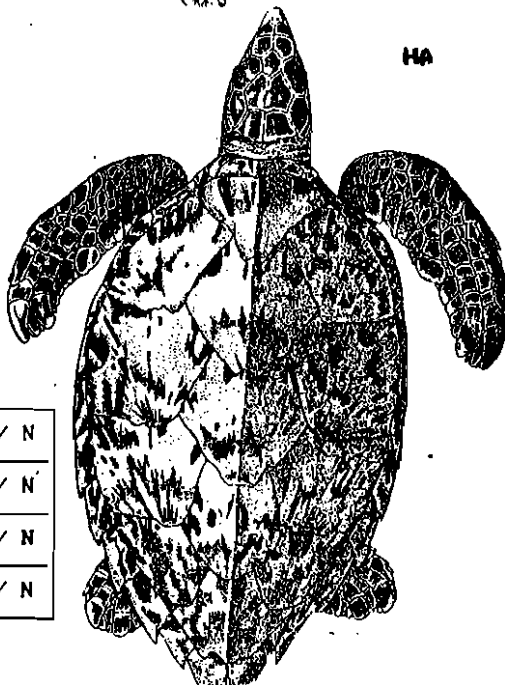
2. (a) Are turtles found in your area? .....  
 (b) Do turtles nest in your area? .....

3. Here are some pictures of turtles that are found in PNG. Please indicate whether each kind of turtle is: found in your area, often eaten in your area, nests there, or has eggs which are eaten by the local people. ( circle Y for yes, N for No).

Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N



Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N



Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N

Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N

4. **When** do turtles nest in your area? (Please just give as much information as you can)

Which months? .....

Which season? (Wet/dry) .....

What time of day? (e.g. early morning, midnight etc.) .....

.....

Phase of moon? (e.g. full moon, new moon etc.) .....

.....

High Tide / Low Tide .....

5. If you are prepared to give us your name and address so that we can contact you if we need more information, please do that here.

.....  
.....  
.....

6. Do you have any more comments that you would like to record?  
We are interested in ANY information you may have about turtles.

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.....

**If you want to tell us about other places please use a new form for each place. We are very grateful for all the information you can give us.**

Thank you very much for your help.

(Return to: Bob Lockhart : Maths Dept, Unitech Lae).

TURTLES QUESTIONNAIRE.

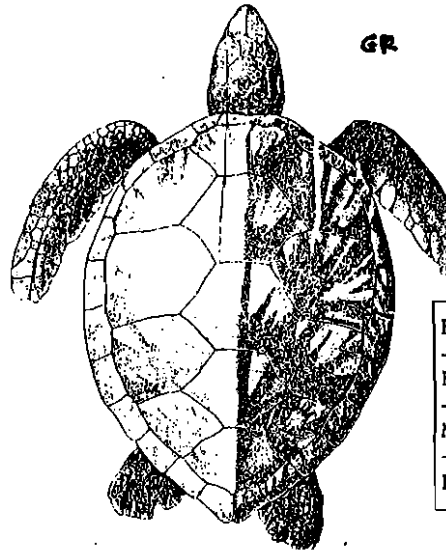
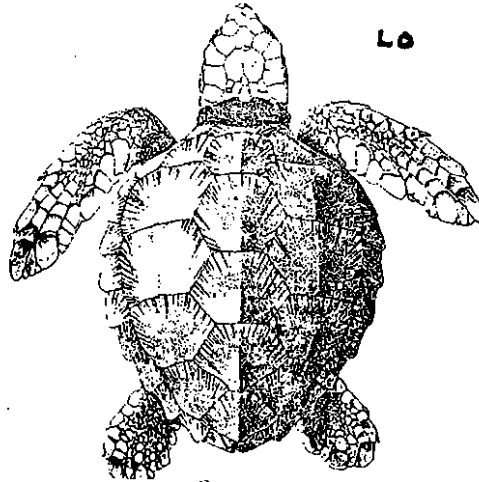
We are seeking information about the sea turtles of Papua New Guinea. We hope that this will help us to increase their numbers. Please fill in this form if you can help us. We would like any information you can give us about sea turtles.

1. Please give the name and province of the place you are going to tell us about. If it is small, give the nearest big town too.  
 .....

2. (a) Are turtles found in your area? .....  
 (b) Do turtles nest in your area? .....

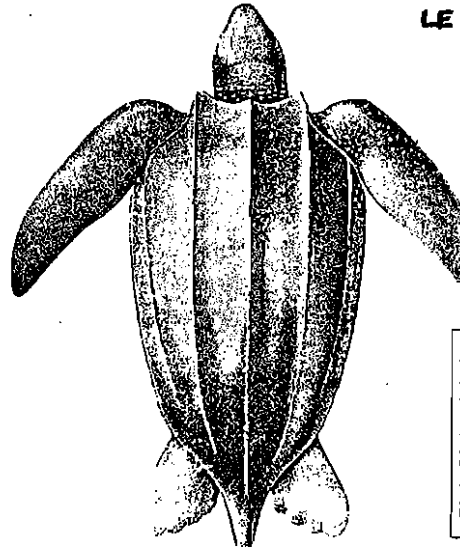
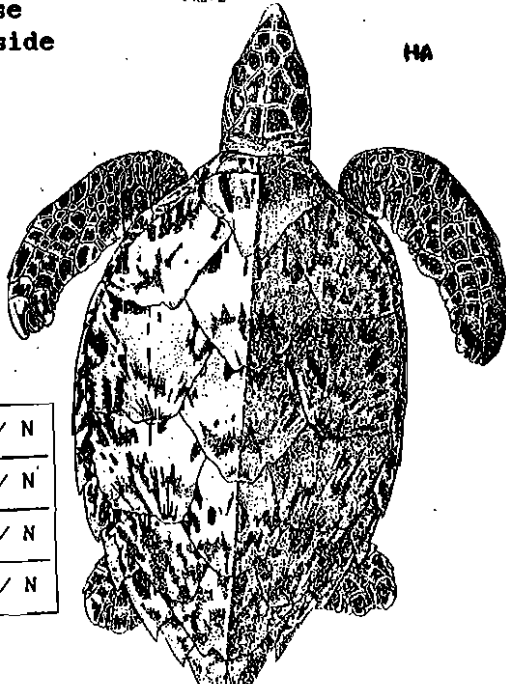
3. Here are some pictures of turtles that are found in PNG. Please indicate whether each kind of turtle is: found in your area, often eaten in your area, nests there, or has eggs which are eaten by the local people. ( circle Y for yes, N for No).

Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N



Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N

If you have a local name for each type of turtle please write it alongside the turtle.



Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N

Found	Y / N
Eaten	Y / N
Nests	Y / N
Eggs Eaten	Y / N

Are you able to tell one kind of turtle from another using these pictures? Yes / No ?

4. When do turtles nest in your area? (Please just give as much information as you can - we'd particularly like to know when they start and finish nesting each year).

Which months? .....

Which season? (Wet/dry) .....

What time of day? (e.g. early morning, midnight etc.) .....

.....

Phase of moon? (e.g. full moon, new moon etc.) .....

.....

High Tide / Low Tide .....

5. What language do the local people of this area speak?

.....

6. If you are prepared to give us your name and address so that we can contact you if we need more information, please do that here.

.....  
.....  
.....

7. Do you have any more comments that you would like to record?  
We are interested in ANY information you may have about turtles.

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We are really grateful for all the information you can give us. Please do use several forms if necessary or include extra pages here. The more information we get, the better our survey will be.

Thank you very much for your help.  
(Return to: John Colwell: Maths Dept, Unitech Lae).

Turtle Questionnaire: Additional Questions.

Dear Mr/Ms

[Form Number: ]

Thankyou for filling in our first questionnaire. Your answers were so helpful that we thought we would ask you to give us some additional information. In return, we shall send you a copy of our final report. We enclose a copy of our new form with this letter because we want to ask you about that too. We have changed that form partly as a result of what we have learned so far and we would be really grateful if you could fill in this new form again - particularly the part that asks about whether the pictures are good enough - we'd value your opinion because you obviously know a lot about turtles.

1. Please fill in the new form carefully. We particularly want to know whether you think our pictures are good enough. We want to see how you fill in this form, because your answers were so good last time, and we can compare what you say with other people's replies. When you have filled in the new form, please answer these questions.

2. If you have said that turtles of different species nest in your area, could you give us information about the times? Do the different species all nest at the same time, or is one of them first (which?). Please give us some information about nesting times, if you have it.

.....  
.....  
.....  
.....

3. Lots of people have given us information about the tide and the moon conditions when turtles are nesting. Would you expect local people to know whether the tide was high or low, or whether the moon was full or not?

.....  
.....

4. Some people have told us that our question about the tides is too vague. They say that turtles come up when the tide is getting higher and nest while it is changing. Then they go back as the tide is getting lower. What would you say about all that?

.....  
.....  
.....

5. Some people tell us that turtles actually nest all the year round but there are peak periods. Is that what you think?

.....  
.....

6. If there are peak nesting periods, could you please tell us when they start and finish? If possible, do this for each species.

.....  
.....  
.....  
.....

7. What are the beach conditions like where the turtles nest? Please fill in these questions.

What is the place called? .....

Is there a coral reef? .....

Is the sea very deep off shore? .....

Is there a river near by? .....

Is the beach very steep? .....

Is the beach very wide? .....

What is the beach like? (white sand / black sand / coral / grass ?)

.....

Is there a lot of food for the turtles in the local sea?

.....

.....

8. Would you say that the number of turtles found in your area is going down? If particular types of turtle are getting rarer, please tell us.

.....

.....

9. Would your people be interested in a conservation scheme, if it increased the number of turtles that they could catch? Would they be prepared to protect some turtles and their eggs in order to increase numbers?

.....

.....

10. Is there a local headman we could write to about conservation? We would like to get some outside money to send various villages information about how to increase the number of turtles they have but we need some-one to send this information to. If there is someone - please fill in the name and address below.

.....

.....

Thanks again for your valuable help. We shall process the information and send you our report. Bob Lockhart. Unitech.



### Form 1

The first version of the form asked people to use the pictures to identify turtle species which nest in their area. I think that people actually identified the species that occurred, without direct reference to nesting (some of the forms seemed to say as much). There was nowhere on the form to record whether or not eggs were eaten. The inference to be drawn from people having detailed information on the number of eggs in a clutch is probably that those eggs are habitually consumed, but the form did not specifically ask about this.

I have recorded the information obtained from these forms bearing these points in mind. It may be that I have jettisoned useful information by this policy.

### Forms 2 & 3

Sometimes, people who filled in form 1 gave information about when turtles nest by referring to the phase of the moon, or the tide, or the season (wet or dry). I included questions on these points in forms 2 and 3, but, as it turned out, these did not elicit much useful information. The questions on the phase of the moon and the tide invited responses that may not normally have been given. The question on whether the season was wet or dry made assumptions about local conditions which may be invalid - not everywhere in Papua New Guinea has a well-defined wet and dry season and even in those places where there may be said to be a definite wet season, the time of that season can vary within a few miles of coastline - particularly on islands.

At best, these questions were inappropriately worded. For example, the tide question offered the possible responses: Low or High. Several people informed me that turtles came up with a rising tide and nested when it was on the turn, retreating with the retreating sea. I don't want to discuss whether or not this is typically the case, but I do want to observe that if this were true, people could as well reply "High Tide" as "Low Tide".

There is fairly good evidence that people replied to the questions on tides and moons in a random manner. There is a reasonable inference that turtles tend to nest in the dry season, but that remark needs qualification - it is not clear to me that any two respondents would agree on what constituted the dry season at a given locality.

A problem some people had with my forms was that they were unable to distinguish between the various species of turtle. People certainly confused loggerhead with green turtles and they may well have mixed them up with hawksbill turtles too. Perhaps the relative sizes of the illustrations was misleading - for example, they show the small hawksbill turtle apparently dominating everything else. My attitude was that any information that the form imparted on relative sizing was likely to be spurious, but now I think that I should have altered the illustrations.

I did not attempt to find out whether each informant was discriminating between turtle species until the third version of the form when I asked about this directly and included a request for the local names for turtles. On the basis of the other, more authoritative, work on turtles in PNG [1], my survey has far too many reports of loggerhead turtles. The informal conversations I had with respondents suggest that the situation may not be quite as bad as I once feared, although I would not wish to offer that as evidence for more loggerheads being found here than was previously thought. I am sure confusion occurred. The replies do give some statistical evidence that this was not happening in all cases: very few respondents claimed that loggerheads occurred but not greens, a larger number claimed the reverse. Similarly, far fewer people reported loggerhead turtles nesting than reported green turtles nesting. Later in this document, Angela Balkwill takes this up and also attempts to map the present distribution of marine turtles.

On this question of confusion - it seems to me that in those areas where loggerheads are actually found people could use the pictures to discriminate; but people who had never seen a loggerhead and were only familiar with greens were likely to confuse the two. I have not attempted to substantiate this assertion. It is based on my reading

of the forms and conversations with some of the respondents. But, by rejecting all information except that which I guess to be expert, I have constructed a map of locations where I feel it is likely that loggerheads really are found.

The line drawings of turtles in my forms were about as good as I could have got anywhere. I doubt that even if I had had the means to circulate colour pictures of turtles to my audience I would have much improved the quality of my response. It may be that a postal survey is not the way to get information about species so similar as the loggerhead and the green turtle in the first place, or that it is not to be obtained from the people to whom I circulated the form - perhaps a pidgin version sent to village fishermen would be more successful.

#### On the data recorded

I have tried to report what I have been told as accurately as I can. I have occasionally quoted people directly when I am worried about misrepresenting their views. If their language is unconventional or unusual so far as the particular dialect of English I speak is concerned, no criticism should be inferred on my part: I quote them only to record exactly what I was told.

This is as good a place as any for me to set down that I owe a considerable debt to my respondents, many of whom went to quite surprising lengths to give me good information. I have dwelt on the areas of weakness in my data. Its major strength is that a great number of people were more helpful and informative than I could have reasonably expected. I'm afraid that I did not obtain some of the biological data I had hoped for, but I did reap an unexpected harvest of turtle lore which my dilettante status permits me to include.

I found that I had to do a considerable amount of interpretation when I was setting out what I had been told. I have tried to indicate where this intrudes on my data but it is difficult to do that consistently.

The data gives nothing on population densities. Some respondents gave information on this, and I have recorded their comments in my footnotes, but all I sought to find out was whether turtles were (ever) found and whether they (ever) nested in each location. I did not ask more than that, and more than that is not recorded on my maps.

### Locations

In Papua New Guinea, the official maps often record places under names which their inhabitants would question. In some areas, villages spring up or die in a very short time and this may be particularly true of places near to the estuaries of rivers. I have relied on a large map of Papua New Guinea issued by the National Mapping Bureau in 1986 [NMB 85/0036] for most of my references, sometimes using another map, by Robert Brown & Associates [1985 - no reference] for additional help. There were places which I simply could not find. There were also places that I did manage to locate on other maps, or as a result of conversations with my colleagues at Unitech. I always give the respondent's account of the location and place name of his/her area, in case I have been misled by similar names, or poor information.

### Conservation

Although no part of my forms mentioned conservation, this was brought up by a sizable minority of the respondents. It seems to me that the general situation with respect to turtle populations in Papua New Guinea is very grave indeed. Unless something is done, soon, this country will lose the bulk of her marine turtle resources. In many areas it is probably already too late.

Where the forms came from.

<u>Forms.</u>	<u>Address.</u>	<u>Province.</u>
1001 - 2080	University of Technology	Morobe
2081	Daru Provincial High School	Western
2082	Kambubu High School	E. New Brit.
2083	Brandi High School	E. Sepik
2084	Boisen High School	E. New Brit.
2085 - 2089	St Xavier's High School	West Sepik
2090 - 2100	Popondetta High School	Oro
2101 - 2123	Sonoma Adventist College	E. New Brit.
2124 - 2144	University of Technology	Morobe
2145	Pombrut Community School	Manus
2146 - 2180	Aiyura National High School	E. Highlands
2181 - 2193	National Fisheries College	E. New Brit.
2194 - 2195	Angoram High School	E. Sepik
2196 - 2198	Dregerhafen High School	Morobe
3199 - 2211	University of Technology	Morobe
2212 - 2214	Field Workers from Unitech	W. New Brit.
2215 - 2221	University of Technology	Morobe
2222 - 2224	Siassi High School	Morobe

2225 - 2229	Hutjena High School	North Sols.
2230 - 2237	Cameron High School	Milne Bay
2238 - 2276	Kerevat National High School	E. New Brit.
3277 - 2299	University of Technology	Morobe
2300 - 2306	Hutjena High School	North Sols.
3307 - 3311	University of Technology	Morobe
2312	Kikori Vocational Centre	Gulf
3313 - 3320	University of Technology	Morobe

How the questionnaire information is represented here.

Each completed form received was given an identifying number and most of the standard information in the form was encoded numerically in rows with one row to each form. Footnotes provide additional information where necessary. This information is given -

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
XXXX	XXXXXXXX	XXXXXXXX	XXXXXXXXXXXX	XXX	XXXXXXXX

**Form:**

Digit 1 1, 2, or 3 indicating which version of the questionnaire this is.  
Digits 2 to 4 a unique identification number.

**Tnumber:**

Digits 1 to 4 these refer, in order, to:  
loggerhead, green, hawksbill and leatherback turtles.

- 0 = The Turtle is not found.
- 1 = The Turtle is found and does not nest.
- 2 = The Turtle is found & nests.
- 3 = The Turtle is found, nesting information is not given.
- 4 = It is not stated that the turtle is or is not found.

If there is some element of interpretation on my part in this information I have simply added 5 to each of these numbers, getting a range of 5 to 9.

Digit 5

indicates whether the respondent can tell the various species of turtle apart using the pictures provided in the form.

- 0 = No information is available.
- 1 = The respondent claims to be able to tell the species apart.
- 2 = The respondent indicates some uncertainty or says that he/she is likely to be confused.
- 3 = I have evidence that confusion is not occurring.
- 4 = I have evidence that confusion is occurring.

Digit 6

records whether a footnote gives more information from this form and whether the form was anonymous or not.

- 0 = There is no further information and the form was anonymous.
- 1 = Further information is provided but the form was anonymous.
- 2 = There is no further information, but the form was signed.
- 3 = There is further information and the form was signed.

Digit 7

gives conservational information.

- 0 = No mention is made of conservation.
- 1 = Some mention is made of conservation.
- 2 = No mention is made of conservation but the respondent does say that turtle numbers are declining.
- 3 = Turtle numbers are declining and the respondent endorses conservation.
- 4 = Turtle numbers are stable or increasing, conservation is not mentioned.
- 5 = Turtle numbers are stable or increasing and conservation is endorsed.



### **Location.**

This is the respondent's account of the place of which he/she is writing. Sometimes, places are located by referring to the nearest large town, river, or mountain. On the few occasions in which I have suggested a place not mentioned in the form I am dealing with, I have marked my action by pre-fixing a star - \*Lorengau.

### **Month Nest.**

This is a twelve digit number with each digit corresponding to a month, January through to December. This is the code:

- 0 = It is not claimed the turtles nest in this month.
- 1 = It is claimed the turtles nest in this month.
- 2 = Turtles do occasionally nest in this month but it not a peak time.

If I have interpreted the respondent's views and reported something which is not specifically stated I have added the number 3 to the corresponding value - getting a number between 3 and 5.

### **STM**

This is a three digit number which specifies the Season when turtles nest, the state of the Tide, and the phase of the Moon.

#### **Season:**

- 0 = No information, or turtles do not nest in this place.
- 1 = Wet season.
- 2 = Dry season.
- 3 = Either there are no wet and dry seasons or they do not affect turtle nesting.

**Tide:**

- 0 = No information, or turtles do not nest in this place.
- 1 = High tide.
- 2 = Low tide.
- 3 = The tide is not relevant to turtle nesting.
- 4 = It is not as simple as this question suggests.

**Moon:**

- 0 = Not known.
- 1 = Full moon.
- 2 = New moon.
- 3 = Moon not up, or no moon.
- 4 = More information is given in the footnote.
- 5 = The phase of the moon is not relevant.

**Predation.**

Sometimes information on the predation of turtles by local people is included. A five digit code is used. Digits 1 - 4 represent the species: loggerhead, green, hawksbill and leatherback. The last digit gives a general indication of turtle predation in this area (some people do not identify which species are involved and the first version of the form did not ask).

- 0 = No claim is made that the eggs or the turtle are eaten.
- 1 = The turtle is eaten.
- 2 = The eggs are eaten.
- 3 = The turtle and its eggs are eaten.
- 4 = The turtle is eaten but not its eggs.
- 5 = The eggs of the turtle are eaten but the turtle is not.
- 6 = Neither the turtle nor its eggs are eaten.
- 7 = More information is given in the footnote.

Questionnaire Information from Western Province.

There are few people in Western province and we did not get many forms from there. Generally, I think that the information we did get is not very reliable. Probably, some of the reports are of fresh water turtles [see 2144].

There are six forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1038	0700030	Daru	000000000000	000	03003
2081	2220430	Brable Key	110000111001	130	33363
2104	2220033	Daru	000001101100	321	33363
2144	2444430	Somogi I	000000000000	000	30003
2187	2200000	Daru	111110001111	212	63663
3320	2220130	Daru	100000000011	221	33363

Further Information.

1038 Turtle meat is the second best meat in Western province! Green turtles do nest.

2081 Location given as Brable K. I think this might be Bramble Key which is due west of Daru. The respondent says that the location is on the border with Australia, and that he is prepared to assist us but that the problem is that, lying so close to the border, he would need permission from the government of Queensland. The respondent is a teacher from Daru Provincial High School. He filled in five copies of the form, all with the same information. He also states that turtles do not nest in his area.

2104 Turtles are common and nest. People don't often kill turtles in this locality but many are eaten in Daru as are the eggs. The respondent is worried that turtles are being wiped out and wishes something to be done to preserve them for future generations.

2144 Somogi Island in the fly river. The loggerhead is the only identified turtle. It and its eggs are taken. The respondent then goes on to say that the turtles he is talking about are fresh water turtles. It seems to me that it is likely that the fly river turtle is being described.

3320 The local language is Kiwai. Turtles nest at any time of the day.

Questionnaire Information from Gulf Province.

Gulf is rather sparsely populated. There were not many replies from the considerable number of schools we wrote to and what we did get did not seem very consistent. Over half of the forms received were of the first type, which may explain the poor quality of some of the information. There are eleven forms.

Form.	Tnumber	Location.	Month Nest.	STM	Predation.
1017	2255020	Kerema	000000000011	000	00001
1031	9969430	Iokea	000000000000	000	00001
1057	8855000	Kerema Town	000000000000	000	00001
2103	2311030	Baimuru	000000001110	111	30663
1129	2299330	Kerema	000000000011	000	00001
1142	9899230	Baimuru	000000011000	000	00001
1143	8844030	Baimuru	000000000000	000	00001
3143	4255133	Baimuru	001000000000	222	03333
2217	2929310	Lou Village	000000000000	020	30703
2312	0200020	*Kikori	000000000010	112	63633
2313	2299430	Terapo	000001100000	225	33003

Further Infomation.

1017 Turtles nest and are good to eat.

1031 Iokea is near the Biaru river, on the coast, some way east of Kerema. The respondent has seen few turtles and does not eat them although some people do. The ones he has seen were large and he thinks they must have been old. He has no nesting information.

2103 Mapaio, near Baimuru. This is exactly south east of Baimuru, inland, and on the Ivo river. Turtle eggs and meat are sometimes on sale here (so the fact that the eggs of the green turtle are eaten although no statement about nesting is made does make sense). The informant makes an interesting comment to the effect that turtles can be domesticated - kept in ponds and reared for their flesh and eggs. I wrote to him about this and have not yet had a reply.

1129 Turtles are good to eat. Green and loggerhead turtles are found locally, green are common and loggerhead are rare. Not many nest. Those that do choose sand bars which vary from year to year and are susceptible to high tides. [Some of this information came in an interview with the respondent].

1142 The Purari delta in Baimuru district. Medium sized fresh water turtles {fly river turtles?} and large sea turtles occur and several types are involved. The fresh water turtles and the sea turtles both nest {at different places in?} the Purari delta. The drawings in the form are not clear enough for the informant to decide which sea turtles occur. The picture that most resembles what he has seen is that of the green turtle and on that basis that drawing was circled. Turtles are good to eat.

1143 The two forms 1142 & 1143 came in together from Unitech. Turtles are good to eat. There is one kind of turtle that the form does not show. These are small turtles, about 10 cm long and commonly found in the local swamps. Forms 3 & 4 were sent to this respondent.

3143 This is from the person who completed 3143. The information is slightly different (but then so is the form). The local Language is called Koriki and all turtles are called "Maireiaii" although the respondent says that there probably are names for each kind which he could find out. The information on hawksbill and leatherback turtles is completed in a puzzling way - they are not found, but they are eaten, and they don't nest but their eggs are eaten. No information is given about loggerheads, greens are stated to occur, nest, be eaten and have eggs that are eaten. Turtles start nesting in March, in the early morning when it is cool. The small turtles described in 1143 are called "Eikia Maireiaii". These nest in the wet season mainly, and are plentiful then, but they can be found nesting all the year round. The respondent says that the survey had motivated him to take an interest in turtles. He knows little about them and regrets that, his home being so far away, he cannot go there and get better information. This information is given in form 4: local people would certainly know whether the tide was high or low and the state of the moon when turtles nest. Turtles nest as

described - coming up with the high tide and going back as it falls (he actually says "return into the river" so may be talking of fresh water turtles again. Turtles do nest all the year round with peak periods "once every quarter of the year". This apparently means that turtles start nesting at the end of March and continue to the end of April, thereafter, this pattern is repeated every four months. The different species nest together in this way. The area he describes has these features: no coral reef, shallow water, a local river, the beach is neither steep nor wide and is grassy. The big sea turtles are heavily fished and getting rarer. Swamp turtles are still plentiful. There is a lot of food for turtles in the local sea - they feed on a palm tree called "Nipa palm" (this is common in Gulf province) and they particularly like the young shoots. The respondent thinks that the local people would like some help to conserve their turtles and that not much is being done. The address given is Koravake village, near Baimuru.

2217 Lou village, Kerema. Two species of turtles nest in the area. The loggerhead is certainly eaten but the respondent is not sure about the hawksbill. He does say that when the villagers see the hawksbill turtle off the rocky coastline, they start checking the "caves" for eggs because that is where the turtles lay their eggs. I would have liked to get more information about this but the form was anonymous.

2312 Veribari village, in Kikori district.

2313 Terapo is near to Malalaua, on the Lakekamu river. Loggerhead and green turtles are found in the rivers (estuaries?) but leatherback and hawksbill turtles are found in the seas. The respondent requests more information about leatherback and hawksbill turtles.

Questionnaire Information from Central Province.

This province includes the National Capital District. It is probably true that a large number of the students who filled in questionnaires were the children of civil servants. They would have been brought up in the town and visited their father's village only during vacations. For this reason, some of their information may well be fairly inaccurate - and a few people said as much in the forms. There are twenty - nine forms.

Form.	Tnumber.	Location	Month Nest.	STM	Predation.
1009	7755011	NCD	000000000000	200	00001
1014	5755332	Kairuku	110000000001	100	01001
1015	5885030	NCD	000000011100	000	00001
1021	5655000	Central Prov.	000001100000	200	01001
1022	2200310	Central Prov.	100000000111	000	71001
1047	8880030	Rigo Coast	000000000111	000	11107
1055	5755010	Port Moresby	000000000001	000	01001
1070	8855030	Kupiano	222222222222	000	00001
2074	1114032	NCD	000000000000	000	44404
2078	2220030	Port Moresby	100000000001	111	33363
2113	2220030	Aroma	000000000000	314	33363
2123	1144330	Marshall Lag.	000000000000	000	11001
2154	2200013	Hood Lagoon	000000000000	000	13003
2166	0200000	Marshall Lag.	000000000000	000	63663
2167	1110010	Gabagaba Vil.	000000000000	000	44464
2169	1110410	Hula	000000000000	000	33363
2174	2220020	Marshall Lag.	000001100000	122	33663
3200	1200110	Rigo district	000000000000	222	22002
3203	1110130	Gaba gaba Vil.	000000000000	000	11101
3207	3300132	Kapa Kapa Vil.	000000000000	000	11661
2242	0220020	Port Moresby	000000001110	122	63363
2266	2220030	Aroma Coast	000000000011	122	33363
2275	2200400	Port Moresby	000000000000	222	33663
3284	1100010	*Bereina	000000000000	000	33663
3286	1200132	Hiri East	000000000000	000	33663



3295	3220130	Yule I	100000000001	112	73363
3296	1220130	Pari Village	100000000011	112	43363
3309	4244130	Aroma	111000000000	111	04004
3314	2224330	Viriolo Vil	000001100000	112	33303

Further Information.

1009 NCD is the national capital district. The location is given as Vabukori village. Two kinds of turtles nest and are good to eat. Turtles in PNG should not be harmed.

1014 Kairuku is on Yule island near the western border of the province and due south of Bereina. Green turtles occur but are becoming extinct as a result of the activities of foreign fishermen (this information is reported as coming from a village fisherman).

1015 Turtles are good to eat and they do nest locally but more than that is not known. The respondent claims that his people come from the Ela beach area and that "Ela" means turtle in their language {personal communication}. There are no turtles there now. I have since heard that although this information is doubtless in good faith alternative derivations of the word "Ela" are thought more likely {personal communication: Glen Lean}. But see 3296.

1022 Central Province (East Papua). Only two types of turtles occur. The loggerhead is quite rare. Green turtles are caught and eaten but loggerheads are not good to eat.

1047 The location is given as the East Rigo coast, Gabone. I have seen Gabone marked on a map as being south west of Kwikila and not quite on the coast. Turtles nest in the last 3 - 4 months of the year and are good to eat. The local people take every one they can find. [See form 3203].

1055 Gabadi village is five kilometres from the beach and near to Port Moresby (I could not find it) so the respondent is not well - informed about turtles. Turtles nest and are good to eat.

1070 Aroma coast - west of Kupiano. Turtles nest at any time of the year and are good to eat. It is not known which species nest. The respondent marks the green and loggerhead turtles as occurring and has written the word: "Marina" beneath the pictures of the green and loggerhead turtles and the word: "Rolu" beneath the pictures of the hawksbill and leatherback turtles. All of these words were subsequently crossed out. It was this that finally persuaded me to include questions on local names for turtles (in form 3).

2074 Hanuabada - a village in the national capital district. Turtles occur very rarely and hardly nest at all. All three identified species are eaten when found. The respondent offers to contact his village elders for nesting information but says nesting hardly occurs nowadays.

2078 Porebada - a village a little to the west of Port Moresby.

2113 Aroma, Central Province, near Kupiano (Marshall Lagoon). Many turtles occur here and fishermen bring them back each time they go out fishing. Turtles are often seen swimming and they do sometimes come up to nest. The months of nesting are not known, but turtles nest in both the wet and dry seasons, when the moon is new or full and the tide high.

2123 Marshall Lagoon, Central Province. This is not marked on my map but lies on the coast near Kupiano. The green and loggerhead turtles are found here but nesting does not occur.

2154 Hood lagoon is approximately longitude 148 degrees east. The writer is not sure whether loggerhead eggs are consumed or not. He has no information about the time of nesting and says that he does not now see many turtles and attributes this to human predation. He thinks that turtles should be farmed or that there should be restrictions on catching them.

2167 Gabagaba village is on the coast and almost exactly west of Kwikila.

2169 Hula, near Port Moresby (this seems to be the coastal village due south of Kwikila). None of the three named species nest but they, and their eggs, are eaten. [This is not entirely unbelievable, gravid females are often caught, perhaps that is what is happening here, or maybe there is a trade in imported eggs from outlying areas].

3200 Rigo sub district. There is a village called Rigo due west of Kwikila and a little way inland. I've only seen it on one large map. The local language is Motu and the respondent apologises about the quality of the information which he says is probably unreliable, although given from the best of his recollections. Turtles rarely nest here.

3202 Gaba Gaba village is given as in Rigo sub - province (see 2167). The local languages include, Motu, Sinaugoro, and Barawaia (Rigo). Turtles don't nest locally. They move into the bay around this area between August and the new year and then they may be harpooned for food.

3207 This village in the Rigo sub-district is on the coast and due west of Kwikila. The respondent claims that he can distinguish the pictures on the basis of the shape of the shells and the scales. There are three language groups in this area and they are: Motu, Sinaugoro, Balawaia. In his grandfather's time, turtles were regularly brought in by the local fishermen. Now they occur rarely.

2266 Local people catch turtles for food and to use the shell for decoration and jewellery. Turtles and other sea creatures visit the reefs when the tide is running strongly and the moon is full. They depart when the tide goes down, leaving just a few behind.

3284 Pinu village in Bereina sub-province. The local language is called Gabadi. People rarely hunt for turtles here - whether this is because turtles are rare or not is not said.

3286 The location is given as Hiri East, which I take to mean a district in Port Moresby. The local language is Motu (Hiri). The number of turtles captured each year is declining.

3295 Yule Island is on the western border of Central province. The local language is called Roro. Loggerheads are not eaten and no information is provided about whether they nest.

3296 Pari village, National Capital District, is just east of Port Moresby town. The local language is Motu. The green turtle is called "Usi Kaka" and the hawksbill turtle is called "Era". This fits with what I was told by respondent 1015, and indeed, 3296 starts to tell the same story about the meaning of Ela beach, but for some reason he crosses it out. It seems clear that the story is widely believed by the people of this area and, on this evidence alone, may well be true.

3309 Aroma. The local language is Aroma. The local name for green turtles is Gaogao. The respondent seems to report that, although they are eaten and they nest, their eggs are not eaten.

3314 Viriolo is marked as inland and on the Bomoguina river on one of my maps. It is approximately thirty kilometres due east of Kupiano. The local language is Hula, and these words are reported for the turtle species: loggerhead = "Aovuna", green = "Aoa", hawksbill = "Gela". Most people will kill turtles for their meat and shells and to sell for money. The majority are killed in November and December. Here are some similarities and differences.

Aoa - white eggs, specific taste to the meat and eggs, swims in a characteristic way.

Aovuna - same white eggs as above. The meat and eggs is distinct from the Aoa. Most people relish the taste of the meat. Its head is much bigger and (the turtle? the head?) is much shorter than other species.

Gela - brown eggs. Again distinctive taste to eggs and meat. Few people kill it for its meat because it is just too smelly, but they do kill it for its shell.

This respondent obviously is an expert on turtles. I have written to him for more information.

Questionnaire Information from Milne Bay Province.

Most of the people who provided information from this province were students and perhaps would only go home during the Christmas holidays. That may explain the emphasis on December as a month when nesting occurs. There are forty - six forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1002	8884030	Kwairaiwa I	000000000001	000	00001
1004	9229030	Guasopa	000000000000	000	00001
1006	8884010	Garuahi	100000000011	000	00001
1010	9199030	Fergusson I	000000000000	000	01001
1011	8889030	Sibalai	000000011111	000	00001
1012	9889020	Alotau	000001100000	000	00001
1026	9799000	Conflict Is	000000000000	020	01001
1033	9799030	Misima	000000000000	000	01001
1035	8889030	Trobriands	000011000000	000	00001
1037	7789310	Sariba I	000000000000	001	00001
1044	8889430	Tewala I	000000000000	021	00001
1052	7799000	Conflict I	000000001111	000	00001
2066	5222332	Kitai I	222222222222	214	03333
3066	0222032	Kitai I	222222222211	214	73333
2160	4244000	Trobriands	000000011000	211	03003
2177	2222030	Normanby I	000000000000	222	33333
2179	2220010	Liak Village	000011000000	112	33663
2184	1220010	Losuia	222222222222	211	33363
2191	2224330	Gumawana I	222222222222	244	33303
3199	2224110	Guasopa	000111110000	222	33303
3201	1114130	Cape Vogel	000000000000	000	33303
3205	2220100	Samarai area	000000000000	210	33363
2230	2244030	Savaia	000000000001	112	33003
2231	4424030	Goodenough I	000000000000	225	00303
3232	1224020	*Kitai I	000000000000	312	33303
2233	2220010	Bilabila	000000000011	211	33363
2234	2220032	Alotau	000000000001	211	33363
2235	2222020	Misima I	222222222222	112	33363
2236	1220030	Brooker I	000000000111	212	63363

2237	2221031	Kiyaha Vill.	111100000111	315	33313
2239	1110030	Misima I	100000000111	312	33363
2246	2200410	Esa'ala	000000000011	222	33663
2248	1220030	Esa'ala	000000000011	222	43363
2249	2200030	Goodenough I	000000000001	221	33663
2256	0200010	Bou Village	111000000000	222	63663
2261	2221010	Ware Island	100000000001	221	33363
2269	0000010	Esa'ala	000000000000	000	00000
2276	2210030	Alotau	000000011111	222	33663
3281	2244231	Misima	000000000011	200	33003
3285	1114130	Misima	000000000000	000	33303
3287	2200133	Calvado Is	100000000011	224	33663
3288	2100130	Fergusson I	000000000000	022	34663
3289	2220130	Conflict Is	111100000111	321	33303
3317	2224112	*Kiriwina	110000000011	121	33303
3318	2224110	Calvados Chain	111000000011	212	33303
3319	1140130	Dobu I	000000000000	000	11061

Further Information.

1002 Kwairaiwa Island in the Engineer group. I can find Kwailaiwa (Watts) on the map. More than one type of turtle nests. The peak period is December.

1004 Guasopa sub-district on Woodlark Island. Green and hawksbill turtles nest.

1006 Garuahi is given as the place, near Alotau. My map mentions a small village called Garuai which is on the coast and just north of Alotau and this is marked Garuahi on other maps.

1010 The contact address given is PO box Salamo. This is a town on the south of Fergusson Island, which the respondent also names. It is just north of Esa'ala. Green turtles are found, hunted for food and do not nest.

1011 Sibalai in Samarai district is on the mainland and just north of Suau. Several types of turtle nest locally, some are good, some bad to eat.

1033 Misima is a large island in the Louisiade archipelago. The respondent says he does not know whether more than one type of turtle occurs.

1035 More than one kind of turtle nests and nesting occurs when the south - east wind is blowing, usually from May to June. The turtles are good to eat. The respondent informs me of a turtle in the Trobriands that lives both on the land and in the sea and which lays eggs. He says this is called a tortoise (people often call terrapins tortoises in PNG). I sent him forms 3 & 4 and asked for more information.

1037 Sariba Island (just off the coast from Samarai). Turtles nest at full moon. Green and loggerhead turtles are described as the most common ones, hawksbill are rarely found, they "live on the outer islands".

1044 Tewala Island Esa'ala district. More than one kind of turtle nests and they are good to eat. The respondent identifies green, loggerhead and hawksbill with small crosses and puts nothing against leatherback. He goes on to say that some of the turtles, e.g. hawksbill and leatherbacks (and writes: Le and Ha - appealing to the mnemonic of the form) live in an area where there is a lot of sand. It is possible that he has the wrong key with the right pictures.

2066 Kitai Island (Tubetube) in the Engineer group. Loggerheads do sometimes occur but do not nest. Formerly, loggerheads occurred occasionally (19 years ago) now they are really rare, although they are sometimes encountered when large numbers of green turtles come because they hide in the crowd. On the other hand green turtles and leatherbacks are very common. Hawksbill are sometimes found and sometimes nest. Turtles nest at any time of the year, particularly the dry season. They nest when the moon is new and when it is full. A large turtle of 2 - 2.5 metres is described. It is a creature of the deep ocean and its local name is Wadala. He says it may nest. (It sounds like a leatherback - but he has already identified that). Forms three and four were sent to this respondent

3066 This is the additional information obtained from 2066. The local language is called "Tube tube". The respondent is not exactly sure of the nesting times of turtles but thinks they occur in the months he gave in form 3. He agrees with my question about tides in form four: turtles come up with a rising tide and nest as it turns. He also agrees that turtles actually nest all the time, with peak periods. He gives the alternative name of Kitai island for Tube tube and agrees that the large turtle he describes may well be a leatherback: "the Wadala is infant the LE. They are often seen in the deep seas. They grow as big as 2 - 3 metres in length". In the new form he states that loggerheads are never seen now and that they are not eaten. These are the features of the beach he is talking about: the beach is clear of reefs, the sea is deep off shore, there are no rivers in the vicinity, the beach is neither wide nor steep and is made of white sand with grass cover. The respondent did not fill in the question about being able to tell the various species apart.

2177 Normanby is one of the three largest islands in the D'Entrecasteaux group. The respondent identifies all species as occurring and nesting and says that in all cases they and their eggs are eaten. He also states that there might be quite a lot of turtle species in the seas of Milne Bay, so it is possible that his information is conjectural.

2179 Liak village is a coastal village on the north coast of Misima island.

2184 Losuia district is an administrative district in the Trobriand Islands. The loggerhead's eggs are eaten, but it does not nest.

2191 Gumawana Island is one of the islands of the Amphlett group (not marked on my map). The administrative district is Esa'ala, so it will be somewhere near Normanby island. The three identified species definitely nest locally. The turtles nest in every month and in the dry season when the evenings are warm and darkness starts to fall.



3199 Guasopa, on the south east of Woodlark Island. The local language is called Muyuw. The respondent indicates his desire to help me and says that he shall find out more about turtles when he is on holiday during Christmas. Unfortunately, the form was anonymous.

3201 Cape Vogel is on the mainland north coast of Milne Bay, close to the town of Mukawa. The local language is Gapa Paiwa. The general name for turtles is "Vonu". There may be specific names, the respondent is unsure. It was not asserted that turtles nest but eggs are eaten. People no longer regard turtles as a major item of their diet because they are believed to cause boils.

2230 Savaia, near Samarai. This is the coastal village on the mainland and a little west of Suau.

2231 There are a lot of turtles here. The eggs used to be collected(?). The respondent has not seen the turtles nesting but she has often seen them killed. Eggs and turtles are eaten. She only positively identifies hawksbill turtles but does not say the other species do not occur. Turtles nest in the dry season.

2233 Bilabila is somewhere near Samarai.

2234 There were many more turtles in the past. Turtle numbers are decreasing due to excessive predation.

2236 Brooker Island lies between the Conflict Group and the Calvados Chain.

2237 Kiyaha Village (which I have been unable to find) near Alotau. Leatherbacks are not often seen and are usually caught by accident, whereupon they are eaten. The phase of the moon is not really relevant to turtle nesting, although they do seem to prefer new moons or moons in their last quarter. The respondent asks whether the wildlife authorities could establish small turtle farms in the Milne Bay area which would provide work for young people and preserve turtles. I sent him the Greenpeace leaflet on turtles.

2239 The indicated turtles are found but none nest. However they do nest on small off-shore islands. People do not go out hunting for turtles but they do kill any that they find.

2246 This respondent is clearly unsure about loggerheads. He says that he has seen lots of turtles when travelling in the Dobu strait [see 3319].

2248 There are lots of turtles in this area and one came ashore during the Christmas holidays and was killed and eaten.

2249 Turtles lay more than 400 eggs, usually in the sand under shady trees.

2256 Location: Bou, near Alotau.

2261 There is a Wari Island at 151 degrees east and 11 degrees south. The respondent says his information covers Ware and the small, outlying islands.

2269 This informant merely reports turtles are found and do not nest. He clearly knows no more than that, and the address is not good.

2276 Unfortunately, the address given was simply Alotau. The respondent finds turtles fascinating and says you can see turtles coming in to feed on the sea grasses on clear mornings. He also finds it pleasurable to watch ten or twenty heads popping up to take air each time you look out to sea. He has often nearly collided with turtles while sailing in his outrigger canoe. He says turtles nest when there is a clear new moon with no cloud in the sky.

3281 Misima district. The local language is Pana Panaeati (Misima) (there is a small island called Panaeati to the west of Misima). The respondent is from a town and says his information comes from recreational experience during Christmas breaks. He says that he is pleased that someone is taking an interest in wildlife in PNG. He feels it is important to present the people with the facts about conservation, so they can consider the issues properly.

3285 Misima island - the language is Pana Misima. Turtles don't actually nest on Misima but in various small islands to the south: Motorina, Panaeati, Brooker, and the Conflict group which is 60 - 80 kilometres south west. The respondent is not sure whether leatherbacks are found or not.

3287 The Calvado islands lie due south of Misima. The language spoken is given as the Misima language. Turtles nest when the moon is between half full and full, and on uninhabited islands. The traditional way of telling that turtles are coming up is that the clouds are then "puffy" in the sky. Turtles are plentiful here. Some are tamed and kept by children which makes their eventual capture easier. Some of them are huge and have green algae growing on their shells. The respondent is afraid that turtles are in danger due to the local people and their love for turtle meat.

3288 Nade, Salamo, (Fergusson island south coast). Turtles occur and nest on rare occasions. The local language is Dobu and the word for the turtle identified as a loggerhead is "Wedala". Turtles are often seen locally, particularly between 5 and 10 pm. They surface for air and make a loud sound. During the day they hide. People fish for them with lines in the evening. People also dive for them at a reef out in the open sea. They usually manage to get at least one by this method. The respondent once saw a turtle nesting locally (the beach is not sandy and there is a lot of disturbance so this is rare). He and his friends killed it for meat.

3289 The local language(s?) are Misima, Ware, Tube tube. Turtles nest on isolated, small, sandy islands in the change from the dry to the wet seasons. This respondent was brought up in Port Moresby and so is not an expert on turtles. His information comes from conversations with his fellow villagers. He says that he would like to help and offers to obtain more detailed information when he goes on leave next Christmas. He remarks that he has never seen a turtle looking like the picture of a leatherback and that this must be a rare species.

3317 The location given is the north east part of the main Trobriand island. The local language is Kiriwina. Turtle numbers are declining. They don't nest as they used to and now people are forced to sail to isolated islands to get the eggs.

3318 The local language is Misima. The respondent has no idea about the leatherback turtle. He/she grew up in Alotau and only goes home during the Christmas holidays. Turtles mostly nest on remote islands. The number of eggs they lay depends on their size.

3319 Dobu island is off Normanby island, a little to the east of Esa'ala. The local language is Dobu and turtles don't nest here but the respondent has heard of a nesting ground on a small island between Fergusson island and Woodlark. He says he shall attempt to get more information for me.

Questionnaire Information from Oro Province.

This is a fairly sparsely populated province. The forms come from areas all round the coast. Many were from Popondetta High School. There are sixteen forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1040	9984010	Popondetta	000100000000	000	00001
2090	2220330	Sefoa	000000011100	212	66666
2091	2222000	Wanigela	000000010000	224	33663
2092	2244030	Ambasi	000001000001	221	33003
2093	4244030	Sefoa	000001100000	214	03003
2094	2222030	Buna	100000000001	135	33333
2095	2220030	Erero	000001110000	221	33363
2096	3333030	Gona	000001000001	221	11001
2097	2220030	Ambasi	000001000001	212	33363
2098	2220030	Pongani	001111110000	114	33363
2099	2200030	Wanigela	111111100000	112	33663
2100	2244033	Uiaku	000000000001	222	33003
2119	2221030	Polu	111100000000	112	63343
2140	2220030	Spear Point	000001110000	221	33363
2264	1100410	Gona	000000000000	000	33663
2278	0222310	Sinei	000001100000	221	03363

Further Information.

1040 More than one type of turtle nests here and they occur at different times of the year.

2090 Sefoa is north east of Tufi, just across a small inlet. Green, loggerhead and hawksbill turtles are found around Tufi and nest there. People catch them for fun, when trawling, diving, or just paddling, but they do not usually harm them or eat their eggs - they do sometimes sell the turtles at Tufi local market. Places where turtles are commonly found include: Merevi (not known), Kikita (not known), and Berobuna (north west of Tufi and round the

headland). All of these are close to Tufi and green and hawksbill turtles are common. The respondent describes an encounter he had with two mating turtles while he was diving with his uncle during the Christmas holidays 1988.

2091 Wanigela is mid way between Tufi and the border with Milne Bay province. All four types of turtle are reported as nesting and the respondent says that only Loggerhead and Green turtles and their eggs are eaten. Turtles nest when the moon is about to rise. After laying: "...the mother turtle goes back to the sea forgetting all about the young ones".

2092 Ambasi - a sizable village in the northern coastal area of the province. Turtles are not seen by man except when they are caught or when they are nesting. They lay lots of eggs - how many depends on the size of the turtle. People who know how can identify the turtle nests and dig out the eggs with their hands or a spade.

2093 Initially, the respondent circled the loggerhead but then changed her mind. She says turtles nest when the tide is high and the sea calm. She says that both the turtles and their eggs are eaten by people and that their shells are used to produce jewelry.

2094 Buna is a coastal village north east of Popondetta. Turtles nest at high or low tide and when the moon is full or new - I assume that the respondent means the tide and moon are irrelevant. He invites me to write for more information.

2095 Eroro is in Oro bay, east - south east of Popondetta. Female turtles lay eggs when there's nobody around. They dig holes about a metre deep, lay the eggs and cover them up again. The number of eggs laid depends on the size of the female - 100 or more can be laid. The eggs hatch after one and one half months into fine baby turtles, lizards, snakes and crocodiles. These (animals) then make their way to where they are supposed to be. [It may be that this respondent is quoting from a reference book - see 2098].

2096 A confusing form. The respondent specifically states turtles do not nest in her area (which she gives as Gona village, due north

of Popondetta) but she goes on to say that nesting occurs in December and June, during the dry season when the moon is full and the tide low. The last few forms have been from Popondetta High School. Perhaps the respondent is copying some of her information. She does say that although turtles don't nest in her area, they are often caught by fishermen and are sometimes found in rivers. It is possible that her nesting information is based on some other area.

2097 Waioletutu, Ambasi north coast. The respondent asks why we are collecting information on turtles and clearly suspects a commercial motive. I wrote to him about this.

2098 Pongani (just south of Eroro). Turtles live in the sea, survive by eating reefs, and lay eggs in holes on the land when they wish to reproduce. From these eggs hatch out turtles as well as snakes, lizards and crocodiles (although some are eaten by local people). This is obviously the same story as 2095. Whether this is a child's story, a local story, or a version of something read, is unknown to me, but I have had a similar (verbal) report from a Unitech student from West New Britain.

2099 Turtles are mating from August to October and nesting from January to July.

2100 One map I have seen records is a village called Uiake midway between Wanigela and the border with Milne Bay province. This respondent states that she is upset when people kill turtles unnecessarily (which her father does) and that she lectures people about this when home on holiday. She says that she has learned about the importance of the environment at school. I sent her a postcard supporting her viewpoint. She says that green and loggerhead turtles are eaten, and their eggs.

2119 Polu, Lower Musa. The Musa river reaches the sea about halfway between Tufi and Pongani.

2140 I think that Spear Point is somewhere on the headland near Tufi. The respondent states that turtles were eaten in the past and says that he ate them himself when ten years old. It would be

against the traditions of some clans NOT to eat turtles, he says. Turtles are common in the Tufi area where most people do not hunt them. They are sometimes caught and kept in special areas for fun. They attract tourists.

2264 I doubt that the respondent realised there were questions on both sides of the form. He/she claims that turtles nest locally, and that loggerhead and green turtle eggs are eaten, and that none of the illustrated species nest locally.

2278 Sinei village, on the northernmost part of the headland that includes Tufi. All turtles are called "Igo" at Sinei village. The hawksbill is found on the reefs and the leatherback, (which is light blue and has a soft shell) is found only in deep water. It can be 2 metres long. Green turtles are found along the beach. This information was provided to my respondent by an elderly man from Sinei village. My respondent took the trouble to seek him out. He himself comes from Mount Lamington and knows nothing of turtles.



Questionnaire Information from Morobe Province.

Morobe is well populated in comparison with other provinces but most people don't actually live on the coast. The large nesting beach of leatherback turtles just outside Lae is worthy of note. Turtle shells are often on sale in Lae in one of the shops which specialises in goods from PNG and from street traders. These are usually from green turtles but I once saw a trader selling a loggerhead shell (May 1989) which he said had come from the Morobe Patrol Post area. There are twenty forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1042	7755030	*Morobe	000001100000	000	00001
1051	4442031	Busama	100000000111	000	00055
2064	1111030	Siassi I	222222222222	335	33363
1065	1114010	Siassi I	000000001111	000	00001
2121	2200030	Labu	000000011111	112	33663
2127	2244033	Morobe South	110000000001	222	33003
2127	2222033	Sappa Beach	111100000111	244	33333
2130	1141030	Bukawa	000000000100	222	13013
2141	2220010	Laugui	000000111111	112	33363
2150	2220032	Bukaua	000000000000	224	33363
2158	2244012	Finschhafen	000000011000	211	33003
2164	4144012	Taimigidu	000000000000	000	03003
2188	0220430	Morobe	110000000001	224	33333
2196	2424010	Sialum	222222222222	335	30303
3202	2222130	Wasu	100000000011	110	33333
2222	4224030	Tuam I	000000000111	221	03303
2223	4224030	Siassi Is	000000000111	221	03303
2271	2224010	Sio - Wasu	000000000000	000	33303
3277	2220130	Siboma Vil.	100000000001	000	33363
3313	4142133	Labu villages	112222222211	244	01057

Further Information.

1042 Hercules bay, on Morobe south coast "outside Lae". Hercules bay is close to Morobe patrol post, so I give that. Nesting occurs in mid year and the turtles are described as good to eat. The

respondent does not live on the coast but does make trips to coastal areas.

1051 The location is the stretch of beach from the Labu villages to Busama on the south coast of Lae. The respondent expresses concern about sea pollution and thinks that financial incentives should be offered to villagers to preserve turtle eggs. This area is one that I know and will report on and such a scheme already is in operation. My data will be a little different from that given here [form 3313]. I usually do not report that eggs are eaten on the basis of information from form 1. I do that here because I know for a fact that 100% predation of these eggs occurs (except possibly in our reserve at Maus Buang).

2064 Man Dok Island near Siassi Island (it seems to be off the south east coast of Umboi and no town is close). Turtles do not nest on this island but they nest on Long Island in Madang province. There are no conditions of time or climate associated with turtle nesting for it is a year round phenomenon. Leatherbacks occur but are not eaten. Local people eat the turtles and eggs of the other three species and hunt for them at high tide using traditional nets. Sometimes people hunt for them at low tide using Coleman lamps.

1065 Two locations are listed: Mutu Malau, Siassi, and Long Island (which actually is in Madang province but is very close to Umboi). The respondent is confident that turtles nest in the area but does not know which types. He says the turtles are good to eat.

2121 Some of this information is rather different from what I have reported from this area, which I know well. The respondent is from Sonoma Adventist College, and, as an SDA may not have direct experience of hunting turtles.

2127 The south coast of Morobe, 80 km from Lae city. The location was fixed when the respondent sent in another form (see below). He expresses concern for the future of turtles in PNG and thinks that the government should encourage an educational campaign to promote wildlife sanctuaries. He says only the common species found in this area are identified. I have sent him forms 3 & 4.

3127 This was the reply sent in by respondent 2127. The area described is south of Morobe Patrol post, near to the Waria river (in Hercules bay). The local language is Yekora and the word for turtle is "Nagabu". Turtles nest in the warm, dry season, which is between October and April. The peak period is between December and January. Turtles nest when a high tide is about to turn, and in the darkness before a rising new moon. The respondent questioned an old man from his village before filling in form 2127. All four types of turtle are found locally. The local area includes: Sappa and Saso beaches, Waria Bera, Sappa Kora, Tumo Kora, and Saso Kora. There are coral reefs in the islands which lie 30-35 kilometres away, and there the sea weeds provide a lot of food for turtles. The (local) sea is not deep offshore, and the beach, which is of black sand, is not steep, although it is wide. The number of turtles is declining and the older men have expressed concern about the regular killing of turtles, although nothing has been done about it. The respondent thinks that the local people would be interested in a conservation scheme and he would like to see such a scheme.

2130 Bukawa and Ologidu, which I think is on the coast just north of Lae.

2141 Laugui, Salamaua (probably a village close to Salamaua). Turtles nest on lonely beaches, often, but not always, when the moon is new, and mainly between July and December.

2150 Bukaua (which is the same as Bukawa). The informant is worried about the populations of turtles in his area. His grandfather has told him that there used to be many more, now they are becoming extinct. Turtles nest when the moon is full and on until it is in its last quarter.

2158 Nasigalatu village, near Finschhafen. Concern is expressed about the future of turtles. They no longer nest on the local beaches although they are still found in the seas. This is attributed to the rate at which they are being hunted.

2164 Taimigidu, which I am informed is a village south of Dreggerhafen. Turtles are dying out because people are killing them.

2188 Morobe patrol post. Turtles nest and are found. Loggerheads are not found nor do they nest, but both they and their eggs are eaten. On the other hand the respondent talks about the various species and gives them their common English names. He says that leatherbacks are common and nest but that low salinity and low and inconstant temperatures (due to local rivers) makes hawksbill and green turtles uncommon. He claims that all four species are eaten, and their eggs. Turtles nest when the moon is new to full. This respondent comes from the National Fisheries college at Kavieng.

2196 Gitua village, Sialum (round the coast and north of Finschhafen). Turtles nest sporadically all through the year and there is no relation to the season or the tides or the moon. The local people, especially the older men, can tell by the look of the sunset whether turtles are likely to come up to nest or not and they will then wait on the beach and kill the nesting turtle.

3202 Wasu patrol post on the north coast of Morobe. The respondent gives the local name "Malue" for the Leatherback and says the local language is either Kiari or Malasanga. He says that turtles are sometimes caught mating - floating stuck together (this information comes from his wife's village which he does not identify). In his village some people can call the turtle to return if its tracks are found and turtles coming up can be directed by means of lights to the place where they are required to lay their eggs. He says that in this way he can cause the turtle to produce a dummy nest which prevents the local people from stealing the eggs (he covers the tracks leading to the real nest). It is not clear why he wishes to do this, perhaps a conservation measure? Turtles nest when there is moonlight - but he does not recollect the particular phases of the moon. They lay their eggs where they will not be covered by water or washed away by the breaking waves - this information is used to support his assertion that they nest at high tide. People from Long island and the Siassi islands "tag" (his word) turtles, especially leatherbacks, by cutting identification marks on the flippers. These

record the place of birth of the turtle and are recognised by people from the surrounding areas when they catch the turtles (to what avail is not recorded). Other places mention tagged turtles being found, [3294, from the West Sepik, and 2155, from Manus]. I had thought in terms of metal or plastic tags but this respondent is clearly talking about scarring of the front flippers. I have sent him forms 3 & 4.

2222 Tuam Island is one of the Siassi islands. Green turtles come into the shallows at night to eat sea weeds. Hawksbill turtles lay their eggs on an isolated island near Tuam.

2223 The location is Masele island and Baim island. These are small islands in the Siassi group. Forms 222 & 2223 arrived together and are both from the same person. The respondent says the green turtle nests on Baim island and the locals catch them when they are doing that. I wrote to him to ask about the tagging of turtles described in form 3202. I also sent forms 3 & 4.

2271 The location given is Sio - Wasu which I take to mean the Wasu in Morobe province.

3277 Siboma village which is northwest of Morobe patrol post and near the Paiwa river. The local language is Numbami. Peak nesting occurs around Christmas. The respondent promised to obtain more information from his uncle who lives in Lae and knows a lot about turtles.

313 The area described starts at the Markham river and extends south east to Busama village. It encompasses at least twenty kilometres of beach, perhaps more. I have been familiar with this area for three years particularly know the stretch of beach centred on Maus Buang. I filled in this questionnaire. The part from the Markham to about five kilometres past Maus Buang (the mouth of the Buang river) belongs to the Labu people. Their language is called Labu and they call leatherback turtles "Hanna" (this may be their word for any turtle). During the months of November to February, the beach from the Markham to Busama is the site of about 300 leatherback turtle nestings. The turtles nest from about 8 p.m. to

about 4 a.m. I have only seen them do this on dark nights and the tide was usually just starting to recede, but I have only seen them nesting about five times. There is almost 100% predation of the eggs. These are sold in the markets in Lae for about 10 toea each (quite illegally, but the legislation is not enforced). The people of Busama are different from the Labu people and there is a certain amount of rivalry between them. People from both villages literally camp on the beach at night waiting for the turtles to come up. The turtles are not themselves molested, although they are sometimes directed back into the sea with lights and man-handling. Tourists also subject them to various indignities. The turtles lay approximately 80 - 100 eggs in holes three feet deep. There are usually a number of small infertile eggs in each clutch (that I have seen) and I have seen turtles jettison infertile eggs on the beach when returning to the sea. The beach is steep, short, and made of dark sand. There are infestations of voracious sand flies which are not active by night. The local sea is deep and may be of lower salinity because of the effect of the Markham and other smaller rivers. The highest part of the beach is grassy and there are palm trees. There is no coral reef in this area. Most of the beach runs parallel to some swampland in which there are small fresh water turtles and crocodiles. Some of these crocodiles grow very big indeed and the local people tell me that they ambush nesting turtles. I have not seen this, but on one of my visits was told by several people that a big leatherback had been killed in this way, on the beach, the previous week. On that same occasion a villager caught a small (0.75 metre) crocodile at the place where a turtle was nesting. When the turtles are nesting nothing distracts them but they may be scared away by excessive lights before they have actually completed their holes. They sometimes appear to dig trial holes first. The local people watch the process patiently and mark the exact spot in which the eggs are deposited with sticks - otherwise they find it hard to locate the eggs. On the nights in which I have seen turtles lay, there was usually some drizzly rain at some point, but then it rains on most nights of the year in Lae. Turtles can sometimes get cruelly disoriented by the hullabaloo which accompanies their nesting in front of tourists. The locals do genuinely seem able to direct them back into the sea quickly - by shining lights in their eyes and pushing the back of their

carapaces. The biggest turtle I ever saw at Maus Buang was 1.7 metres long from the front to the back of the carapace around the curve. Other turtles are sometimes caught locally and I have heard that they do occasionally nest on the beach. I think these turtles are green turtles - judging by the shells one sees displayed in this area. I was once present when two green turtles were being kept (alive) in a pond near the village of Maus Buang. They were subsequently slaughtered. Various (ex-patriate) people in Lae have been trying to maintain a turtle reserve at Maus Buang for two years now. The reserve involves about two kilometres of beach and is associated with the local school. I don't know how successful this has been. The local people (who are sponsored to protect the turtles on the reserve) are very enthusiastic, but I am pessimistic about whether it is being respected by the young men of the village and I think that its long term future must be in doubt. These are my personal feelings and certainly not those of others involved in the project.

Questionnaire Information from Madang Province.

The information from the forms tells the familiar story of declining turtle populations. It is probable that the turtles reported from the Ramu river area are fresh water terrapins of some sort. [Form 2186]. Long island is clearly a key nesting area but many eggs are taken from there. There are twenty - two forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1007	9999010	Malala	000000000000	000	00000
1019	9699330	Karkar I	000000000000	000	01001
1025	7755010	Bogia	000000000000	003	00001
2060	4324230	Mugil Harbour	001111000000	121	01303
2067	2222000	Gogol	000000000000	000	33333
2120	2200000	Madang	000000000011	121	33663
2146	2214210	Karkar I	000000011000	224	33003
2161	3221332	Manam I	000110001100	234	13303
2162	2222330	Manam I	000110001100	235	33333
2168	2244010	Bilibil Vil.	000000011000	221	33003
2186	4244430	Ramu River	000000111000	222	03003
2192	2200030	Bogia	100000000111	224	33663
2193	2222033	Saidor	222222222222	335	33333
2204	2220030	Malala	100000000001	321	33363
3206	2211130	Karkar I	000000000000	012	33663
3209	4214032	Manam I	000011110000	221	03403
3215	2110332	Bogia	000011100000	223	33303
3215b	2220133	Ramu delta	000001111000	221	33363
2216	2222030	Long & Crown I	110000000111	135	35353
2218	2200010	Karkar I	000000000000	000	33663
2224	4244030	Long I	000000000111	221	03003
2282	2222310	Long & Crown I	000000000110	135	53353

Further Information.

1007 Malala, about 50 kilometres south east of Bogia. Turtles do not nest here.



1019 Karkar Island, Dangsai village (this is given as Dangsai village on my map and it is difficult to decide which spelling this respondent favours, but I am told by an ex-patriate who has lived on Karkar, that the place is Dangsai). Green turtles are hunted for food but are not known to nest.

1025 Boroi village near Bogia. The turtles nest at any time but prefer no moon.

2060 Mugil Harbour is almost exactly 5 degrees south. It is the nearest mainland point to Karkar and lies south west of that island. The eggs and meat of Hawksbill turtle is consumed, the respondent is unsure about green turtles. Two turtles are reported as occurring - one is described as a giant, 1.5 metres in length and dark grey (which sounds like a leatherback, and which I think he has identified as a hawksbill on the basis of the pictures) the other is small (50 - 60 cm) and brown coloured. The small one is found along the coast, mainly in clear water with good corals. The pictures are not clear enough for the respondent to decide which species nest locally. He would have been happier with some information on size and colouration. I talked with him on the phone and supplied him with additional forms which he said he would send to his village.

2067 The Gogol river reaches the coast just south of Madang.

2146 Turtles nest when the moon is in the last quarter and new. Turtles were sighted during the Christmas holidays when the sea was calm but recently the north - east trade winds prevented them from coming(?). Turtles are not common in the respondent's (unidentified) village but do occur on many other parts of the island where the beach is more suitable i.e. has lots of sand. The respondent expresses doubt about the complete accuracy of his information.

2161 Baliau village on Manam Island. The green turtles nests mainly when the moon is full but they others can nest at any time. Green turtles are the most common and both they and the hawksbill nest regularly. Hawksbill turtles are usually caught when copulating. Loggerheads are to be found around reefs during the day and are easy

to catch. The respondent has never seen a Loggerhead nesting and has no information that they do nest locally. Leatherback turtles are not often found but the respondent has heard that they were once more common.

2162 Loggerhead and leatherbacks don't often nest and (so) are not often eaten. The other two species commonly nest, Turtles eat seaweed and reefs and when they are killed their hearts continue to pump.

2168 Bilibil village Madang province. There is some evidence that this is fairly close to the town of Madang because the respondent reports that turtles appear on the beach during daylight hours in Coronation drive in Madang town. However, I have been informed that the village is famous for its pots and is located just north west of Saidor. One map gives a village called Biliau in this location.

2186 The location is given simply as the Ramu river (which is in the extreme north of the province). The respondent says that the green turtles' eggs and flesh are eaten, and that this species is particularly common in swamps near rivers, such as those near the Ramu river. These turtles are called tortoises (I think he is probably describing some kind of terrapin).

2192 The best places for turtles are Potsdam plantation and down the coast to Marangis village in Bogia district. Turtles appear around 11 p.m. when there is a half moon.

2193 Vaimas village near Saidor on the south east coast of Madang province. Turtles are plentiful but their numbers are declining. Department of primary industry officers have been doing some work on conserving them locally.

2204 Busip village in the Malala area (south-east of Bogia).

3206 Kordpail village on Karkar Island. The local language is called Waskia and "Saror" is the word for a loggerhead turtle, "Banawun" is a green Hawksbill and leatherback turtles are hunted and eaten in the Astrolabe bay area but when is not known.

3209 Manam is near to Bogia. The local language is actually called Manam. Turtles can only nest when the sea is calm. This happens between May and August. Turtles are becoming much rarer. In particular, many less are nesting. The number of local people is rising and they take all the eggs.

3215 North coast of Madang. Bogia, Bagbag island (perhaps more often called Bagabag island) and south east of there. The respondent attempts coverage of half the coastline of the province and sometimes the area he is discussing is not clear to me. He comes from Bogia where he says that turtles are commonly caught and eaten but they don't nest. The turtles are caught at night using storm lanterns. On any given night there will be 40 people fishing with lanterns along this stretch of coast. Local beaches are unsuitable for nesting turtles - not sandy, and with rough waves, and those that are sandy are usually heavily populated so turtles don't nest. Turtles do nest on the north coast of the province. There, there are good bays, the tides are less rough, and there are less people to disturb the turtles. These beaches have wide expanses of black sand. Bagbag island is (also) an especially good place and the turtles are protected there because it is a wildlife reserve. Over towards Bogia and up on to the Ramu estuary there is a place called Awar (south east of the Ramu) where turtles nest. It is unprotected and people often catch the turtles when they come up to lay. They are also caught with fishing nets. In former times large turtles were commonly caught this way, but now it is quite rare for big turtles to be taken. The respondent says that only about two species are caught. He identifies loggerhead, green and hawksbill as occurring, says that all are eaten and their eggs, but only claims that loggerheads nest (this may be a slip of the pen, or may reflect the fact that he is talking about several different places simultaneously). He states that turtles only nest on fairly dark nights. I have sent him form 4, and form 3 again.

3215b This is the reply from respondent 3215. Again, I experienced some difficulty in deciding which areas were being discussed. I think the principle one is Marangis, which is near Awar, east of the Ramu delta. The respondent knows most about green turtles, which certainly nest locally. I think he is saying that some loggerheads

nest, but they and hawksbills are more likely to be found closer to the Ramu river. Loggerheads nest at the same time as green turtles - the dry, warm season. Nights are fairly cool, and turtles habitually come up when the high tide is on the turn. The local beach has no coral reef. It is flat with a gentle slope and about 25 metres wide. In the Awar area the sand is white, but that gives way to black sand as one gets to the Ramu delta. There is a lot of food for turtles. There is food swept down by the Ramu, and there are shoals of small fish - Tuna and Mackerel. Turtles are declining in numbers, and leatherbacks (and hawksbills ?) are very rare. The local people would respond well to the idea of conservation. The informant gives the address of a local fisherman who could supply more information. I wrote to him.

3216 Crown Island and Long Island. Crown Island is a reserve. Turtles commonly occur in both islands and nest there. People eat the eggs and sometimes the turtles on Long Island.

2218 Karkar (Dampier) is given as the location (this is an alternative name for the island). No information is given on nesting times.

2224 Green turtles nest and they and their eggs are taken. The island is a rich wildlife area.

2282 Long Island / Crown Island. Many eggs are eaten here and more than three types of turtle are found.

Questionnaire Information from East Sepik Province.

A lot of this information came from schools but it is of high quality. It seems to me that people of the East Sepik do know their turtles and I am inclined to believe that most of the species identification is correct. There are eighteen forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1005	8899230	Boiken	000000000000	000	00001
1013	7755030	Turubu	000000000000	004	00001
1030	1222130	Kaup Village	000001100000	000	13333
1050	5755032	Butt Village	000000000111	000	01001
1073	8885032	Turubu	011110000000	000	00001
1077	4474210	Dagua	000001111000	220	00101
2083	2220010	Brandi School	000000110000	222	33363
2085	2222132	Forok Village	000000011111	134	33333
2086	4214330	Kairiru I	100000000001	322	03303
2088	4220010	Kairiru I	000001110000	222	03303
2089	4222330	Unai I	000000000000	122	03333
2170	2200000	East Sepik	000000001000	221	33663
2175	2244030	Boiken (Banak)	000001110000	222	33003
2176	4144010	Wewak	000000000000	112	03003
2194	2220332	Kairiru I	000111110000	311	33363
2195	2220030	Kairiru I	000001111000	124	33463
2238	2220030	Kairiru I	001111000000	221	33303
3315	9244130	Wawat No 1 Vil	000001100000	021	0300

Further Information.

1005 The respondent says that the pictures of the green and loggerhead turtles resemble turtles he has seen but he is not sure about whether both occur. Turtles do nest. He does not know which species.

1013 Turubu is on the east coast from Wewak (some maps show that there is a village called Terebo in about the right position). Both types of turtle nest and this happens when the moon is about to rise. They are good to eat.

1030 I interviewed this respondent. He is from Kaup village in the Murik Lakes area, east of Wewak. He is sure that all four turtles are found locally and has eaten all four. He says that the loggerhead does not nest here, but that the others do and their eggs are eaten. The flesh of the Leatherback is fishy but pleasant enough. The respondent is well known to me and a reliable man. He says that the pictures on the form are clear enough for him to distinguish the different species - this may be because he grew up with experience of all four, which is unusual.

1050 Butt village, near Wewak. I think this is the village marked as But on the map. That is up near the province's western border. The respondent does not know whether more than one kind of turtle nests locally. Turtles do nest and are eaten. He states that there has been a decline in the number of turtles found in his area.

1073 Turubu: "In the past turtles came up to nest in great numbers but at present only a few number come up to nest. I was told by my people that around 2 - 4 nests during the nesting season, which is not the case in the past."

1077 Dagua village is between Boiken and But villages on the north west border of the province. The local beach is not very good for turtles because the waves are quite big, but once in a while they do come ashore. The respondent is not sure whether other species might be involved.

2083 Brandi High School is just south east of Wewak. Turtles are frequently seen "on the beaches" near to the school but don't often nest. This is because the beaches are busy places, with a lot of swimming and night fishing going on.

2085 Forok village is about 18 kilometres south east of Wewak. The respondent is quite sure that all the turtles shown on the form are found in the area and nest. He says that the numbers are decreasing but that many still nest. Turtles nest normally (but not exclusively) in the wet season, when there is a half moon.

2086 Unai and Kairiru Islands (north west of Wewak). Green turtles are the commonest in the area. About five years ago a strange turtle came up onto the local beach and was killed. The respondent thinks it was a hawksbill. Its shell was used as a plate. The respondent says that the months when turtles lay eggs are December to the beginning of January, but then goes on to say that whether the season is wet or dry or the tide low or high is really immaterial, although turtles probably prefer low tide. They usually lay just when the new moon is rising.

2088 This form was actually anonymous but I think it was part of a pooled effort including form 1089. Both came from St Xavier's High School. This form says that many turtles can be seen at Unai Island.

2089 Unai Island and Kairiru. Three names are given on this form, and I think these people may have been responsible for 2088. Only a few Leatherbacks are found. Hawksbill turtles occur in the reefs around Boiken. They also lay eggs there and they are beautiful.

2176 The respondent says that he does not live near the coast and got his information from his friends who come from Wewak. Green turtles and their eggs are eaten (but they don't nest).

2194 Kairiru Island (Baru). Perhaps Baru is a village, but since the respondent gives his address as Kragur Village on Kairiru Island, maybe Baru is an alternative name for the island. The respondent seems to know his turtles. He says that the seasons are not really all that clearly defined on his island so he doesn't think much of the question about wet or dry seasons. Turtles prefer to nest at high tide but do sometimes come up when the tide is low. No one has seen a leatherback turtle in this vicinity since before he was born.

2195 Kragur Village on Kai(riru) Island. Hawksbill turtles nest but their eggs are not eaten.

2238 Turtles are only eaten at certain times of the year. Just when seems to be something to do with what the turtles are eating and when they are breeding. "Turtle is a basic protein in many coastal

areas and islands of PNG. However, in my area we only eat turtles in certain months of the year, when the season is suitable for breeding as well as the food available is appropriate for them".

3315 Wawat No 1 village is close to Wewak. On one map I have seen it given as about 20 kilometres south east of Wewak, and inland. The local languages are Turubu, and then pidgin. Turtles nest not so much in specific seasons, but when the seas are not excessively rough and there is a nice sandy beach (whether wave action litters the beach at some times I don't know). These conditions are met most often at the mid point of the year. There are taboos on the consumption of turtle meat. Young children may not do this because they will then get boils and sores on their legs and put on so much weight that they can no longer climb trees (the respondent said to get betel nuts). Restrictions on children eating turtle EGGS are reported in form 2116 from West New Britain. This respondent says that he can distinguish species on the basis of the pictures provided, but then goes on to indicate uncertainty in three of the four.



Questionnaire Information from West Sepik Province.

The data from this province tells the familiar story of declining turtle populations. Form 3294 mentions turtles which have been tagged being found. I have come across this in the information from other provinces in the North of PNG and I am trying to find out more about it. There are thirteen forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1003	9229332	Aitape	100000000001	000	00001
1008	2999930	Vanimo	000000011000	000	10001
1045	8899000	Aitape	000000000000	000	00001
2061	3222332	Aitape	122222211111	211	03333
2126	3332330	Vanimo	000000000000	000	33333
2180	4224030	Vanimo	000011110000	244	03303
2221	4224033	Aitape	111000000111	325	03303
2265	0330010	Aitape	000000000000	000	00000
2272	7444430	Aitape	000000000011	221	77777
3291	4420230	Vanimo	000000000111	221	00363
3293	2120130	Aitape	000000000000	020	34303
3294	4244130	Aitape	000000000000	020	03003
3299	2220132	Vanimo	000111110000	223	33303

Further Information.

1003 Turtles are being wiped out here.

1008 Mostly one type of turtle is found. They are good to eat.

2061 Location: Lemieng village near to Aitape. I'm not sure which months the respondent claims are nesting months. He actually filled in two forms. In the first he said turtles nest all the year round with peak periods in the dry season, which is December - August, when there are north - easterly winds and the sea is fairly calm. In the second he said they nest around April to November with peak periods December - February. On the basis of these answers I decided that he means that peak nesting starts around the last third of the year and extends into the first third. The respondent seems well

informed about turtles. He says they nest when the moon is full and come up shortly before it rises. He says that he is from the mainland and that all four types of turtle are found locally. About 5 km from the shore are the islands of Ali, Seleo, and Angel. They have extensive reefs. The leatherback and green turtles often nest in this area and are often slaughtered for food. The loggerhead and hawksbill are plentiful around the reefs but the respondent does not know where they nest, although the hawksbill does nest on the local beaches very occasionally. The respondent identifies the leatherback, green and hawksbill turtles by name but does not seem to know the name of the loggerhead. He says that the hawksbill and loggerhead are caught during night fishing or diving and that all turtles are edible. I sent this respondent form 4.

2126 Wutung village is right on the boarder of PNG with West Irian. The eggs and meat of the loggerhead, green and hawksbill turtles are reported as eaten, but none are stated to nest locally. Leatherback turtles nest just over the boarder in the vicinity of the Skou villages. No nesting details are given but the respondent offers to supply further information and gives his address.

2180 Wutung village. Turtles mate in the wet, rough, season which is from October to February. This is when most hunting of turtles is done. They nest in the dry season which is between May and August. Turtles come onto the beach at high tide and leave as the tide is starting to ebb (it was this information that made me realise that my question on tides was probably inappropriate). Only two species occur and people prefer to eat the green turtles although hawksbills are also consumed.

2221 Seleo Island east of Aitape. The respondent says that sadly he does not now see the big turtles that he used to twenty years ago.

2265 Turtles are found and nest locally. The location is given as Waradu (?) near Aitape. The form is in pencil and the intentions of the respondent are not clear.

2272 Lemieng (Aitape). Initially, I ignored this form because the only turtle recorded is the loggerhead and it is described as not found, but eaten and not nesting but the eggs are eaten. It occurred to me that the writer may have misinterpreted the instructions and his answers might be reversed - so the loggerhead occurs but does not nest. In fact, the respondent circled both yes and no for eggs eaten. The fact that only the loggerhead is identified is additional evidence that the answers here may not be reliable.

3291 Yako village, near Vanimo. The local language is Dumo and the respondent offers to write for further information for us. She states that she finds our pictures confusing and is not really sure about the loggerhead and green turtles - colour pictures would help, she says. Turtles nest towards the end of the dry season.

3293 The location is an unidentified village near to Aitape. Local people speak pidgin and very few turtles are found. They, and their eggs, are eaten when found, and are sometimes encountered on the beach or while diving. The local people like turtle meat and will even take very small turtles. The respondent does not remember much information about nesting times.

3294 The local villages each speak their own languages: Miue and Warapu, are mentioned. This respondent reports that turtles are found which have been tagged. I have written to her asking for some of these tags and offering a reward for them. Tagged turtles are also reported in form 2155, from Manus, and form 3202, from Morobe; but the Morobe tagging involves scarring of the turtles. It is not clear that this is not the case here.

3299 Musu village, between Wutung and Vanimo. Turtles nest when the moon has set. The local language is called Soko and these local names for turtles were given: loggerhead and green - "Molang", hawksbill - "Mombee". The respondent has not seen a leatherback. This respondent took the trouble to write me a short letter about turtles with this information: turtles were plentiful until the late 1970s and they often came to the local beaches to lay their eggs. Hawksbills are the biggest of the three and they are found in very deep water. Loggerheads and greens are found around reefs. Nowadays,

few turtles come up to nest because that is when they are caught and eaten. People now spear them from canoes or dive for them. Stories from Aitape suggest that the leatherback (he identifies this as "LE" from the form) is found in areas where the sand is black. That is the case at Aitape. There are also (fresh?) water turtles in the Musu area and these are eaten by the local people.

Questionnaire Information from Manus Province.

This province is rich in turtles although numbers are declining and in most places leatherbacks are no longer found. Lou islanders don't eat turtles [forms 1001 & 2165]. Nevertheless, stocks are being depleted by outsiders and respondent 1001 objects to this [a similar complaint is recorded in form 2062, from New Ireland]. There are twenty - eight forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1001	8889011	Lou I	000000000000	000	00001
1027	0220020	Rambutso I	000000000000	000	00001
1028	0220030	Rambutso I	000000000000	000	00001
3028	9229133	Alim I	122222222221	000	63366
1032	3330030	Loi Village	000000000000	000	00003
1043	9229331	Baluan I	000000000111	000	00001
1068	9229030	Purdy Is	000000000000	000	00001
1075	1119230	M'buke I	000000000000	000	00003
2084	1110032	Derimbat	000000000000	000	44464
2087	4244030	Aua Wuvulu Is	000111000000	212	03003
2102	2220030	Lou I	000000000000	000	33303
2105	2200030	Western Is	000001111000	221	66666
2109	2220033	Salien I	000011100000	211	33303
2117	2200032	Wuvulu I	111001111100	221	33663
2124	2220030	Bipi I	000001110000	221	33363
2145	2220033	M'buke I	000000000000	221	33363
2147	0110032	Liap Village	000000000000	000	61163
2148	9110210	Lou I	000000000000	000	03363
2149	2200020	Johnson I	000000000000	000	33663
2151	2223020	M'buke I	111111100000	012	33303
2153	3224310	Ponam I	222222222222	311	13303
2155	2223030	Bipi I	222222222222	312	33303
2157	2220330	Aua & Wuvulu I	000000000000	010	33363
2159	2222030	Loi Village	001000000000	321	33333
2165	2220010	Lou I	000000000000	000	33363
2189	0221330	Lawes	111111111000	212	63363
2198	2210030	Baluan I	000001111111	221	33463
2263	4224030	Mouklen	000000000000	000	03303

### Further Information.

1001 Lou Island is off the south east coast of Manus. The respondent identifies three types of turtles as occurring and says more than one kind nests. He gives a plea for the protection of his island's turtles. The local people don't eat them, outsiders do.

1028 This was very similar to 1027 and they were given in together (different writing). My map shows a Rambutyo island off the south east coast of Manus, and quite large. This respondent gives the additional information that the turtles nesting are definitely green and hawksbill turtles and that there are no peak nesting periods. He says that turtles are hunted for special occasions - to celebrate new year, or for the bride price ceremony and a similar statement was made in form 2304 (from the North Solomons). I wrote to him for more information and sent form 4.

3028 This is the reply to the questions I asked of respondent 1028. The area discussed is Alim Island and Mbrutol Island. The local language is Titan and the respondent refers me to Margaret Mead for more information. Exactly two species are found: green (local name "Changini") and hawksbill (local name "Kareng"). The local people would certainly be able to give information about the state of the moon and tide when turtles nest, but the respondent does not have such information himself - except that he is fairly sure they come up at high tide. The two islands have a coral reef and the sea is deep off shore. There are no rivers and the nesting beach is not steep nor wide. It is made of white sand with some grass and coral. There is a lot of turtle food in the area - seaweed and marine plants. The local people would probably react favourably to advice on conservation and the respondent supplies the names of people who might be prepared to help. It is certainly true that the number of turtles found locally is decreasing. I asked the respondent to amplify his remarks on the use of turtles at celebrations. Here is what he said. "Few days before New Year Eve, the five clans in our village will sent a canoe each out to hunt for turtle. We normally use harpoon made from steel which inserted at the end of long spear made from coconut stumps. Each clan can catch around 5 - 20. It depends on weather, fine day and clear water is best to hunt turtle.

We also use speed boat to chase them and then dive to catch them. I was there once when we catch 30 turtles - 1986."

1032 Loi village is on Manus main island, a little to the east of the middle of the south coast. The respondent has never seen anything like the leatherback turtle I show on the form. In her village, turtles are kept fresh alive on their backs beneath people's houses. They seem to live for some considerable time when stored this way.

1043 Baluan Island is south east of Manus. The turtles are eaten. The nesting area is Alim Island, which seems to be the island 3 degrees south and 147 degrees east. "The wildlife department has to make regular visit to certain rural village in coastal province". I am not clear whether this reports a fact or is a suggestion. Presumably, a conservation measure is being discussed.

1068 The Purdy islands are also known as the Mwilitau Islands. They lie perhaps 80 kilometres south west of Manus main island.

1075 M'buke Island is about 20 kilometres south west of Manus main island. Turtles nest but the respondent is not sure which species are involved. She says that people count ten days after the turtle lays her eggs and then expect her to come up again and lay more.

2084 Derembat, Manus province. I have been told that this is on the north coast of the main island and near the middle. Turtles are seen in this area but it is difficult to find where they nest. Turtles are eaten by some people on special feast days but not otherwise. You see turtles when the moon is full. Back in the 1960's the informant saw lots of turtles nesting but now you hardly see any due to environmental disturbances.

2087 Aua and Wuvulu Islands, on the extreme west of the province. The respondent says the turtles nest when a new moon is about to rise and they go ashore at high tide. There are a fair number of turtles to be found in the local waters and the people catch them, although he is not sure how.

2102 The respondent apologises for being unable to give nesting information and offers to obtain more when he next goes home. Further forms were sent to him (29/3/89)

2105 The Western Islands (Pion). I think these are the island lying just west of 146 degrees east. The respondent is a lady from Sonoma Adventist college and claims that turtles are not eaten, nor their eggs (SDAs leave turtles alone). Confusingly, she then goes on to give directions on how to handle live turtles safely. She says that one should not hold the turtle at the neck because it may trap your hand and drown you. The safe way to store turtles out at sea is on their backs. A similar report was given to me verbally and is recorded in the North Solomons section, and there is another such report from Lassul Bay in East New Britain [2156]. Form 2107, from New Ireland says this too, but that respondent also comes from Sonoma Adventist college and this may be a case of pooled knowledge.

2109 Salien Island, near Lorengau. On my map, there is a Sabben Island off the west of Manus, and I have seen a map which shows a village called Salien on the west coast of the main island. The respondent expresses concern for the decline in numbers of turtles, particularly those on the west part. There were many more turtles around in the early 1970s. The respondent attributes the decline in population to the human predation of turtles and thinks that this should be controlled.

2117 Wuvulu Island is on the far west of the province at longitude 143 degrees east (approx). The respondent says that hawksbill and leatherback turtles are believed to have occurred during the time of the ancestors but they don't occur now. He does not explain how he is privy to this information.

2124 Bipi Island is off the west coast of the main island. The respondent says that turtles are usually caught at sea when copulating. This is usually done when the tide is low, the moon full and the water calm.



2145 The respondent expresses great concern for the future of turtles in Manus. He has attempted to get the locals at least not to kill them when nesting, with no response. He asks whether something can be done to help prevent unnecessary killing of turtles. He also asks for literature on conservation (which I sent him).

2147 Liap is a village on the north coast of the main island. Turtles do not nest here although they used to. The respondent attributes this to disturbance from the local people. Turtles and their eggs are eaten by the locals but they only get eggs when they kill a gravid female (it was this information which made me realise that it was possible to claim that turtles don't nest but that their eggs are eaten - this also sometimes occurs when there are big markets in the locality because people bring eggs in). Turtles come to the local seas to feed on sea grass and shells from the coral reefs.

2148 Locations: Lou Island, Alim Island, Johnson Island, and Kumuli plantation Island. I have found some of these, they lie off the south east coast of Manus main island. The respondent has seen turtle eggs locally, does not know to which species they belong, and has no information about nesting. He says that the turtles and eggs of the green and hawksbill turtle are consumed and does not know whether the loggerhead occurs. [See 2149, 2159]

2153 Ponam is off the north coast of Manus, between the villages of Tulu and Leiwa. Turtle hunters catch many turtles in this locality. The green turtle is very common, loggerhead turtles are found but hawksbills are very rare. The respondent has never seen a leatherback.

2155 Bipi is off the west coast of Manus. The local turtles are not much disturbed. The respondent identifies leatherbacks as occurring, but is not sure about whether they nest or not. People sometimes catch turtles with "tags" on the shell (I don't know whether this means a metal or plastic tag or some local identifying marking) - they let them go. [Form 3294 from West Sepik, and form 3202 from Morobe also report tagged turtles being found].

2157 Aua and Wuvulu islands (longitude 143 degrees east). Turtles and eggs of all three named species are eaten. The respondent reports that the leatherback used to occur but has now disappeared. He does not know the reason for this but says that the locals used to eat it. He does not know the nesting details of turtles although he states that they mainly nest at high tide. He does say that there is a kind of turtle that is becoming rare in his islands and which the islanders call "Lapi". He says the turtle is brownish - grey and has a long penis about one metre in length. The turtle used to attack people long ago by passing its penis into the gap just above the collar bone.

2159 Loi village is on the south coast of Manus near the middle. Presumably, Johnson Island is just off shore. Turtles feed off the coast of Loi village but they lay their eggs on Johnson Island.

2165 The respondent says that he has seen all the kinds of turtles in the form being caught except the leatherback (which he identifies by name). The local people of Lou Island do not eat turtles but they permit others to do so. Turtles nest on Lou but he is not sure about the species.

2189 Lawes, near Lorengau - there is a Luis river just south of Lorengau. The respondent identifies various species by name and says that green and hawksbill turtles do nest occasionally, but not often because the beach where they would nest is heavily populated. Leatherbacks have been seen locally, in the river mouth, but not since 1980.

2198 Baluan island is off the south east coast of Manus. Turtles do not often nest here. The respondent suggests that I should contact the south coast Manus group called Titan. These people would have more information, he says. [Respondent 3028 gives Titan as a south Manu language, so a group of villages is probably involved].

2263 I don't know where Mouklen is, but a chain of circumstantial evidence suggests it may be on the south east corner of the main island, and one of my other respondents gave a postal address of Moukland Village, Rambutso Island..

Questionnaire Information from West New Britain Province.

I was lucky to get some help from Unitech field worker Lorraine Lamotte, who took my forms to the south coast of the island and interviewed local fishermen. There are fourteen forms.

Form.	Number.	Location.	Month Nest.	STM	Predation.
2114	2222030	Kove	000111111000	222	33333
2116	2222030	Tangea	000000011000	211	33333
2122	2220030	Kimbe Town	000011000000	212	33363
2132	2244012	Hoskins	001111111110	212	33003
2133	2220030	Matililiu Vil	000001111000	211	33363
2134	2222032	Kombe	000000011100	231	33363
2212	2222033	Wirewir Vil	001100000000	011	33333
2213	0222034	Amio Vil	000000000100	034	63333
2214	2222034	Kaskas I	222222222222	311	33333
2250	6600400	Kimbe	000000000000	000	33663
2251	2220030	Kimbe	000000000110	304	33363
2255	2200020	Kaiamu (Bialla)	000111111000	312	33663
2257	0220000	Baia (Bialla)	000100000000	221	63363
2274	2222030	Cape Gloucst.	000001111000	221	33333

Further Information.

I had a long conversation with a student who comes from the west coast of the Willaumez Peninsula. He said that the commonest turtles occurring were leatherbacks - which he described as turtles with keels or corners (the same terms were used by 2108 from New Ireland). They are eaten, as are their eggs and their flesh leaves you with a fishy smell which persists for days. The peak nesting period is around Christmas. He has a low view of turtles - saying they were like dinosaurs, and he kills every one he can find. Second children of a marriage are in some way associated with the mother and this means that they must not eat turtle flesh (but the mother can). 50% of turtle eggs hatch into young turtles, the rest become snakes, lizards, and something else (when I suggested crocodiles, he readily agreed). This story is also reported by children from Oro

province [2095]. The respondent is a second year forestry student from Unitech, and has some scientific training. He promised to fill in a form for me and I sent him forms 3 & 4.

2114 Kove and Talasea. Leatherback turtles are restricted to the Talasea area, and not many people will eat them.

2116 Tangea - Kimbe. "The first lay will not allow to be eaten by children under 10 years only parents and the above". I take that to mean there are restrictions on who may eat the first eggs appearing. There are restrictions on children eating turtle meat in the East Sepik [form 3315].

2122 Turtles always nest in the dry season. At that time one can see them coming up for air in the afternoon when the reefs are about to dry. That's when they start coming in towards the shore.

2132 Numbers are decreasing nowadays because people kill them and eat them.

2133 Matililiu village, near Biälla town.

2134 I could not find Kombe. Turtles are the main local source of protein and are becoming rare due to overexploitation. The local people have many different techniques for catching turtles. I sent forms 3 & 4 to this informant.

2212 Wirewir, Fulleborne (on the south coast, near the border with East New Britain). Turtles nest at Easter time, at the end of the dry season and the beginning of the wet. People spear fish for turtles and the numbers seem to be declining. Sometimes, turtles and their eggs are left at the advice of the big men of the village in order to build up the population. [See form 2273 from the North Solomons].

2213 There is a place called Avio just east of Gasmata. I think that is the area covered. Turtles nest at the start of the dry season, in early evening, when the moon is in its last quarter.

2214 Kaskas island, near Amio. Turtles nest after the moon has gone down and are caught by spear fishing. There are plenty about. The shell is used to make jewelry.

2251 Turtles nest in between the new and full moons. The location is an island . Turtles usually nest there and on some other islands. At that time of the year one can expect to take six turtles or so each time one goes fishing, along with other "crustaceans". [It sounds as though they are netting them].

2274 Cape Gloucester (on the extreme west of the island - the respondent says the nearest big town is Kimbe). Although turtles do tend to nest at the times given, they can nest at any time throughout the year. Likewise, they prefer low tides and full moons but these conditions are not absolutely essential.

Questionnaire Information from East New Britain Province.

It seems to me that many people give the location as Rabaul and mean places up to eighty kilometres away along the coast. The bulk of the population lives in the Gazelle peninsula. There are thirty forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1029	8585030	Matong	000000000001	000	00001
1039	8855010	Mainge	000100000000	000	00001
1041	8880030	Pomio	100000000011	000	00001
1046	6666430	Palmaal	000000000000	000	00001
1053	8555010	Raluana	000000000000	000	00001
1054	5155010	Kokopo	000000000000	000	01001
1071	8888430	Pomio	100000000001	000	00001
1079	5656010	Rabaul	000000000000	000	00001
2082	4244000	Kambubu	000000000000	000	03003
2110	2220032	Kambubu	000000000000	221	33363
2112	2200030	Ganae	000000011000	121	33663
2152	2200030	Rabaul	000011110000	221	33663
2156	2200030	Lassul Bay	001100011000	221	33663
2171	2244000	Kokopo	000000000000	212	33003
2190	2222431	Rabaul	000001111111	211	33333
2197	0222020	Pomio	111100000111	212	63333
2219	7700230	Pegion I	000000011100	221	33663
2241	2210020	Rabaul	001000100010	222	63463
2247	1100010	Matupit	000000000000	000	00000
2252	1100030	Kabakaul	000000000000	000	33663
2260	2444010	Talvat	000001000000	221	30003
2268	0000010	Vanamami	000000000000	000	66666
3280	1100131	Kokopo	000000000000	000	33663
2290	2200012	Rabaul	111000000000	123	33663
3292	2444130	Karavia Vil	000000000000	000	30003
3297	2444130	Vunamarita Vil	000000000000	000	30003
3298	3333132	Malakur Vil	000000000000	210	33333
3307	2224130	Makada I	000001111100	111	33103
3311	2220130	Wide Bay	110000000111	225	33363
3316	2224230	Jacquinet Bay	222222222222	144	33303

Further Information.

1029 Matong, which is on the coast a little east of Pomio. Turtles are eaten. The respondent identifies loggerhead turtles as occurring and says that hawksbill turtles are seen around in lesser numbers. She is unsure whether more than one kind nests in her area and says that not more than two turtles come up per night. From the way she has given her information I have guessed that she is saying that loggerheads nest, but it is quite likely that she is unsure of which species are really involved.

1039 Mainge in Pomio district, near to Palmalmal. I have a map which shows a Meingi, on the Melkoi river, near the western border of the province and quite a way from Palmalmal. Turtles do nest locally and they are good to eat. They are only around at certain (unidentified) times of the year. The respondent does not know whether more than one type nests and does not identify a type as nesting.

1041 More than one kind nests and turtles are good to eat. The respondent has not seen a leatherback but identifies the other three types. He also says that a much bigger type of turtle breeds locally. This may be a leatherback and the respondent may simply be confused by the forms. I wrote to him for more information. [See 1071].

1046 The respondent says that all four species are found in the local seas. They don't nest where he lives because of the pebbly beach, but ten kilometres east or west there are sandy beaches where many turtles nest.

1053 Location Raluana, Kokopo. Turtles are very rare here. They are certainly good to eat, and the type identified is the loggerhead. There is no nesting information

1054 Respondent says turtles are good to eat. He has seen many turtles caught by nets or speared but never one with eggs.

1071 This form resembles 1041. Nesting occurs in the Christmas period and more than one species is involved. Turtles are good to eat and the respondent again says another type occurs which is not shown on my form and which is large. This comment is like the one that occurred on form 1041 - both are in pencil, are similarly worded, and are in similar handwriting.

1079 This form seems to suggest that green and leatherback turtles occur locally, but it may be that what I took to be an identifying cross on the picture of a leatherback was actually indicating that it does not occur (the cross was much larger than the one that identified the green turtle and had been ruled). The main reason the respondent filled in the form was probably to tell me that the department of fisheries in Port Moresby has statistics on turtles in the gulf of Papua. The respondent kindly gave me the name of someone to contact there and a letter was sent on March 8 (with no response so far).

2110 I cannot find Kambubu on the map, the respondent gives the information it is about 60 km from Rabaul town. There is a sandy area there where turtles nest in the dry season but people usually kill and eat the nesting turtles so numbers are declining rapidly.

2112 Ganae, near Kokopo. This is south of Kokopo just round the peninsula and near the mouth of the Warangoi river.

2152 Turtles dig dummy holes to fool people and there is a bird that signals that a turtle is laying. I hope to contact the person who provided this information when I give a talk at Aiyura National High School.

2156 Lassul bay is approximately fifty kilometres west of Rabaul. The local people trap turtles with fishing nets or using their bare hands. When trapped turtles must be turned onto their backs otherwise they may carry you down to the depths of the sea. [See the comment in 2105 from Manus].



2190 This is so different from other answers that either some confusion is occurring or the area discussed is not Rabaul. The respondent gives a strong plea for sensible exploitation of turtles and says that they should not be dynamited or caught in large numbers - only sufficient for food should be taken. He is from the National Fisheries College.

2219 Pegeon Island is between Rabaul and the Duke of York islands. The respondent admits to confusion about the which turtle is which and says he cannot really distinguish green and loggerhead turtles on the basis of our pictures. He is also unsure about the hawksbill. He is clear the leatherback does not occur. As to nesting - he is pretty sure that this occurs in September but never kept records when he was home. The respondent took it upon himself to send a copy of our form back to his village and hopes that the people there will be able to furnish more accurate information.

2247 Matupit is the volcanic region at the head of Rabaul harbour. Loggerheads and green turtles are to be seen swimming and coming up to breathe.

2252 Kabakaul (~~Kokopo~~ is crossed out and I think this village will be near there). Turtles do not nest and it seems that the occurrence of turtles is an annual event. She has a friend who is making a trap for this year's turtles.

2260 Talvat is on the same headland and south east of Rabaul, only a few kilometres from the town.

2268 Vanamami, which is near to Kokopo. Turtles are not found.

3280 The local language is Kuanua. Turtles nest quite far from this location but the details are not known. The respondent is glad someone is doing something about conservation and wishes me well with this survey.

2290 Ten minutes drive east of Rabaul town. People here do not commonly eat turtles. There have not been any nesting lately, but you sometimes see turtles when you are diving on the local reefs.

3292 Karavia No. 1 Village (described as near to Rabaul). The local language is Kuanua. Turtles don't actually nest here, although the respondent suspects they might nest in undisturbed areas - he says that there are a lot of people living in the bay where he comes from. He sees turtles swimming in the afternoon and early evening.

3297 North Baining - Vunamarita village, I have seen maps showing this as east of Lassul and not actually on the coast. Loggerheads occur and are very rare. The Tolai language is Kuanua, and their word for this turtle is Mayai. The respondent has not seen any of the other species. He knows of no local nesting. He says more loggerheads are to be had towards Open bay (on the northern border with West New Britain). He knows a person who does exploit turtles and will obtain nesting information from him.

3298 Malakur village somewhere in Pomio district. The local language is Mungen and they have names for each species of turtle but my respondent can recall just two: hawksbill are called "Pulung" and leatherbacks are called "Lata". The general name for turtles is "Kursinna". Up to 1976, this area had sandy beaches and turtles laid their eggs on them. Now the beaches are covered with dense pebbles. The respondent was a small boy of 12 years in 1976 and fears he may have not got the nesting information right, but so far as he can remember turtles nest at high tide in the dry season. The common species seen close to the local reefs are the green, and then the hawksbill, and then the Loggerhead. Leatherbacks are normally found in the deep ocean and only noticed when surfacing. The respondent is clear that he has seen all four species. He says the local reefs are full of a red sea weed which turtles like to eat. Turtles are hunted with fishing guns and sometimes they are caught in nets purchased from trade stores. Four rivers meet the sea at intervals of about 300 metres in the area discussed. The sea bottom is sandy and that's where green, loggerhead and hawksbill turtles are found. This area also has some long shallow reefs and then, separated from these by channels of some 30 - 50 metres depth, isolated round reefs lying about 6 - 15 metres down. These round reefs are favourite haunts of green and loggerhead turtles. They are most common between November and April.

3307 Makada Island, in the Duke of York group. The language is Kuanua, but a different dialect to that of the Tolais. The respondent has seen turtles eaten and also their eggs. The people of a village called Urkuk specialise in catching turtles and the respondent believes that these people know a lot about them. It is the only village on Makada where people eat a lot of turtles. The respondent offers to contact these people (Urkuk is near to his village) and obtain more information about turtles for me. I sent him forms 3 & 4 and stamped addressed envelopes to enable him to do this.

3311 Wide Bay is at 152 degrees east and 5 degrees south. The local language is Suika. Loggerhead and green turtles are called Kutun, hawksbills are called Mabua (I suppose the implication is that loggerhead and green turtles are the same species). Some of the information given may be wrong because the respondent has spent most of her life at school, only going home for Christmas. Turtles nest at other times of the year but she is unsure about when.

3316 Pomio is in Jacquinot Bay. The local language is Mengen (and the nearest big town is given as Rabaul). This form is so similar to 2305, from North Solomons, that I at first suspected a pooled effort. I am quite sure that that did not occur. The respondent here is unsure about leatherback turtles which he thinks are sometimes seen by other villagers but not by him. Nesting of turtles occurs on an island a few kilometres away from the village. Turtles nest every month but peak periods tend to be in the dry season. The moon is not really relevant and they mainly nest at high tide, but not always. Local people can tell when turtles are going to nest. They listen for a certain bird. When it cries and flies out to sea the villagers quickly go to the nesting island. During high tides it is particularly difficult to find where the eggs are (not explained) so the villagers fish in the sand with sticks. When these easily penetrate the sand they know they have found where the eggs are and can dig them out; but they do sometimes miss them and then you will eventually see the hatchlings going down to the sea. I wrote to this respondent for more information and sent him forms 3 & 4.

Questionnaire Information from New Ireland Province.

A lot of information came from this province but I lack data from the south and west of the island. It is sad to note that turtles in the St Matthias group are now being exploited by outsiders. In the past this area has been a haven for turtles due to the dietary restrictions of its inhabitants [see 2062]. There are thirty-seven forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1020	5885030	Kavieng	100000001111	000	00001
1024	8858010	Namatanai	100000001111	000	00001
1059	8855030	Djaul I	000000000000	000	00001
2062	2224033	Mussau & Emira	111000000111	134	66606
1069	8885430	Tigak Is	100000000001	000	00001
2076	2444230	Karu	000111111110	232	30003
1080	5252333	Hilalon Vil.	100000000001	000	00003
2106	2220020	Mussau I	100000000000	211	66666
2107	2221031	Mussau I	000000000001	111	66666
2108	2224031	Mussau I	000000000000	321	66606
2111	2220020	Mussau I	000000000000	021	66666
2115	1210030	Tabar I	000000000100	221	43463
3115	2220133	Tabar I	000000000000	311	63363
2118	2221030	Emanasa I	000000000000	022	33463
2125	2220030	Tigak Is	000000000000	000	33363
2128	2222333	Tigak Is	222222222222	212	33333
2135	2222030	Konos	000000000011	221	33663
2136	2220030	New Hanover	000000000011	111	33363
2137	4844230	Katedan Vil	100000000001	120	03003
2138	2224030	Kantebu Vil	111000111000	211	33303
2139	4244030	Medina Vil	000011110000	212	03003
2163	2200030	Lihir Island	222222222222	325	33663
2181	2220030	Kavieng	000001111000	211	33363
2182	2222332	Kavieng	000001111000	224	33333
2183	2220030	Kavieng	000001111000	211	33363
2185	2220030	Kavieng	000001111000	214	33363
2208	2220030	Kulangit	100000000001	222	33363
2210	2210333	Malom Vil	222222222222	221	33003

2211	2234220	Tabar I	000000000000	122	33103
2220	3220230	Tigak Is	000000000000	214	13363
2240	2224330	New Hanover	000001000000	324	33303
2244	0210010	Palakau	000000000000	100	65665
2245	0200000	Namatanai	000000000000	002	63663
2253	2220030	Bagail Vil	000000000000	011	33363
2258	2220030	Lamekot Vil	000000110000	211	33363
2259	0220000	Konos	000000000011	112	63363
2262	2220000	Kara area	000000000000	221	33363

Further Information.

1020 Turtles only nest in remote places. The respondent is unsure of the details.

1024 The location is Namatanai district but the nearest big town is given as Kavieng. Turtles do nest.

1059 Djaul (or Dyaul) island is a large island in the north of the province, directly south of Kavieng.

2062 Mussau & Emira Islands in the St Matthias Group. Turtles nest when the moon is about to fade. Religious rules prevent the local SDAs from harvesting the turtles but people are coming from Rabaul and Kavieng to catch them. This is having a serious effect and the respondent wants something to be done about this urgently.

1069 The Tigak Islands, near to Kavieng [see 2125]. More than one kind of turtle nests locally. They nest during the Christmas period and lay up to 500 eggs. There is a much bigger turtle that is not shown in our form which lays up to 1000 eggs (this sounds like a leatherback).

2076 Karu, about twenty kilometres north of Namatanai. The respondent is unsure about which type occurs. Nesting is given as in the dry, south-east(erly) season. Turtles nest on a small island called Mumn, off Karu bay 30 km north of Namatanai, and on an island near Huris, about 100 km south of Namatanai. The respondent also records Mussau Island (in the St Matthias group) as a haven for

turtles due to the dietary restrictions of the local people.

1080 Hilalon village thirty - five kilometres south of Namatanai. I interviewed this respondent. He says that there has been a decrease in the number of turtles over the years and he attributes that to slaughter by the local people. He says that the green turtle sometimes nests where there are reefs but the leatherback prefers deep water and nests on plain white sand. Leatherbacks will follow lights when they are nesting (I have seen this at Maus Buang in Morobe myself).

2107 This respondent gives a report on the danger of getting your hand caught when dealing with turtles. Form 2105, from Manus, says much the same thing, it is possible that the forms were written together. Turtles are harmless creatures, part of the heritage of PNG, and they should not be treated poorly.

2108 The leatherback (called in this form "the fourth turtle which has keels") is not recognised by the respondent from his own personal experience. He has heard that it is found locally in deep water. It is called the "four corner turtle". An informant from West New Britain referred to leatherbacks as having keels and also called it the four - corner turtle (reported as a conversation).

2115 The Tabar Islands are 120 kilometres east of Kavieng. Turtles are plentiful. They mass at the new moon and the locals catch them with big Japanese fishing nets. The sea bed makes this type of fishing very easy. There are places where turtles are looked after here, and such turtles become tame (I wrote to this respondent for further information).

3115 This is the reply I had to the request for information in 2115. The different species of turtles probably nest at the same time. The places discussed include: Simberi, Sos, and Mapira (Simberi is both the name of the northernmost island, and a village on its south western corner). The respondent agrees that turtles come up as the tide is turning and return as it retreats. He agrees that they nest year round, with some peak periods. The local beach has a coral reef. The sea is deep in some places and shallow in others and there

is a river near by. The beach is not wide. There is white sand, coral and grass. The local area has lots of food for turtles. Hawksbill turtles are now getting rare in this area. The local people would be amenable to conservation and farming help. They do tame and keep turtles although these are eventually eaten. Since the respondent has been away at school for eight years, he is a little unsure of his information, but he knows that turtles are still kept in this way.

2118 Emananusa is a small island south west of Mussau Island, in the St Matthias group. The respondent is confident that the loggerhead, green and hawksbill turtles are common and nest locally. He says that although the leatherback is seen in the water it does not actually nest. He seems quite clear that eggs of hawksbill turtles are not eaten but gives no explanation.

2125 The Tigak Islands, which the respondent explains are a group of islands spreading between Kavieng town and New Hanover main island. Turtles nest on remote beaches. This respondent took the trouble to give me a list of the names and addresses of other students of New Ireland who might be able to help me. I wrote to them all.

2128 The area covered by this form includes: Tigak Islands, Mussau & Emira in St Mathias, and Namatanai. All four species occur and are eaten, and their eggs. The respondent says that Mussau & Emira are areas where much nest - robbing occurs. He seems to express concern about the depletion of turtle numbers. I think that this respondent would have good information - he gives an address at the department of primary industry in Kavieng.

2135 Konos patrol post is on the north east coast of the main island, half way between Namatanai and Kavieng. The area has white sandy beaches and reefs. Turtles like nesting there and they are often taken when are nesting.

2136 One leatherback was found some years ago and was eaten. The respondent has seen none since. Turtles copulate for at least three months at a time. After that, the female comes ashore to lay the eggs.

2137 Katedan Village is somewhere in central New Ireland. The respondent grew up in Port Moresby and has not been to New Ireland since 1984. Once the local boys caught a green turtle, and they did used to hunt turtle eggs for food, but the respondent says that she does not know what the present situation is at Katedan.

2138 Kantebu village in the Mandak area in central New Ireland, on the north coast, and approximately 152 degrees east. They have a turtle similar to the loggerhead but much bigger. This turtle is not seen swimming in the sea, and is only noticed around Christmas time, when it comes up to lay eggs. It is then killed and it takes ten strong men to lift it up and put it on its back. When you eat the meat from such a turtle, a strong smell remains with you for days (this sound like a leatherback).

2139 Madina village is marked on some maps as being on the east coast and seventy kilometres south of Kavieng. Presumably this is the same place. Turtles nest on quiet beaches where there is no human habitation.

2163 Lihir Island is the large island due north of Namatanai. One can tell when turtles are going to come ashore because you will hear thunder coming from the horizon or you will see fire flies dancing in front of you. [Oddly enough, I myself have always seen fire flies on the evenings on which I have seen turtles nesting at Labu Tale].

2181 The respondent says that better information could be obtained by appealing to the local fishermen. Perhaps this, and the next three forms, should be regarded as a joint effort on the part of students at the National Fisheries college.

2182 The respondent identifies the species by name - saying that leatherback turtles are common but hawksbill and green turtles are rarely found. Turtles are being driven out because people have



started to populate the small islands where they once lived. Turtles nest when the moon is between new and full.

2183 Each of 2181 - 2183, and 2185 gave the same answer for the months in which turtles nest. These respondents were all from National Fisheries College in Kavieng. The respondent from form 2183 chooses the same wording as the respondent from form 2181 and makes the same suggestion about local fishermen. [This probably represents a genuine collaborative attempt to be helpful and informative on the part of these students].

2185 This respondent kindly offers to supply further information which he says he will obtain by talking to local fishermen, and doing some research with the staff and students of the National Fisheries College. This tends to confirm that the last few forms should be regarded as a kind of joint effort relating to the Kavieng area. The same comment about the moon is made as in 2182.

2208 Kulangit, described as near Kavieng. Turtles must nest at low tide because: " they leave track marks starting from the sea shore to their nests". They nest out of the reach of the sea. They need to grip something hard with their mouth when laying and this will usually be a tree root. They disguise their nests so well that it is hard for an inexperienced person to find the eggs after they have finished. A good tip that will enable one to do this is for one to search for something hard with definite teeth marks in it, such as a root. The eggs will be found opposite that {in the disturbed area of sand?}.

2210 Malon village. This is on the coast, east of Konos, and a little to the west of longitude 152 degrees east. The respondent confidently identifies loggerhead and green turtles as occurring, and states that he has seen hawksbill turtles swimming on occasions when diving for fish. He has not seen hawksbill turtles on the beach and assumes this is because they are too wild. He has never come across a leatherback turtles at all. The respondent warmly supports conservation and says that turtles are getting much rarer. When he was a small boy they would go out looking for the marks turtles make on the beach, and follow those marks into the nearby bushes to find

the turtles. Now turtles are rarely seen nesting except in really remote areas.

2220 Turtles nest on isolated islands on dry nights in the dry season, probably when the moon is full, although there is some uncertainty about that. The respondent is also unsure about whether he has seen loggerhead eggs, but he has seen green and hawksbill turtles nesting (I coded this as uncertainty about the different species but it may actually indicate the opposite).

2240 There are lots of turtles in this area and they are commonly used for food. Leatherbacks do occasionally occur but they are rare. Turtles nest in June and other months, mainly at the new moon but also when the moon is full, and at any time of the day.

2244 Palakau is a small town on the south coast of Mussau Island, the largest island in the St Matthias group. Only the eggs of the green turtle are eaten - this is indicated by circling the relevant answer. No turtle is eaten, and only the green turtle nests. It is possible they do eat the eggs here but most of my information from other sources suggests they do not and I suggest that this was just a slip of the pen.

2253 Bagail Village - in Kavieng town. The respondent is not sure about in which months turtles nest but says that these coincide with there being a lot of sea weed. She goes on to say that baby turtles could be reared by man - fed on sea weeds and small shells (which she calls kina shells). It is probable that the respondent is reporting something she has read about rather than an actual rearing project. I wrote to her for more information.

2258 Fifty kilometres out of Kavieng and on the east coast, there is a Lemakot village. The respondent gives a postal address in Madina village [see 2139]. He can tell very old turtles because they have sea weeds or lumps of coral growing on their shells. Despite their great age they can still lay eggs.

2262 The Kara area, (probably Karu - see 2076).

Questionnaire Information from North Solomons Province.

The generous help of the headmaster of Hutjena Provincial High School enabled me to get better information than would otherwise have been the case. He even went to the trouble of sending a map on which the various locations were clearly marked. There are twenty - seven forms.

Form.	Tnumber.	Location.	Month Nest.	STM	Predation.
1016	8889012	Buka	000001100000	000	00001
1018	9899020	North Solomons	000000000000	000	00001
1023	9899200	Laluai	111100000001	000	00000
1034	9899030	Malulu	000001100000	000	00001
1036	8888020	Kieta	100000000011	001	00001
1048	9889030	Mamagota Beach	000000100000	000	00001
1056	9399230	Buka	000000000000	000	00001
1058	9699020	Arawa Town	100000000001	000	00001
2072	2224020	Mortlock Is	000000000000	222	33303
2101	2222430	Buin	100000000001	221	66565
2173	1144000	Kieta	000000000000	000	00000
2178	2220033	Mortlock Is	000000000000	000	33363
2225	2220033	Tasman Island	222222222111	325	33363
2226	0222332	Iaun, Tinputis	100000000011	011	63333
2227	2220033	Nguria Is	222222222111	325	43363
2228	2200030	Siwai	000000000111	221	53663
2229	2220332	Haku	122222222221	324	33363
2243	2220030	Nissan Is	000001000000	122	63363
2273	2224030	Matsunke Vil	100000000011	122	33303
2300	6222430	Wakunai	222222222222	322	63333
2301	0200330	Nissan Is	000000000100	212	63663
2302	2222030	Amun	000000000000	111	33333
2303	1110432	Carteret Is	000000000111	112	33363
2304	2220330	Buka Town	000000011110	221	33363
2305	2222332	Hahon	222222222222	312	33333
2306	2222330	Torokina	222222222222	212	33333
2310	2210233	Mortlock Is	000000000000	212	33103

Further Information.

1016 It is not known whether more than one species nests but turtles do nest locally. Some of the turtles shown on our form no longer exist here.

1023 The Luluai river is about forty kilometres south east of Kieta. Peak nesting occurs during Easter and Christmas. It is not known whether more than one species occurs. Turtles are not good to eat - they have no taste at all.

1034 Malulu Island, somewhere near Buka. Turtles do nest locally and are good to eat. Malulu island is the most popular local nesting ground but turtles do nest on other islands in the vicinity.

1036 More than one species nests locally. Turtles are good to eat.

1048 Mamagota beach, Siwai area, near Arawa (I am told this is on the coast, south west of Buin). It is not known which types of turtle nest. The respondent says that this project is a good one and offers any help that he can give.

1056 More than one type of turtle is found here.

2101 Orava (a village due east of Buin) to Teomanapu plantation (near Kieta). The respondent seems to be describing a huge coastal area encompassing the south east corner of Bougainville island. He says that it is under populated so the turtles are not disturbed and that the sand extends for miles (it is not clear whether he is talking about the whole beach or a particular part of it). He says that the sea is usually rough here.

2178 The Mortlock or Takuu islands lie about 157 degrees east and five degrees south. The details as to when turtles nest (which are asked for in the form) would only be known by the village elders. Turtles used to be easy to catch but are now becoming rare due to over-exploitation. The respondent feels that something should be done about this.

2225 The Tasman or Nukumanu group of islands lies almost 160 degrees east and 4.5 degrees south. Turtles nest all the time with peak periods between September and Christmas. The phase of the moon and whether the season is wet or dry are not relevant. The respondent says that all turtles of whatever size are killed when found and that this is having a serious effect on the population. He asks for help to improve things.

2226 Iaun and Tinputu (more often spelled "Tinputz") are both on the north east coast of Bougainville island. A special rain falls when turtles are going to lay their eggs (a colleague of mine from Iaun enthusiastically endorsed that statement). Leatherbacks are getting to be rare now although they were common in the 1970s - people have taken to killing them while they are laying their eggs. Hawksbill and green turtles are still found, but mainly on uninhabited islands. Turtles mainly nest on islands and they are killed while doing so. People also spear them in the open sea. They have special turtle spears. Forms 3 & 4 were sent to this respondent.

2227 The Nuguria Islands lie 154.5 degrees east and 3.5 degrees south. They are also known as the Fead Islands. Turtles are becoming rarer but are still fairly plentiful. The respondent attributes the decrease in numbers to "noise pollution" - people now have power boats which are noisy. These boats also make it easier for the local people to catch turtles. The respondent says that there should be laws to protect turtles. He seems to suggest that some local conservation of turtles may go on.

2228 This area is south west of Buin. The time to eat turtles is when a chief or big man dies - they are an important part of the funeral feast [see 2304].

2229 Haku (Lemanmanu) is on the north west coast of Buka island, a little below Lemankoa. Turtles nest on dark nights and when the moon is new. Turtles are now much rarer than they once were. Only three types are found and then no more than ten a year.

2243 The Nissan or Green islands lie off the north west coast of Buka - about 4.5 degrees south of the equator. Turtles nest in isolated areas and their eggs are rarely found.

2273 Matsunke Village near Torokina. Torokina is in the middle of Bougainville island and on the west coast. The wildlife service put a ban on killing turtles during the 1982-1983 season. Last year, one of the village elders made a similar complete ban on killing turtles. They also do leave some eggs to hatch. [See form 2212 from West New Britain].

2300 Wakunai is on the east coast of Bougainville, about fifty kilometres north west of Arawa. Turtles don't nest in particular seasons. They nest when "the light is splashing in the east". People then walk the beach in the early morning, looking for the marks which indicate that a turtle has come up. Sometimes they will find the nesting turtle herself and then they turn her over and beat her to death with sticks - these are the ones that get eaten. If you find turtle tracks, the eggs will be found where they stop.

2301 The respondent is quite clear that only the green turtle nests and that it is fairly common. She says that turtle eggs are nice to eat.

2302 Amun is on the west coast of Bougainville almost 6 degrees south of the equator. Turtles come up when there is a light rain falling because then the beach will be devoid of people. There will be a full moon but it will be obscured by the mountains. The back of the turtle is very strong and not eaten. "Sometimes when there is lightning people already know there is a turtle laying eggs so they just went find it. It lays hundreds of eggs."

2303 The Carteret (or Tulun) islands lie off the north east coast of Buka island, between the Green islands and the Mortlock islands. People kill turtles whenever they are found so numbers are declining. You know that turtles are coming up to nest when the sky is dark and thunder occurs without rain. I suspect the nesting information on this form was accidentally filled in incorrectly. The respondent is quite clearly saying that three species do nest,

although that is not what he has indicated on the form.

2304 The headmaster of Hutjena has marked this place as being some way north of Buka town, on the east coast of the island and nearer to Hanahan than Buka itself. "We usually eat turtles when a big man in my village dies. They are forbidden to eat when they come up to the beach one by one. Sometimes the meats and eggs are either sold or eaten at home with all the village people. Turtle shells are preserved in the house of the big man or chief as a mark of one successful fisherman". Form 3028, from Manus, says much the same thing, as does form 2228, from Siwai. Forms 3 & 4 were sent to this respondent.

2305 Hahon village on the north west coast of Bougainville, somewhere between Kunapopo and Puto [it is marked as Hahen on some maps and lies 4.5 degrees south]. Turtles nest all through the year. Turtles are caught at sea whenever there is a feast in the village. One can find out when they have nested by listening for the cries of a certain bird. When these are heard the local people patrol the beach and look for the nesting place - they always do find it. Turtles nest when the moon is full and hiding behind the local mountains. Before digging up the eggs a sharp stick is inserted into the sand. If there is a smell of the egg liquid the eggs are dug up. The number of eggs laid depends on the size of the turtle - big ones lay a lot of eggs. Small turtles are sometimes found drifting with logs in the sea. These are looked after, although they often die. If they grow up they always escape (eventually). Leatherbacks choose beaches which have no coral because their bodies are not strong. This species lays the largest number of eggs and usually comes up around Christmas time. The other three species are common and they are often to be found round the shore. Leatherbacks live out in the open sea. Only the female comes to land so the local people have never seen a male. It is hard to turn these turtles upside down when they are still alive. Usually, people hit their front flippers to make them docile, then they can be turned. People catch turtles at sea without weapons by swimming after them and holding the side of their shells - forcing the turtles to the surface [I have seen a TV film of Colin Limpus employing just such a technique to catch loggerhead turtles for tagging purposes in

North Queensland]. This is less often done nowadays because now people have fishing guns. Many are killed by means of these guns. A lot of what this respondent had to say was repeated by 3316 (from East New Britain). Forms 3 & 4 were sent.

2306 Torokina is on the west coast of Bougainville near the middle. Turtles nest all through the year. Mainland beaches are of sand and fairly soft but the local islands have beaches which are made up both of sand and coral and are much harder to dig in. Green and loggerhead turtles nest both on the mainland and in the islands. Leatherback and hawksbill turtles dig deeper holes and so nest only on the mainland. Loggerhead and green turtles can nest every three weeks, so long as the tide is high and the weather fine. They are very careful about where they lay their eggs and bury those eggs to the side of the hole they are digging and not in its centre. Leatherbacks and hawksbills nest at the same times as mangos are in season. They are the largest types of sea turtle and have power to control the weather. They are creatures of the deep sea. You know when (these?) turtles are going to come up from the weather conditions - "When the stars and the sky is bright and the night is still and dark with splashes of lightning that steals the stillness of the dark, we say there will be a huge turtle nesting....". One can confirm that a nesting will take place from the tide and by looking for a cloud in the shape of a turtle.

2310 Turtles provide a major protein source for the Mortlock islanders. Turtles hardly ever lay their eggs there now due to excessive predation. Last year, a conservationist was appointed and the respondent suggests I contact him, and kindly gave me the address. I have written to him. In a conversation, the respondent also reported the following: some time ago his maternal uncle was fishing out at sea with a friend when a really large turtle came up for air right next to the boat. He seized the turtle and it caught his hand between the shell and the neck. The turtle dived and took him with it. It came up once with the man still alive and trapped but dived again and drowned him. Since that time his mother has been forbidden to eat turtle meat although the respondent has had it. His whole family is now under the protection of turtles and are therefore safe at sea. The respondent has some instances of how



turtles have protected members of his family. The danger of getting your hand trapped in this way is recognised by at least one other respondent - 2105 from Manus. Form 2107, from New Ireland, says much the same thing.

## A Preliminary Analysis of the data

Angela Balkwill has had a look at the information from 232 of the forms. Here are her findings.

### **Maps**

For each of the turtle species studied, a map was prepared showing where turtles are found, and where they nest.

In the case of loggerheads, greens and hawksbills, the provinces were in most cases divided into regions, typically three to a province, in order to lose as little information as possible given the constraints on marking sites on the maps. Replies from each area were then examined and if the majority of respondents indicated that a particular species was found, this was indicated on the corresponding map. A similar procedure was followed for reports of nesting.

Leatherbacks were reported much less commonly than the other species (see statistical results). Furthermore, their nesting areas are very localised. All positive responses concerning leatherbacks were therefore examined individually. Where we had received more than one reply from a village from which leatherbacks had been reported, this report was in general accepted only if it appeared in the majority of responses from that place; however, if it was felt that the reports not citing leatherbacks were of dubious reliability, the report was accepted even when not in the majority. In cases where there were no other respondents from the immediate vicinity, and the quality of responses on the form seemed reliable, the incidence (and nesting if stated) of the leatherback in that area was accepted.

### **Statistical results**

All forms of type 2 or 3 up to form 3313 (a total of 232 forms) were coded and analysed on the computer.

Of these, only 1 (from East New Britain) reported that turtles were not found in the area. The results obtained from the remaining 231 are shown below.

## Responses by province

Numbers of responses by province were as follows:

Central	17
Gulf	4
Madang	12
Manus	24
Milne Bay	30
Morobe	15
National Capital	3
East New Britain	21
West New Britain	16
New Ireland	30
North Solomons	19
Oro	15
East Sepik	12
West Sepik	10
Western	3
Other (not PNG)	1
<hr/>	
TOTAL	232
<hr/>	

## Prevalence of the different turtle species

The percentage of reports citing each turtle type throughout PNG are shown below. A distinction was made between those respondents who specifically stated that they were not sure ('Don't know') and those who left the relevant section of the form blank ('No information').

	Found	Nested
LOGGERHEAD		
Yes	81.0 %	64.9 %
No	8.7 %	16.5 %
Don't know	0.9 %	2.2 %
No information	9.5 %	16.5 %
	Found	Nested

## GREEN

Yes	94.8 %	79.2 %
No	0.9 %	10.4 %
Don't know	0.4 %	1.7 %
No information	3.9 %	8.7 %

## HAWKSBILL

Yes	69.3 %	57.1 %
No	16.5 %	22.1 %
Don't know	0.4 %	2.2 %
No information	13.9 %	18.6 %

## LEATHERBACK

Yes	22.1 %	16.0 %
No	51.9 %	50.2 %
Don't know	2.2 %	3.0 %
No information	23.8 %	30.7 %

The leatherback was the only species reported by less than 50 % of respondents: there were 51 reports of leatherbacks being found, out of a total of 231 reports for the four species. In fact, whereas the other three species were reported as being found and nesting in every province in PNG, there were no reports of leatherbacks from Central, Gulf or Western Provinces, or from the National Capital District.

## Nesting times

These data are not available by turtle species. The results are presented here as an overall summary of all responses which cited turtles as nesting.

## SEASON

Wet	20.7 %
Dry	46.6 %
Either/both	9.5 %
Don't know	6.0 %
No information	7.8 %

## MOON

Full	34.1 %
New	31.0 %
Half	2.6 %
Other	8.2 %
Any phase	9.5 %
Don't know	6.9 %
No information	5.6 %

## TIDE

High	31.5 %
Low	42.7 %
Both	6.9 %
Don't know	4.3 %
No information	5.2 %

The only question on nesting time which seems to have yielded any information is that on season, where 'dry season' responses outweigh 'wet season' responses by more than 2 to 1.

Otherwise these results tend to confirm doubts regarding these questions. In relation to the phase of the moon, it is interesting to note that a number of respondents comment that, though nesting occurs during the full moon period, it takes place when the moon is obscured by a mountain or clouds.

### Differentiation between species

Only form 3 asked explicitly whether or not respondents could distinguish between species on the basis of the pictures provided. Unfortunately at the time of analysing the data, only 31 form 3's had been returned.

Of those 31 replies, 25 respondents said they were able to differentiate between turtle types, 2 said they were not, and 4 did not answer the question.

In examining the 231 forms which stated that turtles were found, there were 18 respondents who gave different replies to whether or not loggerheads and greens were found. It is interesting to note that only 1 respondent said that loggerheads but not greens were found in his area; whereas 17 stated that greens were found, but not loggerheads. If confusion between the two species were universal, one would expect the 'split' between these two groups to be 50/50; or, on the basis of the layout of the questionnaire, that there would be more respondents citing only loggerheads, since this is the first of the two pictures which they encounter on the form.

To investigate this issue further, the four-digit numbers corresponding to the full set of responses ('found', 'nested', 'eaten' and 'eggs eaten') were examined for loggerheads and greens. The only forms which were analysed were those where neither set of four responses was completely blank; form 3's were not included if the respondent explicitly stated he/she could not tell the species apart. This left a total of 201 forms, of which 49 had different response patterns for loggerheads and greens; on this basis it would appear that at least 25% of respondents are able to differentiate between the two species.

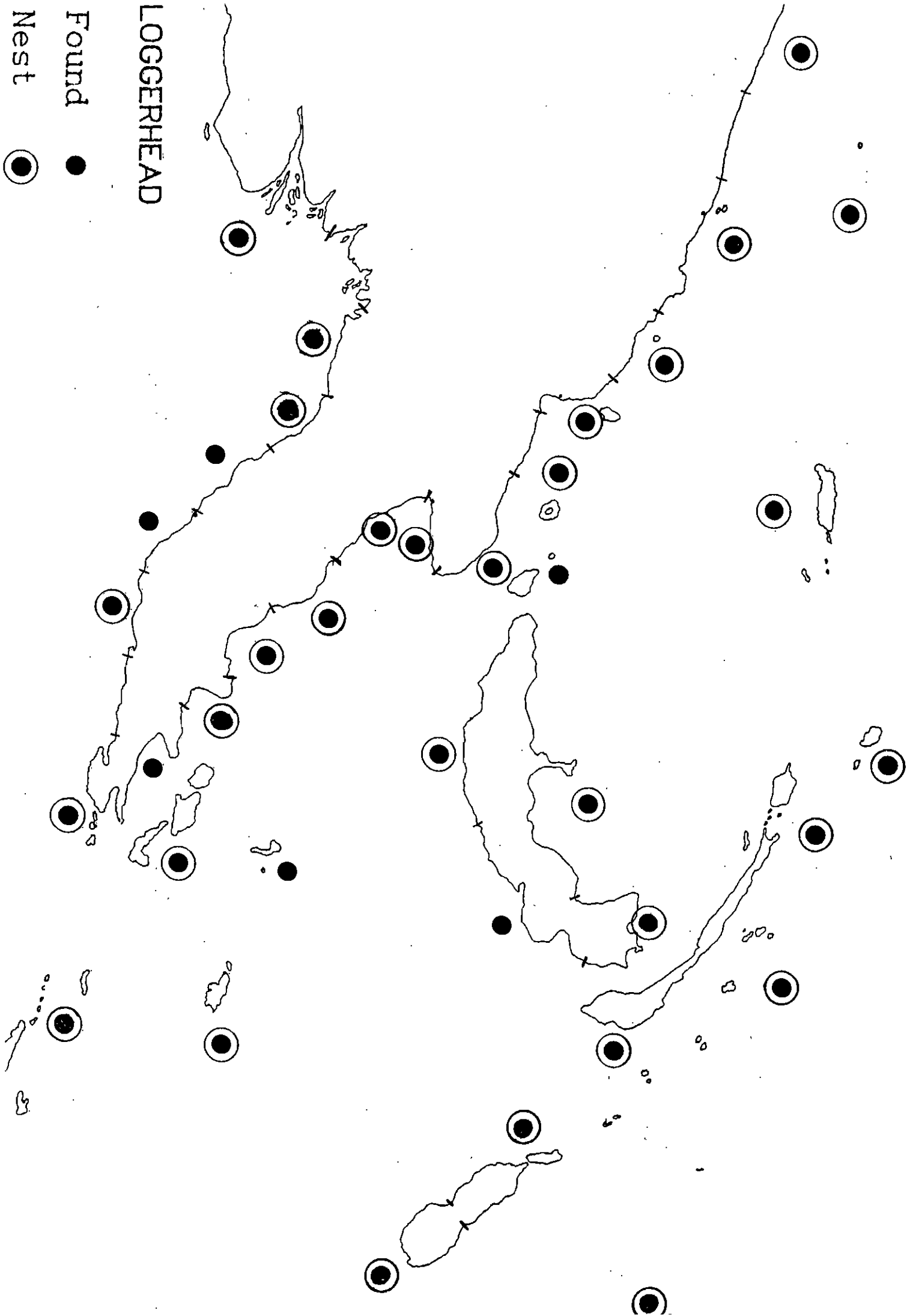
#### Declining Populations

At the time of writing, 69 respondents from 317 replies either state that turtle numbers are declining, or specifically endorse conservation. None of the first three versions of the form asked about this, the information was volunteered.

It seems that sea turtle populations in PNG are under a grave threat, and that local people are worried and would perhaps be receptive to more guidance from the central government or from the independent conservation authorities.

The following four maps show the present distribution of the four species of turtle on the basis of the stated analysis of 232 forms. The fifth map was not drawn by Angela Balkwill. It shows areas where I (Bob Lockhart) am fairly confident that loggerhead turtles are to be found. I have drawn this map by analysing all 317 forms that are to hand and it is based only upon my personal opinions.

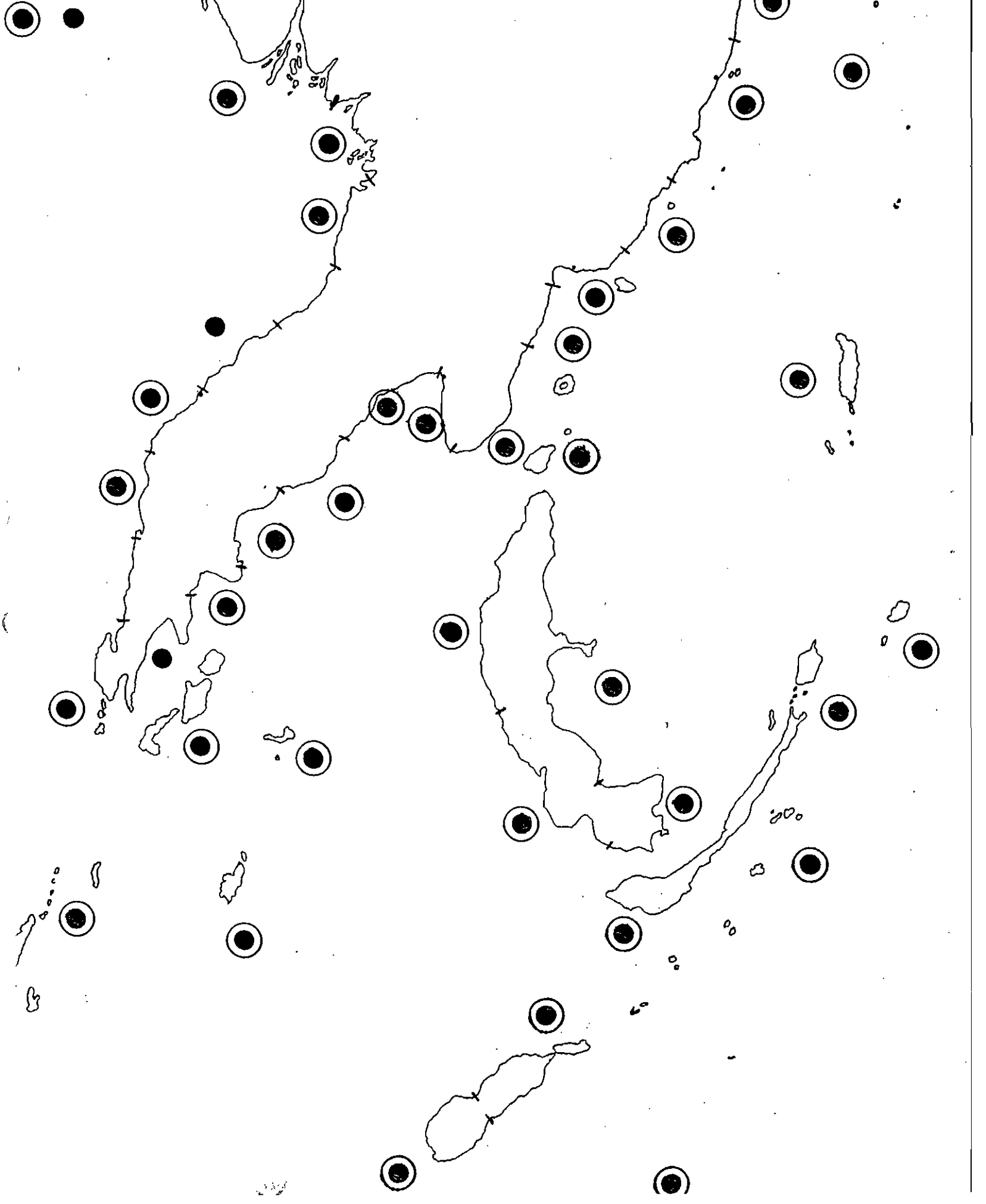
# LOGGERHEAD



GREEN

Found

Nest

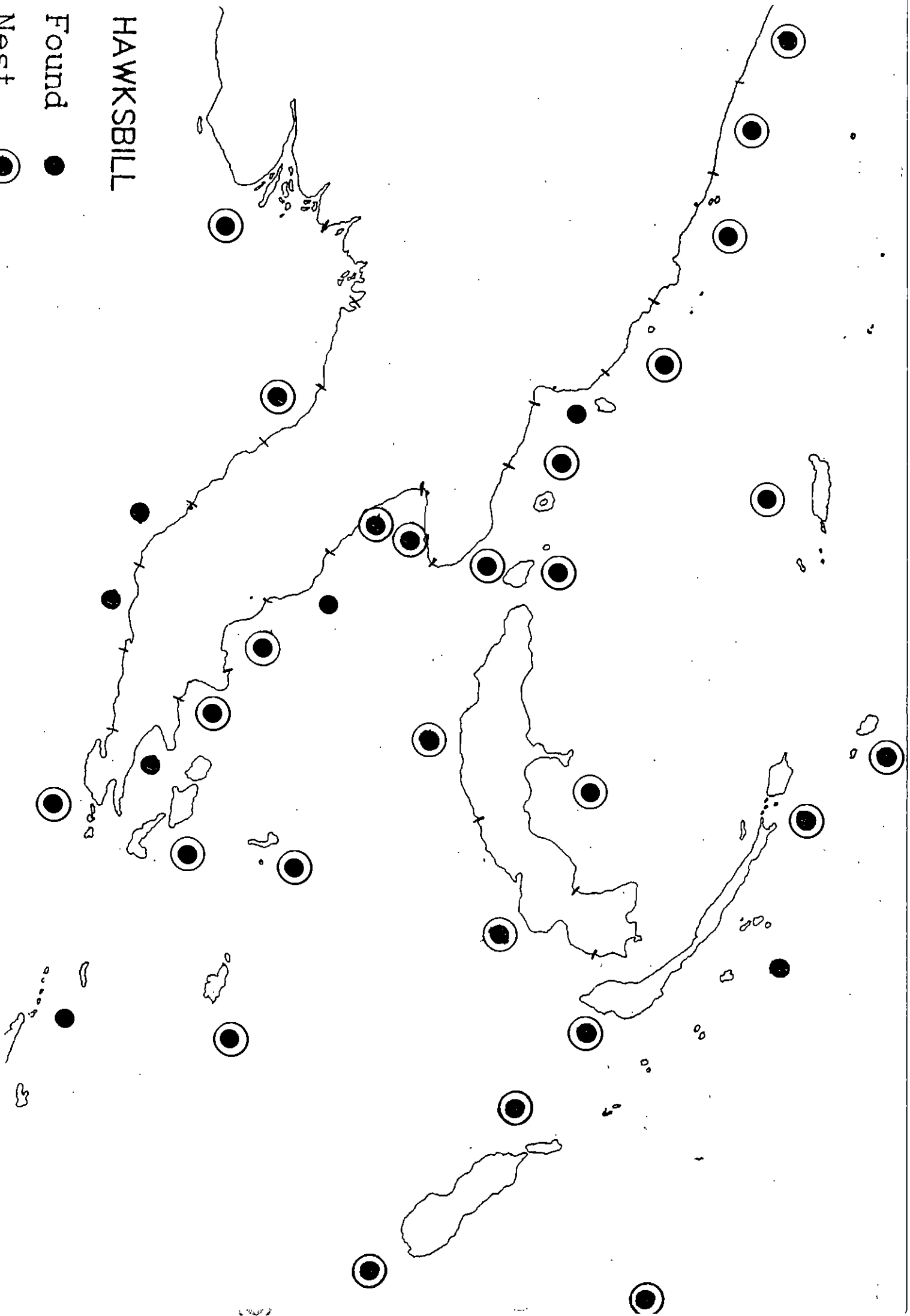




# HAWKSBILL

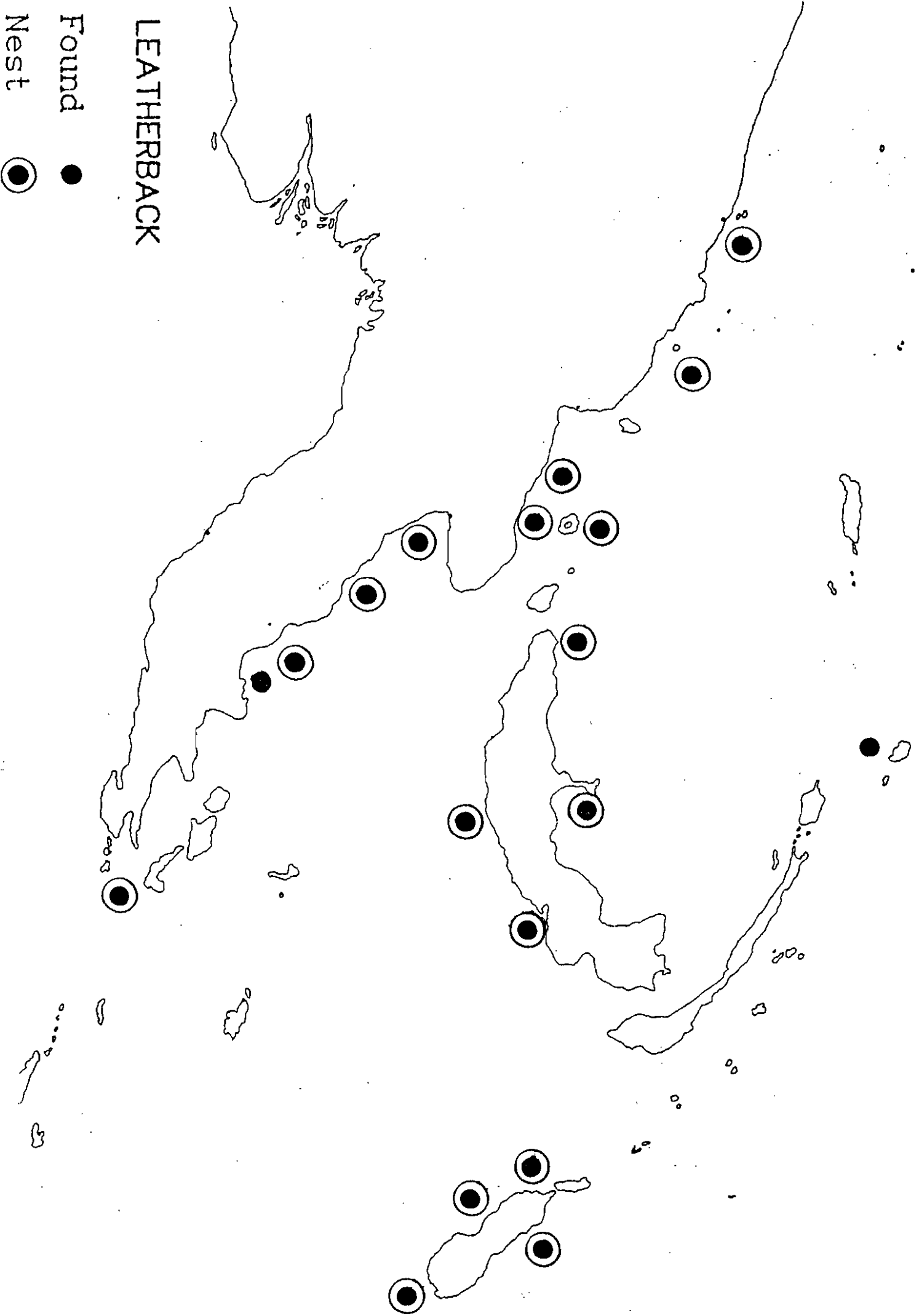
Found ●

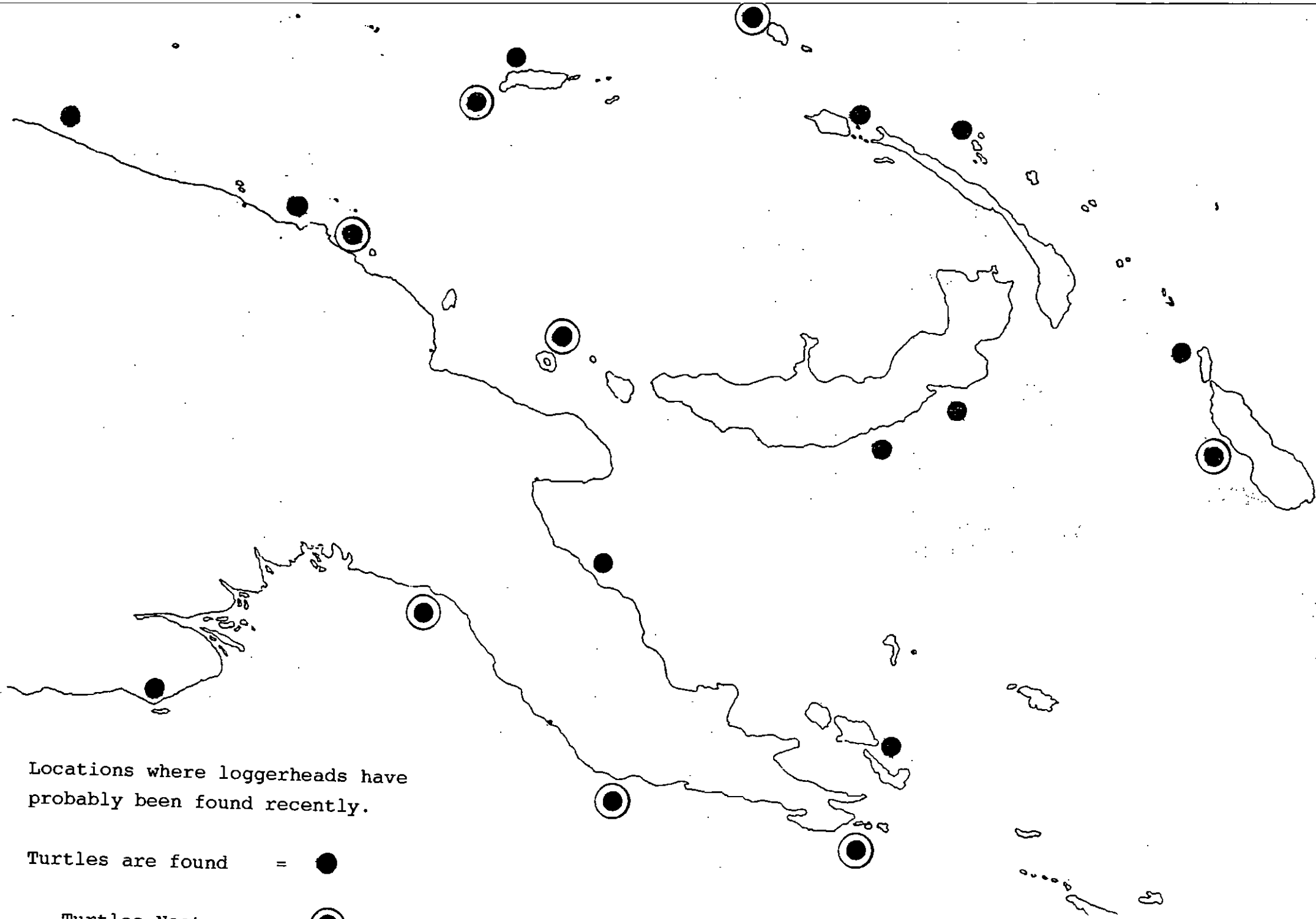
Nest ○



# LEATHERBACK

- Found ●
- Nest ○





Locations where loggerheads have probably been found recently.

Turtles are found = ●

Turtles Nest = ⊙

## Appendix: How to Start a Conservation Area.

Marine turtles in Papua New Guinea are suffering a severe decline. Most conservationists would say that at the very least you must not kill nesting turtles and you must permit some nests to hatch naturally if you want to have some chance of maintaining turtle stocks. These measures are obvious ways in which local communities can continue to benefit from their turtles for years to come. Only a fool kills all of their chickens and leaves no breeding stock. Why do people expect it to be different for turtles?

It occurred to me that coastal schools could take a lead in educating their communities about preserving some turtles and in this way they could benefit both their own communities and the whole country. Since this report will be sent to many coastal places around PNG I thought I would set out a programme which schools might like to try to carry out in their area. It is based on my own experience of trying to set up a turtle reserve at Maus Buang, near Lae.

### Plan for setting up a reserve.

The school children should:

1. Get the local community to make over a small stretch of beach where turtles nest to the local school as a turtle reserve. Make sure that the boundaries are clear to everyone. Make notice boards and set them up on the beach. The notice boards should say that the beach is a turtle reserve and that the turtles coming to the beach belong to the local school and must be left alone. If possible, get the local community to make laws forbidding people from taking turtles or eggs from the beach and get them to agree that anybody who takes turtles or eggs from your reserve will be fined and have to pay the school compensation.
2. Keep a record of turtles coming up to nest on the beach. You don't have to patrol the beach all night, but do check it every morning (you could take it in turns to do this) and you should report each time you find a turtle nest and mark it on a map of the

reserve. You should not interfere with any turtle you find nesting. Don't shine lights at it and don't play games with it. Leave it alone (you could try to identify which species it is and the pictures in this report might help you).

3. If a nest is robbed from the beach or a turtle is killed, complain to the local big men and obtain compensation from the person involved. Keep the money to help with your turtle reserve. The compensation should be MORE than the local value of the turtle and its eggs. Don't sell your turtles - only take money from people who have stolen a turtle or its eggs. Your turtles must be left in peace.

4. Keep a record of when each nest hatches. Try to protect the hatchlings as they run down to the sea. Keep dogs and pigs and birds from getting them.

5. Find out as much as you can about turtles. Try to make a school book which records what happens on your reserve, including your record of hatching turtles. Talk to the old men of the village and get stories about turtles from them. Write it all down in your book. Find out whether turtles are getting scarcer and write that down too. Each year, add to the information that you have got, so that your book gets bigger and bigger.

6. Form a "Turtle Society" in your community. Enlist village people as members. Continue to support the reserve when you leave school. Remember: unless you protect some turtles now, your children will never see them.

7. Whenever your village has a sing sing or a party make sure that someone is there from the turtle society to spread the message that PNG must conserve her animals so that your children can enjoy them.

Good Luck!

Charles Levi has kindly translated these suggestions into pidgin for me.

Tingting bilong kamapim wanpela ples bilong was long ol trausel.

Ol skul mangi mas

1. Tokim ol pipel long peles long makim wanpela liklik hap nambis we ol trausel isave karim long en, givim igo long skul na olgeta pipel mas save gut long mak bilong dispela hap. Raitim ol tok save na putim long dispela hap nambis. Dispela ol tok save imas tokim klia ol pipel olsem dispela hap nambis em bilong skul na itambu long ol pipel kilim o kisim kiau bilong trausel. Em bai gutpela tru, long tokim ol pipel long peles long mekim sampela lo we bai stopim ol pipel long kilim na kisim kiau. Na tu, traim long kisim tok orait long ol pipel olsem sapos man o meri i kisim kiau long dispela hap, ol bai sasim em na em bai baim kompensaisen moni igo long skul.

2. Lukautim wanpela buk long raitim numba bilong ol trausel isave putim kiau long nambis. Yu noken was long nambis olgeta nait, tasol lukluk long olgeta moning (traim tokim wan wan skul mangi long lukluk) na yu mas raitim daun wan wan taim yu lukim wanpela trausel kam antap karim. Makim long mep we wan wan trausel putim kiau long dispela hap nambis. Noken pilai o bengim tos (sut lam) long trausel. Lusim tasol na traim luk save em wanem kain trausel (ol piksa ia bai halivim yu).

3. Sapos ol i kilim trausel o stilim kiau, kotim ol long bikman bilong peles na kisim kompensaisen moni long ol. Sasim bikpela moni abrusim amas bai ol kisim sapos ol salim trausel o kiau. Kisim moni tasol long ol dispela bikhait manmeri na noken salim trausel o kiau.

4. Raitim daun tu wanem taim ol kiau isave bruk na ol pikinini trausel igo long solwara. Was gut long ol birua olsem dok, pik na pisin long kaikaim ol pikinini trausel taim ol igo daun long solwara.

5. Traim painumaut moa stori bilong ol trausel long ol lapun manmeri long peles na raitim igo daun long buk. Dispela buk imas igat namba bilong ol trausel i karim, dei ol kiau iburuk long olgeta yia. Painim aut tu sapos ol trausel iwok long pinis isi isi. Yu mas putim wantaim stori bilong wan wan yia long mekim kamap wanpela bikpela.

6. Traim kirapim wanpela "Trausel Sociati" long peles bilong yu. Raitim daun nem bilong ol manmeri olsem memba bilong sociati. Noken stop givim sapos bilong yu taim yu lusim skul. Tingim, sapos yu no savim trausel nau, ol pikinini bilong yu bai inonap lukim na save ol trausel.

7. Sapos wanem taim peles bilong yu igat singsing o pati, traim lukim olsem wanpela memba bilong "Trausel Sociati" mas stap tu. Em bai tokim aut tingting bilong yupela long bihain taim iken hamamas lukim ol.

Gut Lak!

## Bibliography

1. S. Spring. "The Status of Marine Turtle Populations in Papua New Guinea". World Conference on Sea Turtle Conservation November '26-30 1979 Washington DC



