ON

BALAZS

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PHASE 1

SEPTEMBER 16-25 2012

SEPTEMBER 2-14 2008

GEORGE H. BALAZS
BIOLOGIST AND LEADER
MARINE TURTLE RESEARCH

CMA CGM MATISSE

PACIFIC ISLANDS FISHERIES SCIENCE CENTER
NOAA, NATIONAL MARINE FISHERIES SERVICE
2570 DOLE STREET
HONOLULU, HAWAII 96822-2396
Cell: (808) 286-2899
Office: (808) 983-2902
Fax: (808) 983-2902
gbalazs@honlab.nmfs.hawaii.edu

NEW CALEDONIA

9-22-2012 N=48

22

aquarium des lagons Nouvelle-Calédonie

11

aquarium des lagons Nouvelle-Calédonie

151 Sept 9 2008

Hot Picks

9/08 NC

Arts & culture

9/2012 = 5th anniversary

Wonders of the underwater world

On 30 August, the new Noumea Aquarium celebrates its first anniversary. An ideal opportunity for a visit.

Since the new Aquarium des Lagons opened on August 31, 2007, New Caledonians and visitors have been flocking to gaze spellbound at the aquarium's treasures. The aquarium extends over almost 2000 m² and boasts 33 tanks ranging from 150 to 400,000 litres, housing an astonishing variety of underwater plant and wildlife species, including corals and nautiluses, 'living fossils' which have survived relatively unchanged for millions of years.

Water wonderland

A visit to the aquarium takes you on a voyage of discovery through the water wonderland of New Caledonia's aquatic environments. Leave dry land behind as you step through the curtain of water cascading down the building's glass façade and enter a world of lakes and rivers, inland water habitats thronged with eels and carp, wild taro and tree ferns. Move on to explore the mangroves and then the lagoon reefs with their abundance of wildlife and plant life. Finally, dive deep into the mysterious ocean depths and meet the aquarium's mascot Napoleon fish and a host of kingfish, sharks, mantas and turtles. Take a seat, relax and enjoy the show.

Aquarium des lagons: 10 a.m. to 5 p.m., Tue. to Sun.
Late opening: Fri. till 9 p.m.
The ticket office closes at 4 p.m. (8.15 p.m. on Fri.)
Full rate F1000
Children aged 5 - 16: F500
www.aquarium.nc
Tel. 26 27 31

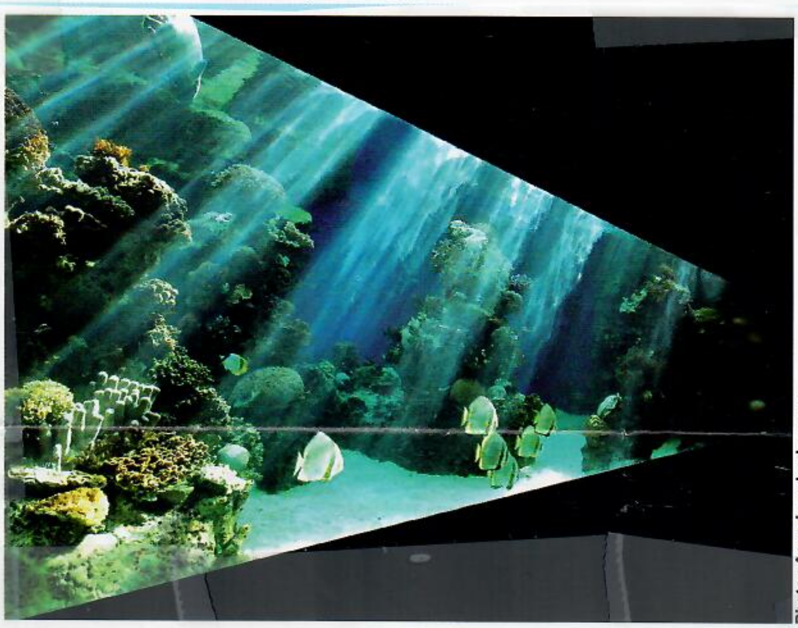
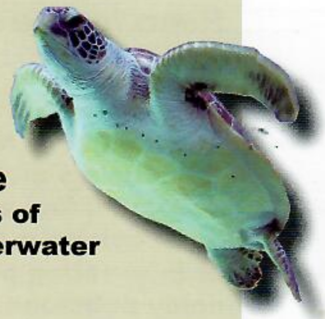


Photo : Aquarium des lagons

9/08
New Caledonia

Contents



AUCKLAND NZ 9/08

DAILY ACTIVITIES AND FEEDING TIMES

WHEN	WHAT
10.30am	Life on the Ice Presentation
11.00am	Stingray Encounter
12.00pm	Fish Alley Encounter including talks on the following animals: piranha, octopus, venomous fish, poisonous fish, crayfish and eels.
1.00pm	Stingray Encounter
1.30pm (Tuesday + Thursday only)	Shark Tank Feed (by diver)
2.00pm	Oceanarium Feed (by diver)
3.00pm	Stingray Encounter
4.00pm	Oceanarium Surface Feed

WELCOME TO KELLY TARLTON'S

23 Tamaki Drive, Orakei, Auckland • Ph 0800 80 50 50 • Open 9am daily • www.kellytarltons.co.nz

PATROUILLEUR
LA GLORIEUSE

Visite de courtoisie du HMAS *Maryborough*

Le HMAS *Maryborough* séjournera à la base navale de la pointe Chaleix pendant son escale.

Le patrouilleur australien HMAS *Maryborough* fera escale à Nouméa du 5 au 7 septembre. Durant son séjour en Calédonie, le navire sera stationné à la base navale de Nouméa.

Le HMAS *Maryborough* tire son nom d'une petite ville côtière du Queensland méridional, située à 300 kilomètres au nord de Brisbane. Ce patrouilleur appartient à une flottille de quatorze bâtiments de type Armidale en charge de la protection des pêches, du contrôle de l'immigration et de la lutte contre la drogue. En cas de conflit, ils seraient assignés au contrôle de la zone côtière australienne.

Long de 57 mètres pour un déplacement de 300 tonnes, le patrouilleur a été admis au service actif en décembre 2007. Le HMAS *Maryborough* est commandé par le capitaine de corvette Jeffrey Davison et compte vingt et un marins à bord. Le navire qui est à la fois en escale technique et en visite de courtoisie ne sera pas accessible au public pendant son séjour.

57 METERS
Aluminum
1 year old

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Agency Name:	COMMERCE	*Account Number:*	4486-0200-0022-5477
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Discretionary Code:		*Tax Exempt #:*	
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09/10	09/11	6011	5000000002355	14	NATIONAL BANK	AUCKLAND		66.87
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09/11 09/13	09/15	5812	6122533650066	18	PORTOFINO VIADUCT (Foreign Currency) 308.90 NZD (Rate) 1.493930	AUCKLAND	NZ	206.77
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09/13	09/15	6011	8000000005322	20	ANZ AUST	SYDNEY		80.45
09/14	09/16	7523	9259270152902	21	AMPCO PARKING HONOLULU AI	HONOLULU	HI	124.00
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09/14 09/16	09/16	4121	9106929050078	23	MY TAXI FARES (Foreign Currency) 27.00 NZD (Rate) 1.502504	AUCKLAND	NZ	17.97
09/22	09/22	0000	6266249374239	24	PAYMENT - THANK YOU			87.22 py
09/22	09/24	5814	7531477561104	25	HAWAII SNACK B30225619 7200	HONOLULU	HI	5.63
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09/23	09/25	7523	8268106238909	27	AMPCO PARKING HONOLULU AI	HONOLULU	HI	20.00

Continued on next page

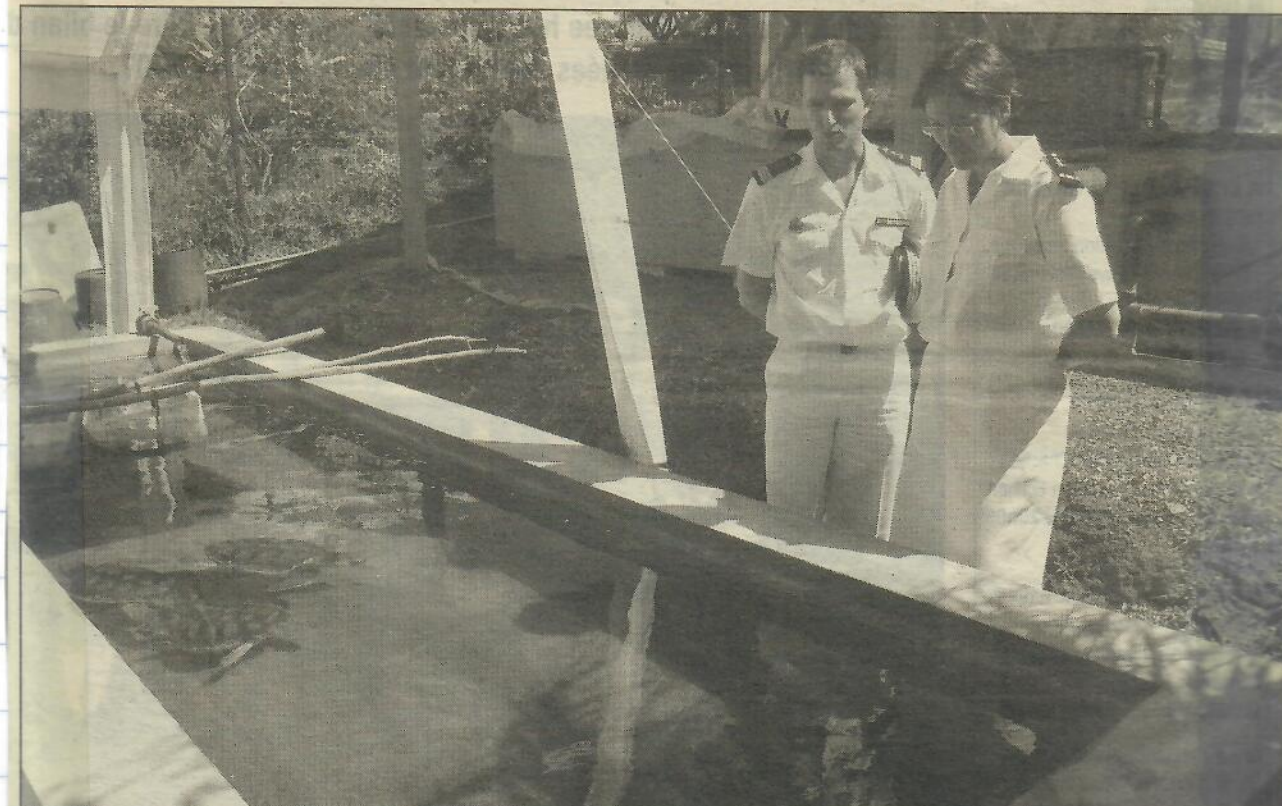
Des
lâc

Une phase
des lagons

C'est le lieutena
L'opération sera

Des tortues à grosse tête lâchées en pleine mer

Une phase importante de travaux de recherche sur les tortues à grosse tête menée par l'Aquarium des lagons va débuter dans les prochains jours avec l'aide de la Marine nationale.



C'est le lieutenant de vaisseau Sendao, ici en compagnie de l'aspirant Flavie Denais, sur le *La Glorieuse*, qui va remettre à l'eau ces tortues. L'opération sera effectuée dans les prochains jours entre la Calédonie et la Nouvelle-Zélande.

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L'Aquarium des lagons collabore depuis deux ans avec l'US National Marine Fisheries à Hawaï (équivalent américain de l'Ifremer français). Ensemble, ils étudient les déplacements des tortues à grosse tête pendant les premières années de leur vie. La phase calédonienne a débuté fin 2003 par la protection des nids à la Roche Percée, à Bourail, en collaboration avec l'ASNNC (Association pour la sauvegarde de la nature néo-calédonienne), l'association Bwärä et le Centre d'initiation à l'environnement (CIE).

Quarante-six tortues piégées dans leur nid, alors que les autres étaient parties à la mer, ont été sauvées par les volontaires et mises en nourrissage à l'Aquarium des lagons. Sur ces quarante-six tortues, quarante-deux ont survécu, la mortalité étant due à des malformations congénitales. Ces tortues ont aujourd'hui atteint la taille minimum de 25 centimètres et peuvent ainsi être équipées de balises satellite de la dernière génération. Plus petites, elles n'émettent que lorsque l'animal est en surface et s'éteignent lorsqu'il est immergé.

Grâce au satellite, les Calédoniens pourront suivre les tortues à la trace.

Les tortues à grosse tête de l'aquarium vont donc être équipées et mises à l'eau lors d'une mission du patrouilleur *La Glorieuse*. L'opération sera conduite quelque part entre la Nouvelle-Calédonie et la Nouvelle-Zélande lorsque la température de l'eau atteindra 18° (Isotherme 18°). Les scientifiques auront auparavant prélevé des échantillons de tissus des tortues pour des analyses ADN qui contribueront à l'étude des populations.

« Une expérience similaire a eu lieu à Nagoya, au Japon. Elle a mis en évidence une vire (NDLR : un circuit) *dans un courant équatorial que les tortues empruntent »*, explique le directeur de l'aquarium, Richard Farman. *« Ainsi, elles s'en vont et reviennent en passant par une zone de pêche où elles risquent d'être capturées accidentellement. Cette étude va probablement mettre en exclusion ces zones de pêche dangereuses pour l'espèce. »* Dans l'expérience calédonienne, elles seront immergées dans le courant qu'elles suivent d'ordinaire sans le risque de se faire piéger dans le lagon et en économisant une partie de leur parcours. *« La probabilité que les quarante-deux survivent est faible sachant qu'une sur mille seulement survit dans les conditions habituelles »*, précise Richard Farman. Mais point n'est nécessaire d'espérer pour entreprendre et les scientifiques comptent bien recueillir des données essentielles pour progresser dans la connaissance de cette espèce.

Grâce au satellite, les Calédoniens pourront suivre les tortues à la trace sur le site de l'aquarium : www.aquarium.nc. Il faudra toutefois pour cela attendre leur mise à l'eau prévue vers le milieu ou la fin de la semaine prochaine.

Hervé Girard

Depuis leur éclosion à la Roche Percée, les tortues ont été nourries nuit et jour par les volontaires du Centre d'initiation à l'environnement.

SEPT 4, 2008

CITIBANK GOVERNMENT COMMERCE SERVICES

CARD STATEMENT

Previous Balance	Payments and Credits	New Charges	New Balance
$87.22	$103.20	$2,468.79	$2,452.81

Invoice Date 10/03/2008

Due Date 10/28/2008

FOR CUSTOMER SERVICE CALL 1-800-790-7206 OR WRITE P.O. BOX 45134, JACKSONVILLE, FL 32232-5134
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SEND PAYMENTS TO: CITIBANK GOVERNMENT COMMERCE SERVICES, P.O.BOX 6575, THE LAKES, NV 88901-6575

Agency Name: **COMMERCE**
Accounting Code: FR2200133
Billing Office Id:
Discretionary Code:
Single Purchase Limit: **$0.00**

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Agency/Org Id:
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09/02	09/05	5994	8892016700198	3	BVO - BOOKSTORE #9 900-182668	HONOLULU	HI	15.98 cr
09/02	09/05	7011	8900018225344	4	HOTEL MOLOKAI 3000019431	KAUNAKAKAI ARRIVAL: 09-01-08	HI	139.27
09/02	09/05	5994	8892016700185	5	BVO - BOOKSTORE #9 900-182667	HONOLULU	HI	15.98
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ACCOUNT SUMMARY CURRENT PERIOD		Previous Balance	Payments	Credits	Purchases and Advances	Taxes and Fees	New Balance
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	Advances	$0.00	$87.22	$0.00	$311.91	$0.00	$224.69
	TOTALS	$87.22	$87.22	$15.98	$2,468.79	$0.00	$2,452.81

Memo Section

Amount Over Credit Limit:	
Amount Past Due:	$0.00
Net Total Charges:	$2,140.90
Total Cash Advances:	$308.05
Current Period Total:	$2,448.95

Approval Section

CARDHOLDER SIGNATURE

APPROVING OFFICIAL SIGNATURE (Except Travel)

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STAMFORD
Plaza
Sydney Airport

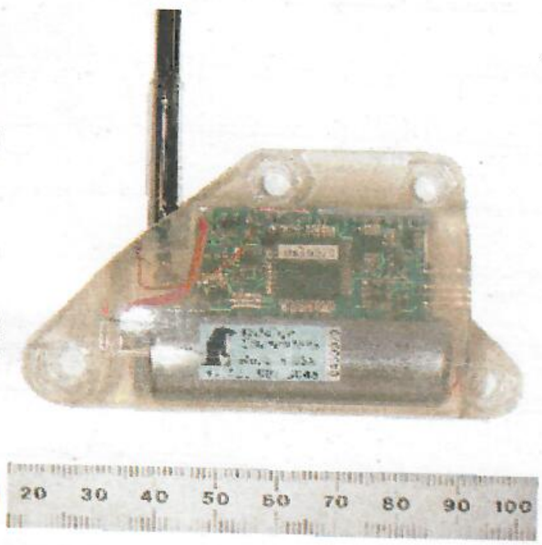
NIGHTS OF
Wednesday 9/3/08
&
Saturday 9/13/08

Stamford Plaza Sydney Airport
Cnr Robey & O'Riordan Street, NSW 2020 Australia - ABN 83 092 724 073
Telephone (61 2) 9317 2200 - Facsimile (61 2) 9317 3855
www.stamford.com.au

April 2008

Smart Position or Temperature Transmitting Tag (SPOT5)

The SPOT5 tag is our smallest Argos transmitter, other than the AC1 (which is designed for avian applications). It is designed specifically for the marine environment. The SPOT5 is available in a variety of shapes optimized for deployment on seals, turtles, large and small cetaceans, sharks and other fishes, penguins and large sea birds. The SPOT5's size and weight also make it suitable for other non-marine applications.



Controller features The operating code of the SPOT5 can be upgraded. This means you can always have the most up-to-date version of on-board software, regardless of when the tag was purchased.

User-defined parameters All parameters are user-programmable. You are able to set the parameters that control how and when the SPOT5 stores and transmits its data using your PC.

Temperature data collection Temperature is measured from -40°C to +60°C, with a resolution of approximately 0.2°C. Temperature is reported in "time-at-temperature" histograms. You can set the temperature range for up to 12 bins, as well as the number of hours over which the temperature histograms are collected (1 to 24).

Haulout Statistics The tag can be configured to generate the percentage (10% resolution) of each hour of each day when the wet/dry sensor reads dry. This is useful for both haulout behavior studies and for determining the time spent at the surface for pelagic animals.

Transmitter The SPOT5 incorporates the Cricket, a specialized transmitter developed by Wildlife Computers. When configured with one cell, it generates 0.5W of radiated power output, operating at a high efficiency to allow the maximum number of transmissions from the battery. The high-efficiency and frequency stability of this transmitter maximize both the quantity and quality of received messages.

Location accuracy Service Argos provides the locations with an accuracy as good as ±350m.

Size, weight and pressure resistance Electronic components are fully

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cast in epoxy. Many configurations are available to suit your study requirements. The smallest configuration weighs less than 30g in air.

Battery and deployment length Several battery configurations are available for the SPOT5 tag. For position-only deployments, a single "AA" battery is capable of providing approximately 30,000 transmissions; a single C-cell provides between 60-80,000 transmissions. As a general rule, a budget of 250 transmissions per day is sufficient to provide daily location calculation via Argos. Therefore, a single AA cell provides locations for approximately 120 days; a single C-cell provides locations for 240-320 days. For deployments reporting temperature histograms or haulout statistics, the number of expected transmissions should be decreased by one third. Actual results are dependent on animal behavior and environmental temperature.

Extending deployment length. The SPOT5 further extends deployment length by:

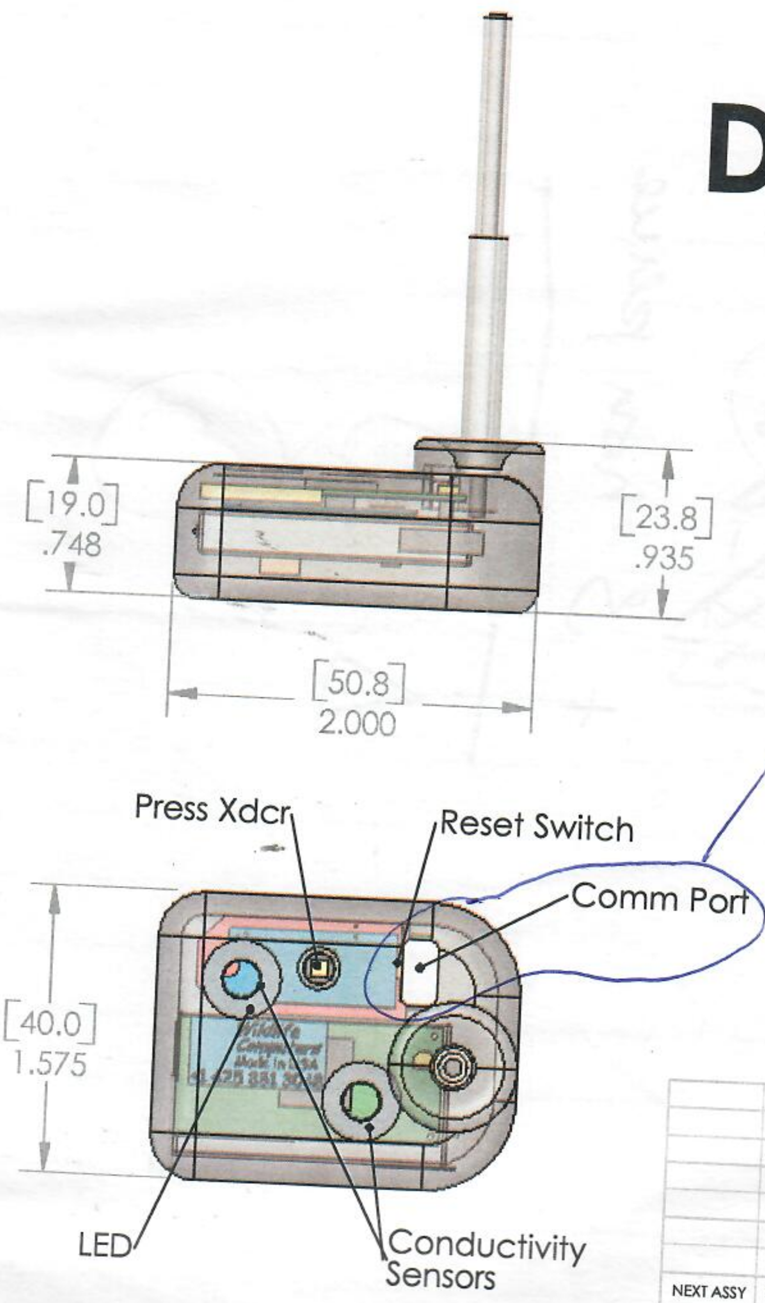
- Incorporating a wet/dry sensor that limits transmissions to when the tag is at the surface.
- Allowing duty-cycling by day or month. CONSIDER ← Need DENISE
- Limiting total number of transmissions per day.
- Limiting transmissions to hours when the satellite is likely to be in view.

Tag activation The SPOT5's can be turned on and off with a magnet. The LED flash sequence indicates whether the tag is in stand-by mode or deployed.

Analysis software Windows-based software is provided to decode the Argos data into an easy-to-use format.

top of page

DRA



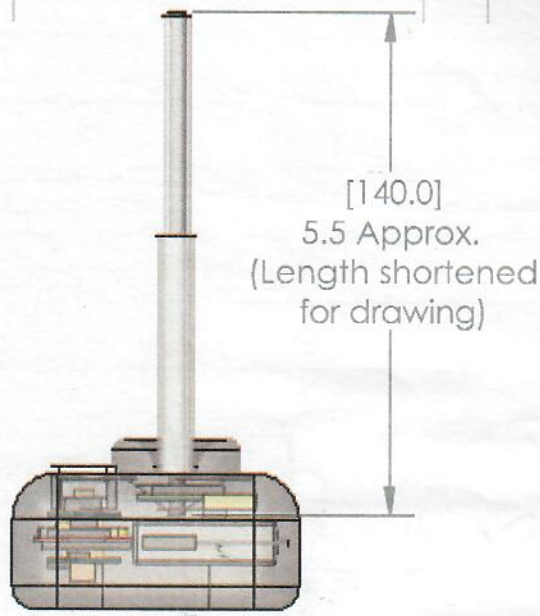
NEXT ASSY	USED ON
APPLICATION	

SPLASH1.Mold192.M1.SideBySide.assy.SLDDRW

60-65g

ZONE	REV.	REVISIONS DESCRIPTION	DATE	APPROVED
	001	Initial Release	dd/mm/yy	T.E. Rupley

AFT



DRAFT

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ± 0.01
THREE PLACE DECIMAL ± 0.002

MATERIAL: UltraClear Epoxy

FINISH: –

	NAME	DATE
DRAWN	T. E. Rupley	04-DEC-03
CHECKED	A. F. Leask	dd mmm yy
ENG APPR.	T. E. Rupley	07-DEC-03
MFG APPR.	T. E. Rupley	dd mmm yy
Q.A.	L. Thomas	dd mmm yy

COMMENTS:
1000m depth,
60-65g weight,
1x M1 Battery,

Wildlife Computers

SPLASH ASSEMBLY-Generation #1, Flat Side-by-side

SIZE A | DWG. NO. AF-SPLASH-192-000 | REV. 001

SCALE:1:1 | WEIGHT: | SHEET 1 OF 3

Printed 12/12/2003 1:09 PM

(168)

~~Lieutenant~~ DVD/sent 11-8-08 ~~need~~/send picture CD

04 (a EV₂ BROQUET)
"La Glorieuse"
BN Nouméa
98843 Nouméa Cedex

"MARINE NATIONALE"

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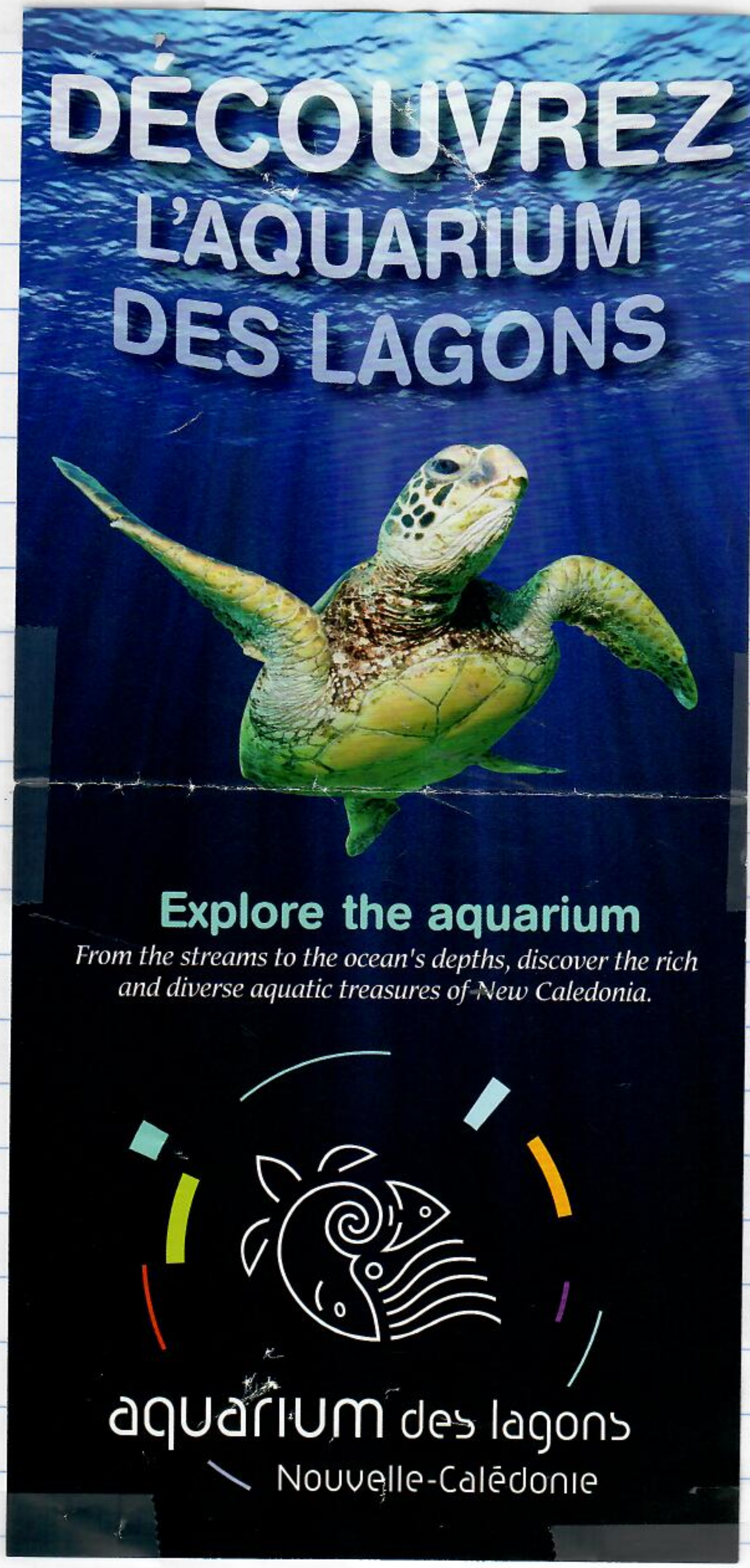
need Send photos

pcaillet@canl.nc Patrick CAILLET
Journaliste TV.

Edit' Publications
Bernard VILLECHALANE
[redacted]
MOBILIS : 77 72 75
editpub@canl.nc
SHOP CENTER VATA, 2ÈME ÉTAGE
B.P. 8223 NOUMÉA CEDEX 98807
NOUVELLE CALÉDONIE
[redacted] FAX 25 17 59

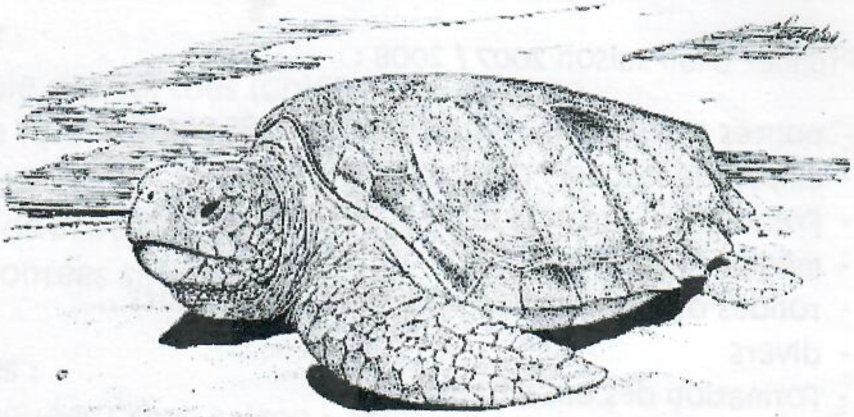
news reporter

9/2012


DÉCOUVREZ
L'AQUARIUM
DES LAGONS
Explore the aquarium
From the streams to the ocean's depths, discover the rich and diverse aquatic treasures of New Caledonia.
aquarium des lagons
Nouvelle-Calédonie

OVER

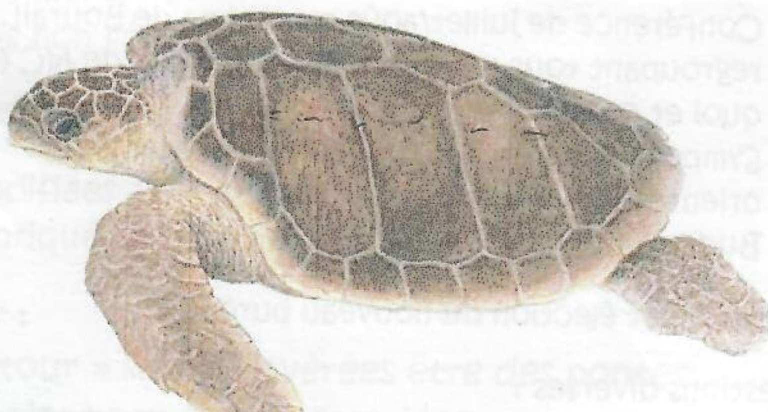
2-5pm 6-18-08 BOURAIL meeting



BWÄRÄ TORTUES MARINES

ASSEMBLEE GENERALE

05 Avril 2008



April 5, 2007

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To: Erin Siebert
Regional Resources

From: Michele Masala
Melick Aquafeed, Inc.

Re: Feed Inquiry

Dear Erin,

In response to your recent request for the sources of proteins in our turtle developer feed, the sources are as follows:

Animal Protein consists of Menhaden Fish Meal and Pet Food Grade Poultry Meal.

Plant Protein consists of Whole Wheat and Soybean Meal.

If you have any other questions regarding our feed, please call our office at 1-800-358-6595.

Regards,

Michele Masala
Vice President
Melick Aquafeed, Inc.

Sugar cube wrapper

France in Australia
Embassy and Consulate-General

France in Australia Embassy and Consulate-General > News and Information > Media releases > Archive Media releases

Contact us

Search

French naval vessel to make port call on Sydney

PR/04/07

The French patrol vessel "La Glorieuse" will make an official call on Sydney from Monday 21st to Saturday 26th of May 2007.

Based in New Caledonia, the 55 metre patrol boat La Glorieuse houses thirty officers and crew and is charged with the protection of French waters. Other recent operations include humanitarian assistance and co-operative maritime surveillance with neighbouring Fiji and Vanuatu. In 2006, La Glorieuse participated in the multinational exercise "Croix du Sud" alongside 1500 personnel from Australia, New Zealand, Vanuatu, Tonga, Fiji and Papua New Guinea.

On Monday 21st of May, the Consul-General of France in Sydney, Mr. Lionel Majesté-Larrouy, and the Commanding Officer Lieutenant Commander Arnaud Berthet will be available for interviews by appointment.

The public is welcome to visit the ship in groups of 10 people from Tuesday 22nd to Friday 25th of May. On the condition of pre-registration, visits will be arranged between 9am and 11am and from 2pm to 5pm.

Where: HMAS Kuttabul, Garden Island

When : 21 - May 2007

Media contact (and for pre-registration purposes):

Zoë TILLER : 02 9268 2417 or 0412 037 526

La GLORIEUSE
(P686)

CITIBANK GOVERNMENT COMMERCE SERVICES
CARD STATEMENT

Previous Balance	Payments and Credits	New Charges	New Balance
$0.00	$0.00	$2,488.97	$2,488.97

Invoice Date 07/03/2008
Due Date 07/28/2008

FOR CUSTOMER SERVICE CALL 1-800-790-7206 OR WRITE P.O. BOX 45134, JACKSONVILLE, FL 32232-5134
OUTSIDE THE U.S. AND CANADA CALL COLLECT 904-954-7850
SEND PAYMENTS TO: CITIBANK GOVERNMENT COMMERCE SERVICES, P.O.BOX 6575, THE LAKES, NV 88901-6575

Agency Name: COMMERCE
Accounting Code: FR2200133
Billing Office Id:
Discretionary Code:
Single Purchase Limit: $0.00

N.C. Book

Account Number: 4486-0200-0022-5477
Agency/Org Id:
Tax Exempt #:
Cycle Purchase Limit: $0.00

Sale Date	Post Date	MCC Code	Reference Number		Description			Total Amount
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06/15	06/16	6011	8000000004365	3	ANSE VATA	NOUMEA		12.88
06/14	06/17	5994	8892017600968	4	BVO-INTER ISLE #1 103-189617	HONOLULU	HI	35.47
06/16	06/17	0000	9000000001840	5	CASH ADVANCE FEE			1.62
06/16	06/17	6011	9000000001840	6	ANSE VATA	NOUMEA		129.90
06/17 06/18	06/18	7011	9806110339137	7	HOLIDAY INN SYDNEY A (Foreign Currency) 180.00 AUD (Rate) 1.049624	MASCOT	AU	171.49
06/16 06/18	06/18	5812	9601693443365	8	SARL SAMSARA (Foreign Currency) 2,180.00 XPF (Rate) 76.117318	NOUMEA NELLE-	NC	28.64

ACCOUNT SUMMARY CURRENT PERIOD

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Advances	$0.00	$0.00	$0.00	$144.56	$0.00	$144.56
TOTALS	$0.00	$0.00	$0.00	$2,488.97	$0.00	$2,488.97

Memo Section

Approval Section

Amount Over Credit Limit:	
Amount Past Due:	$0.00
Net Total Charges:	$2,344.41
Total Cash Advances:	$142.78
Current Period Total:	$2,487.19

CARDHOLDER SIGNATURE

APPROVING OFFICIAL SIGNATURE (Except Travel)

XPF

Agency Name:	**COMMERCE**	*Account Number:*	**4486-0200-0022-5477**
Accounting Code:	FR2200133		
Billing Office Id:		*Agency/Org Id:*	
Discretionary Code:		*Tax Exempt #:*	
Single Purchase Limit:	**$0.00**	*Cycle Purchase Limit:*	**$0.00**

Sale Date	Post Date	MCC Code	Reference Number		Description			Total Amount
06/16 06/18	06/18	5812	9601693443472	9	SARL PAPARAZZI (Foreign Currency) 5,400.00 XPF (Rate) 76.120665	NOUMEA NELLE-	NC	70.94
06/17 06/19	06/19	5812	0601703490890	10	SARL SAMSARA (Foreign Currency) 4,050.00 XPF (Rate) 76.113512	NOUMEA NELLE-	NC	53.21
06/17 06/20	06/20	7512	1601713504051	11	SARL PACIFIC CAR (Foreign Currency) 13,230.00 XPF (Rate) 76.196510	NOUMEA - NELL	NC	173.63
06/17 06/20	06/20	5200	1217155301760	12	GOLD AND SEA 3243838 (Foreign Currency) 2,190.00 XPF (Rate) 76.200418	A6NOUMEA	NC	28.74
06/20	06/23	7523	3173122676807	13	AMPCO PARKING HONOLULU AI	HONOLULU	HI	61.00
06/19 06/21	06/23	5541	2601723588499	14	SARL SOCIETE VIC (Foreign Currency) 3,960.00 XPF (Rate) 75.572519	NOUMEA NELLE-	NC	52.40
06/19 06/21	06/23	5814	1102549080620	15	L ANNEXE 4420929 (Foreign Currency) 18.86 EUR (Rate) 0.633311	NOUMEA	NC	29.78
06/20 06/24	06/24	7011	5601753599199	16	.NOUVATA HOLDIN (Foreign Currency) 46,418.00 XPF (Rate) 76.111302	NOUMEA NLE CA	NC	609.87
06/25	06/26	5812	7512765011231	17	BUBBA GUMP REST #337	LONG BEACH	CA	50.77
06/24	06/27	5814	8531477150492	18	STARBUCKS HNL 30221501 9983	HONOLULU	HI	6.18
06/27	06/30	5812	9560141011312	19	CA PIZZA KITCHEN #141	LONG BEACH	CA	27.79
06/27	06/30	5814	9720002817929	20	DENNY'S #6847 01974646847VP1Y7000000025	POMONA	CA	14.67
06/28	06/30	3513	0151806250531	21	WESTIN LONG BEACH 1055306	LONG BEACH ARRIVAL: 06-24-08	CA	575.90
07/02	07/03	3390	4642755540959	22	DOLLAR RAC LAX PJ3670984	LOS ANGELES	CA	266.94
07/01	07/03	7523	4184090250605	23	AMPCO PARKING HONOLULU AI	HONOLULU	HI	80.00

*****TOTAL AMOUNT DUE: $2,468.97

The foreign currency conversion rate used to convert your foreign transactions to U.S. dollars includes an adjustment of 1% assessed to Citibank by the applicable bankcard association.

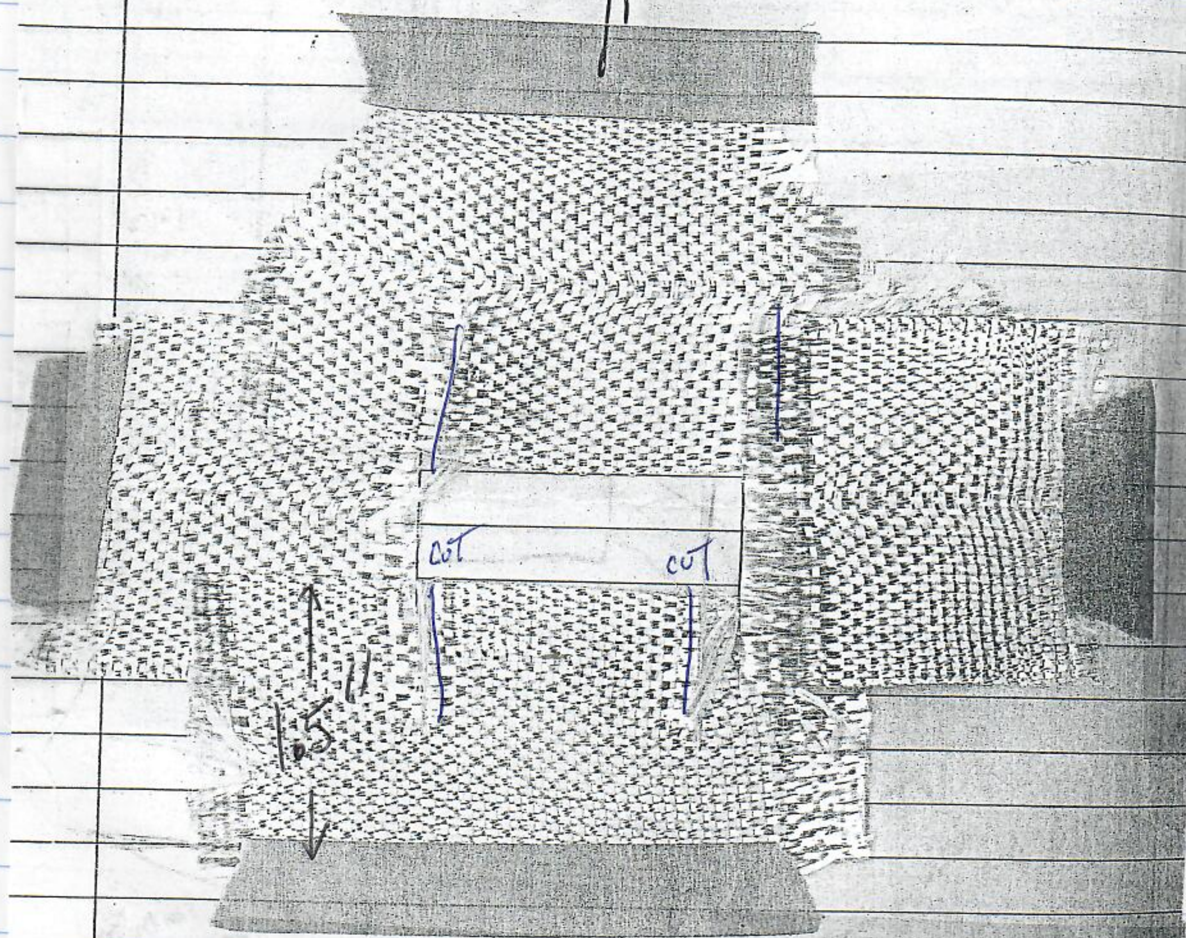
79X

pattern used IN JAPAN

SPOT 5

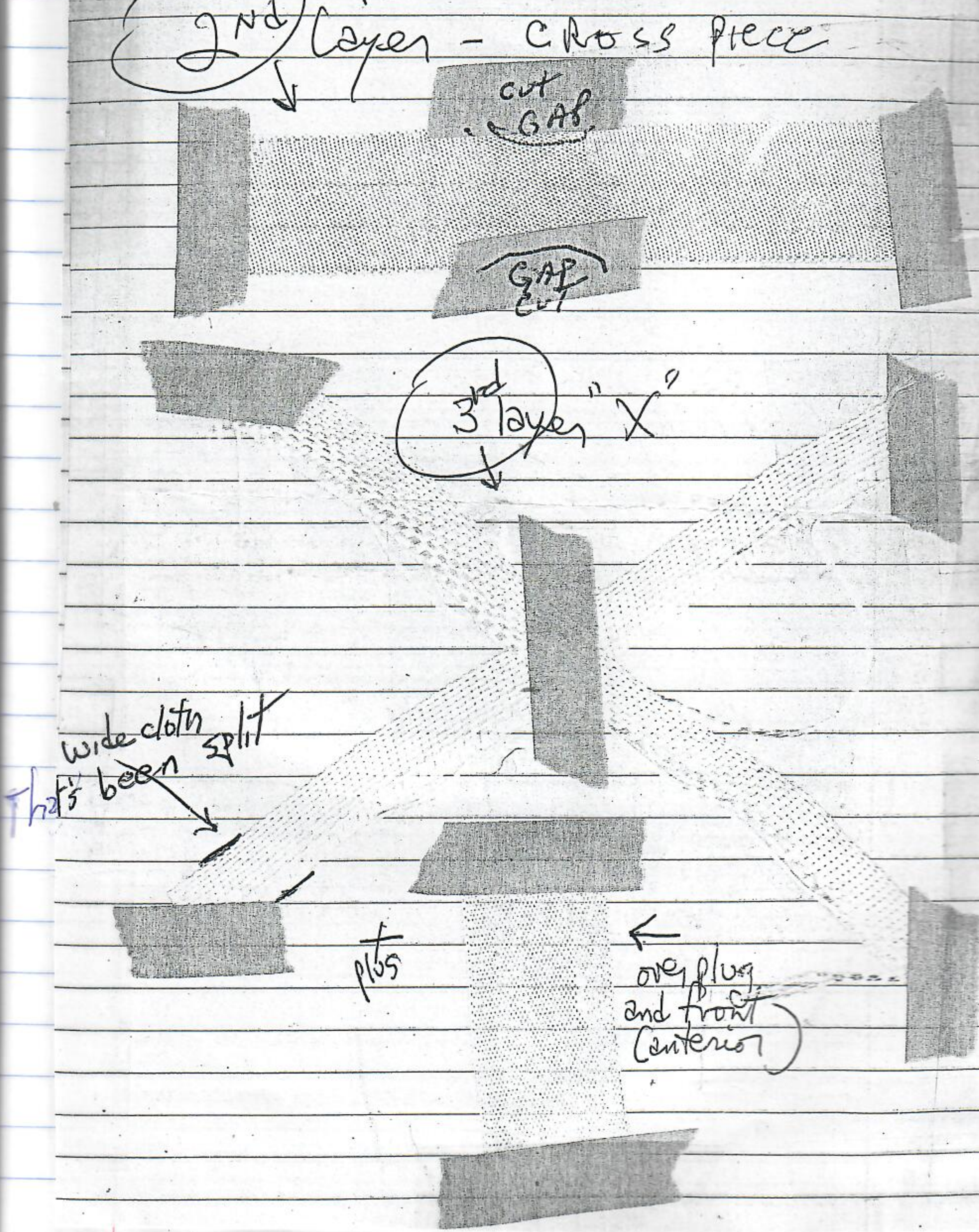
1st Layer (Dams)

Head ↑



PATTERN used IN JAPAN

SPOT 5 (continued)



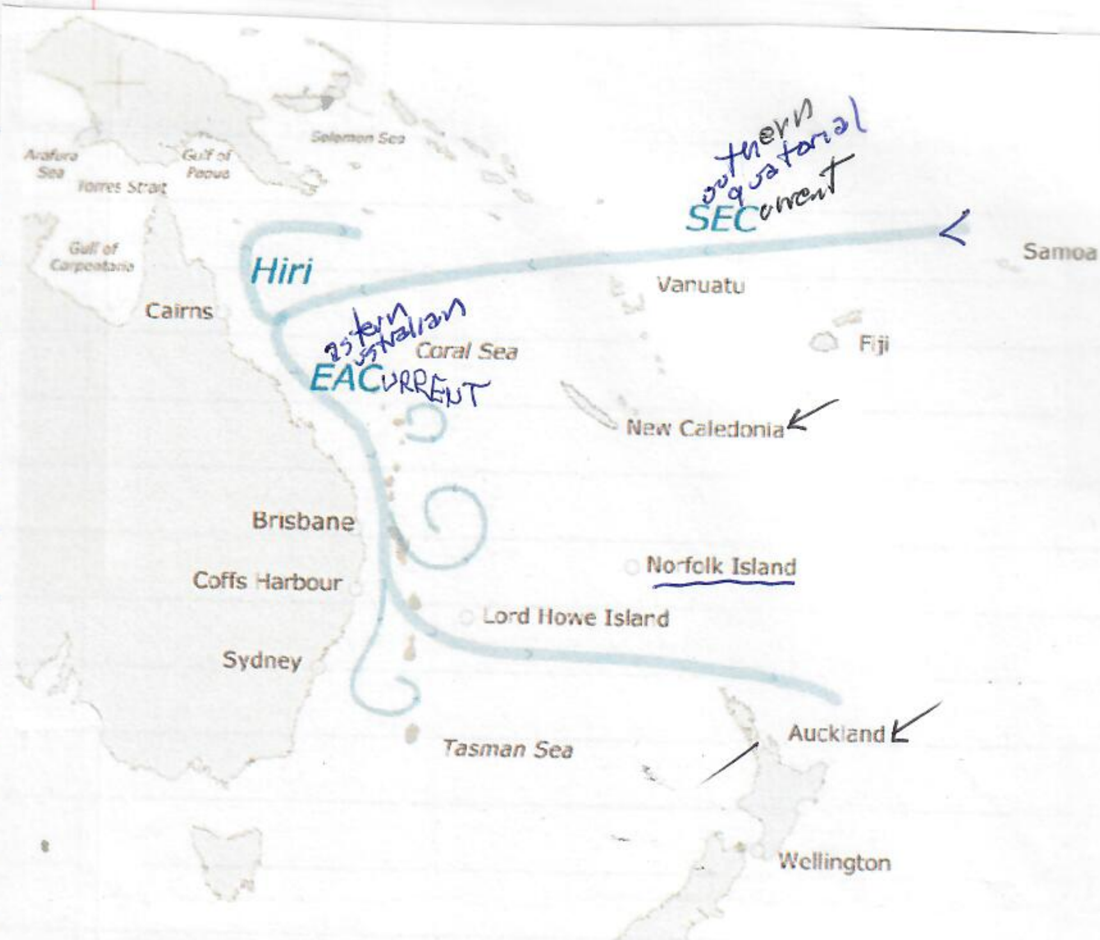


Figure 2.1. The dominant surface currents in the southwest Pacific Ocean. As the Southern Equatorial Current (SEC) flows into the Coral Sea it divides into a number of jets: the North Vanuatu Jet (NVJ), the South Vanuatu Jet (SVJ), the North Caledonian Jet (NCJ), and the South Caledonian Jet (SCJ). These jets are the source of the current systems off eastern Australia, the East Australian Current (EAC), the North Queensland Current (NQC) and the New Guinea Coastal Current (NGCC). The seamounts located off the eastern Australian coast are shown as shaded regions.

If post-hatchling loggerhead and green turtles in the southwest Pacific region conform to the current understanding of an oceanic post-hatchling stage, their spatial and temporal distribution should reflect this and the following observations would be expected;

- observations of post-hatchling turtles will be missing from Australian coastal waters.

- post-hatchling turtles will be distributed away from rookeries in the direction of dominant currents.

- a positive relationship between the size of post-hatchling turtles and distance from closest rookery (i.e. potential source of natal origin) will exist. This is based on the assumption that the greater the distance a post-hatchling sea turtle is from its natal rookery, the older, and therefore larger, that animal will be.

neighbouring countries (New Caledonia and New Zealand) and islands (e.g. Lord Howe Island, New South Wales) were contacted to assist in the reporting and sampling of post-hatchlings in their region. Samples and information from stranded post-hatchlings were successfully obtained from New South Wales Parks and Wildlife Service and from New Zealand.

Post-hatchlings were also sourced from fishermen operating within the East Coast Tuna and Billfish Fishery (ECTBF), where occasionally post-hatchling turtles are found within the stomachs of *Coryphaena hippurus* (also known as dolphin fish or mahi mahi). These fisheries operate around the seamounts that occur offshore from the Sunshine Coast, Queensland and offshore from Coffs Harbour, New South Wales (refer to Figure 2.1). An attempt was also made to enlist the help of long-line fisheries operating out of Cairns (northern Queensland), however this was unsuccessful owing to the fishermen's concerns regarding the linking of their operations with sea turtles, no matter how indirect this link and despite assurances of anonymity.

Data recorded for each post-hatchling included species, date and location of capture and a series of morphometric measurements, based on those used in the Queensland Sea Turtle Research Program (Appendix B). A skin biopsy was removed from post-hatchling specimens for genetic analyses (Chapters 3 and 4) and stable isotope analyses (Chapter 6), and the crop and digestive tract were removed to enable the collection of stomach contents for dietary analyses (Chapter 5). The rationale and methodology of sample collection will be discussed further in their respective chapters.

Results

Spatial distribution of post-hatchling loggerhead and green turtles in the southwest Pacific

Documentation on the occurrence of post-hatchlings was scarce prior to the 1980s, with only 13 records existing, the first dating back to 1922. After 1980, recording of post-hatchling observations through *StrandNet* became more regular. Currently documentation for 123 loggerhead post-hatchlings and 172 green post-hatchlings in the southwest Pacific region exist (correct at date of this thesis submission, 10/09/06). These figures are based primarily on the QPWS stranding database in addition to the New Zealand records and those that have been reported in previous literature (Limpus and Walker, 1990), which include a number from New South Wales prior to 1991.

Post-hatchling loggerhead turtles

The majority of records that exist for post-hatchling loggerhead turtles in the southwest Pacific are for animals that have become stranded along Australia's eastern coast between Fraser Island in southern Queensland, southward, to the mid New South Wales coast (n>101). There is one stranding report for a 10 cm CCL loggerhead turtle north of the SEC's bifurcation point. Post-hatchling loggerhead turtles have also been found stranded on the northern New Zealand coastline (nine records), and there has been one stranding record

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from Lord Howe Island. There are also 52 records for loggerhead post-hatchlings occurring in the waters off the coasts of southern Chile and northern Peru (Figure 2.2) (Alfaro-Shigueto *et al.*, 2004; Donoso *et al.*, 2000; Kelez *et al.*, 2003). These animals were documented as long-line fishery by-catch by these authors.

KERMADECS ? NORFOLK ?

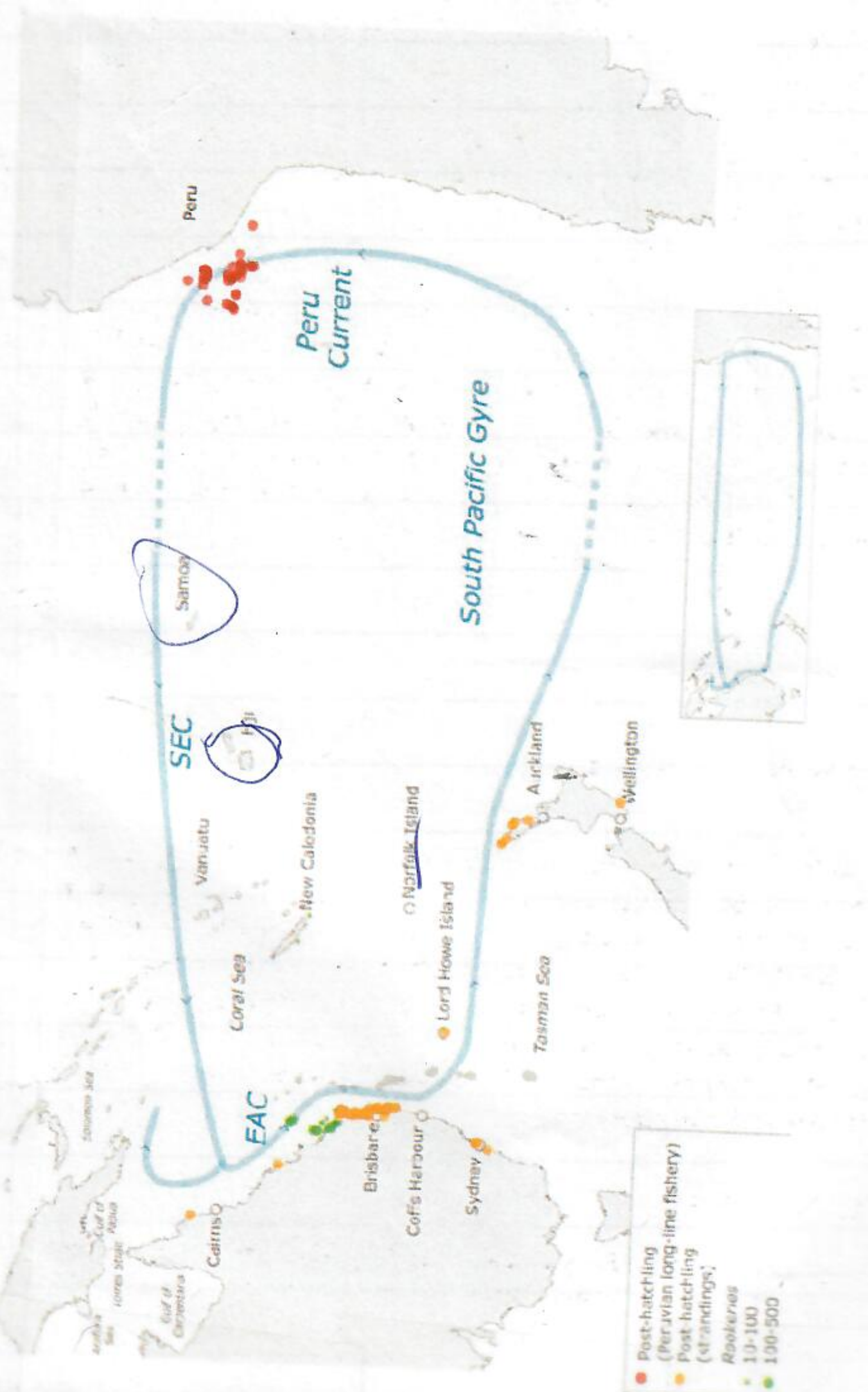

Figure 2.2. The distribution of post-hatchling loggerhead turtle (*Caretta caretta*) records for the southern Pacific Ocean, with rookeries and simplified primary currents shown.

Size distribution of post-hatchling loggerhead and green turtles in the southwest Pacific

Post-hatchling loggerhead turtles

Post-hatchling loggerhead turtles recorded along Australia's eastern Pacific coast ranged in size from neonates (4.5 cm CCL) up to 13.7 cm CCL (Figure 2.4), with the majority (90%) of the individuals measuring less than 9.0 cm CCL.

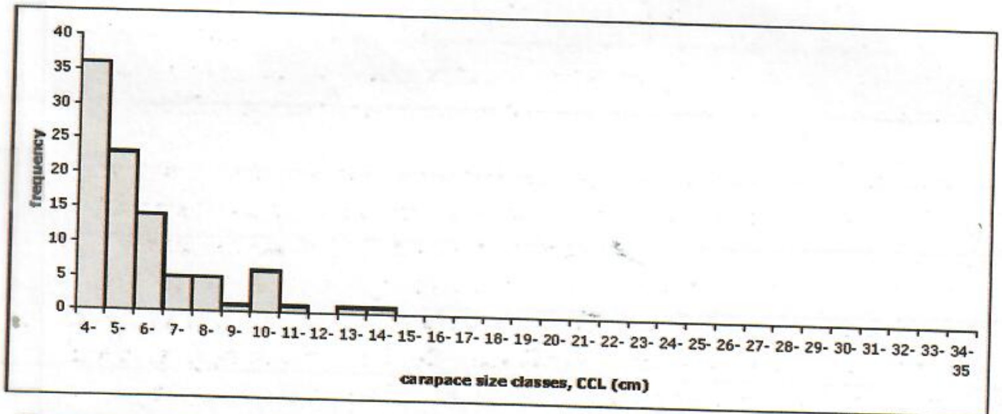

Figure 2.4. The size-frequency distribution of post-hatchling loggerhead turtles (*Caretta caretta*) stranded along Australia's Pacific coast.

The mean size of loggerhead post-hatchlings increases with distance from the primary rookery locations in the direction of the South Pacific sub-tropical gyre. The mean CCL measurements were 6.04 cm CCL along the Queensland coast, 8.05 cm CCL along the New South Wales coast, 13.82 cm CCL on New Zealand beaches and 53.3–71 cm CCL in the waters offshore from Peru and Chile (Table 2.1).

Post-hatchling green turtles

Post-hatchling green turtles recorded along the Australian Pacific coast ranged in size from neonates (4.9 cm) up to 34.7 cm CCL (Figure 2.5), with 81% being under 12 cm CCL. Green post-hatchlings found in the stomachs of *Coryphaena hippurus* ranged in size from 5.9 to 9.4 cm (mean = 7.3 cm, SD=1.18). The sole record for a green post-hatchling recorded at a locality offshore from Australia's east coast measured 10.2 cm CCL at Lord Howe Island.

The East Australian Current and post-hatchling dispersal patterns

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As the Southern Equatorial Current brings water westwards into the Coral Sea it is likely to entrain loggerhead hatchlings emerging from Tokelau, Vanuatu and New Caledonian rookeries and green hatchlings emerging from New Caledonian and Coral Sea Platform rookeries. At the bifurcation, these entrained post-hatchlings will be directed either southwards within the EAC or northwards within the North Queensland Current in the Gulf of Papua.

Post-hatchlings emerging from rookeries in the southern Great Barrier Reef region, including Mon Repos, the Capricorn and Bunker Groups of islands and the Swain Reefs[1], will encounter the southward flow of the East Australian Current (EAC) (Figure 2.3). The concentration of post-hatchling strandings along the southern Queensland and northern New South Wales coasts strongly suggests that the EAC influences the initial migratory route taken by hatchlings emerging from rookeries in the southern Great Barrier Reef. The EAC may also contain a number of green and loggerhead post-hatchlings from offshore rookeries that have emerged into the flow of the Southern Equatorial Current (SEC).

The region (Figure 2.3) where the greatest number of records for stranded post-hatchlings occur, is also where the EAC crosses the continental shelf and moves closer inshore before turning eastward away from the Australian coast (Anderson, 1987; Tomczak and Godfrey, 1994). Post-hatchlings entrained within the EAC will be brought close to the shore in this region resulting in a greater chance of animals becoming washed ashore than in other regions, particularly during adverse weather conditions. This is supported by post-hatchling strandings occurring more commonly after strong winds and heavy seas (C. Limpus, pers. com, 2002).

Post-hatchlings stranded south of the SEC's bifurcation point would be predicted to be a mix of hatchlings from both the eastern Australian and offshore rookeries. It is likely that the greater proportion of these would originate from southeast Queensland rookeries, which are nearer. The spatial and temporal distribution of the post-hatchling turtles alone do not indicate whether this is the case. In order to ascertain the importance of the EAC in the distribution of post-hatchlings from offshore rookeries compared to rookeries within the southern Great Barrier Reef region, the genetics of these post-hatchlings needs to be investigated to determine their natal origin (see Chapters 3 and 4).

After the EAC swings away from the Australian coast, post-hatchlings using this current for transportation can embark on one of two likely migratory routes; (i) they can travel northwards and remain in the eddies offshore from the Australian coast or (ii) they can travel eastwards with the Tasman Front. If they remain with the Tasman Front, post-hatchlings would travel across the South Pacific Ocean, past Lord Howe Island and the north of New Zealand, across the southern Pacific Ocean, and past Peru and Chile via the Peru current (also known as the Humboldt Current), before returning to the east coast of Australia with the SEC (Figure 2.2) (Burrage, 1993).

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[1] [1] The latitudes and longitudes for the regional locations referred to in this thesis are provided in Table A1, Appendix A.

A number of factors indicate that the southwest Pacific loggerhead post-hatchlings are making trans-oceanic migrations similar to those undertaken by loggerhead post-hatchlings from south eastern USA and Japanese rookeries (Bolten *et al.*, 1998; Bowen *et al.*, 1995). The first line of evidence is the occurrence of oceanic stage loggerhead turtles stranded on northern New Zealand beaches and in fisheries operating in the waters off the Peruvian and Chilean coasts. As the only documented loggerhead rookeries in the Pacific Ocean occur in Japan in the northeast Pacific, and in eastern Australia and New Caledonia in the southwest Pacific Ocean, it would seem, based on distance and oceanographic features, that these post-hatchling loggerhead turtles have originated from southwest Pacific rookeries. Further evidence that this species undertakes trans-Pacific migrations is provided by the progressive increase in size of loggerhead post-hatchlings along the route of the anticyclonic subtropical gyre in the South Pacific Ocean. Additionally, the complete absence of records for loggerhead post-hatchlings larger than 13.7 cm CCL in Australian coastal waters suggests that post-hatchlings of this species inhabit waters far removed from the Australian coast.

Post-hatchlings that do not embark on migrations across the South Pacific Ocean could instead remain in the warm water eddies produced by the EAC offshore from the east Australian coast. Owing to its meandering nature, the EAC forms approximately three eddies each year that can persist as large-scale (ca. 1000 km across) anti-clockwise gyres in the deep water off the southern Queensland and northern New South Wales coasts, with four to eight eddies often co-existing at the same time (Burrage, 1993; Tomczak and Godfrey, 1994). Within these EAC eddies, post-hatchlings would embark on a counter-clockwise journey around the Coral and Tasman seas. The size distribution and spatial data available for green post-hatchlings suggest that this is what this species is doing. This is highlighted by the absence of records for post-hatchling sized green turtles in New Zealand or in waters beyond the southwest Pacific (compared with loggerhead records). Additionally, although the majority of stranding records for green post-hatchlings belong to small size classes, records do exist for all size classes up to the size observed that juveniles recruit back into coastal feeding grounds. That larger post-hatchlings do occasionally become stranded further supports the supposition that these animals occupy offshore oceanic waters and do not undergo trans-Pacific migrations that would remove them completely from the Coral and Tasman seas.

The difference in migration routes undertaken by the two species is further evidenced by the presence of only green post-hatchlings in the stomach contents of the dolphin fish, *Coryphaena hippurus*. These dolphin fish were caught in waters near offshore sea mounts. The lack of decomposition of the post-hatchlings, indicates that they were also inhabiting waters in the vicinity of these sea mounts. These seamounts lie beyond the typical path of the EAC but within the region that EAC eddies often exist. No loggerhead turtles were found in the stomachs of *C. hippurus*, which further attests that the post-hatchlings of this species, unlike post-hatchling green turtles, are not occupying waters near offshore sea mounts.

It is possible that the different plastron colouration of post-hatchling loggerhead and green turtles could account for the absence of loggerhead post-hatchlings in the stomachs of *Coryphaen hippurus*. However, as countershading (light underside) is a predator avoidance technique for marine pelagic organisms (Denton *et al.*, 1972; Johnsen, 2001), it would be expected that the dark plastrons of loggerhead post-hatchlings, would be more visible to fish predators than the light plastrons green post-hatchling turtles. Therefore, if post-hatchlings

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of both species were in the same area, one would expect that loggerhead post-hatchlings are more likely to be preyed upon than green post-hatchlings. Loggerhead post-hatchings have been found in the stomachs of predatory fish in other studies, including *C. hippurus* (Carr, 1987; Witham, 1974) and *Lutjanus* spp. (snapper) (Vose and Shank, 2003), and this suggests that if loggerhead post-hatchlings were available in these waters they would be preyed upon. The number of post-hatchlings collected from *C. hippurus* predation is reasonably low (n=18), further collection would enhance our understanding of the presence of each species in these environments to support the observation made here that loggerhead post-hatchlings do not frequent the same waters as green post-hatchlings.

The North Queensland Current and post-hatchling dispersal patterns

Records for post-hatchlings north of the SEC bifurcation point were considerably lower than records south of this point. Consequently, there was little evidence to indicate transportation by the North Queensland Current that were comparable to those available for the East Australian Current. Certainly, as hatchlings emerging from northern rookeries (e.g. Raine Island and Bramble Cay) will for some period be associated with surface waters in the Gulf of Papua, it would be anticipated that post-hatchlings occasionally strand along Australia's eastern coast northwards of Cairns and along the southern New Guinea coast. In southeast Queensland and northern New South Wales a high level of effort goes into collecting information on stranded animals, primarily in the form of public awareness generated by *StrandNet* and the response of EPA staff to stranding reports. This effort is not replicated in the coastal region north of Cairns primarily because of the relative remoteness of this area. Additionally the lower human occupancy of this region would considerably reduce the chances of a small post-hatchling turtle being found before it decomposes or is eaten by scavengers such as seabirds or crabs. It may also be that the low stranding records for the northern region are because fewer post-hatchlings actually do become stranded in this region. The northern coast is protected by the Great Barrier Reef from high-energy wave action, whereas the southern region is not, and consequently the northern coast is rarely subjected to rough seas that may weaken small post-hatchlings and contribute to them becoming stranded. Moreover, there is not an equivalent current that swings in as close to the coast as the EAC along the southeast coast.

The flow of surface waters in the northern Great Barrier Reef and Gulf of Papua region are complex and vary both spatially and temporally. The post-hatchlings that will most likely be caught in these complex drift schemes are green hatchlings emerging from rookeries in the far northern Great Barrier Reef and Torres Strait, and any hatchlings within the SEC that were directed northwards at the bifurcation point. Hatchlings that enter this system could follow one of several possible drift schemes. They may; (i) travel into the Torres Strait, (ii) be directed southwards into the EAC, (iii) remain within the gyre in the Gulf of Papua, or (iv) enter the Solomon Sea.

The net flow of water from the Gulf of Papua into the Torres Strait is low and surface drift is variable, generally flowing eastward from January to March and westward for the remainder of the year (Wolanski and Thomson, 1984). Therefore the route westwards from the Gulf of Papua New Guinea is likely to be a possibility only for hatchlings emerging after March, and even then because of low flow in this region it is unlikely that this route would be taken by many post-hatchlings. If a post-hatchling was to embark on this journey, it would enter the waters of the Gulf of Carpentaria and eventually reach the Arafura Sea.

Under some conditions there is a southward flow of waters from the Gulf of Papua to southern Queensland. This is supported by observations of drift seeds from northern Queensland and Papua New Guinea germinating on cays in the southern Great Barrier Reef (Smith *et al.*, 1990) and from satellite-tracked buoys released in the northern Gulf of Papua being recovered in southern Queensland (MacFarlane, 1980). If post-hatchlings were to be directed southwards from the Gulf of Papua their ensuing route would be influenced by the EAC flow and the subsequent direction would be the same as for hatchlings emerging from southern rookeries.

The most likely routes for post-hatchlings in the Gulf of Papua are to remain within the circulation of the northern Coral Sea (the North Queensland Current), or to leave the Gulf of Papua via the Solomon Sea. The complex drift scheme in the Gulf of Papua may result in post-hatchlings travelling within numerous gyres until they take up residency in a local coastal feeding zone or are directed into another current system. The release of particles from Raine Island (Bode *et al.*, 1995) suggests that post-hatchling turtles associated with surface waters in the Gulf of Papua are most likely to be advected into the Solomon Sea and then along the northern coast of Papua New Guinea towards Indonesia. From Indonesia, currents flow south-eastwards towards Vanuatu, via the western coast of the Solomon Islands, and post-hatchlings associated with this flow may eventually be directed back towards the coast with the flow of the SEC (Bode *et al.*, 1995).

If post-hatchling loggerhead turtles emerging from offshore rookeries (e.g. New Caledonia) do become entrained within the SEC, and are directed northwards into the Gulf of Papua at the bifurcation point, it seems unlikely that they would undertake trans-Pacific migrations via the sub-tropical South Pacific gyre as the only way of reaching it would be through southwards advection into the EAC. Although this has been shown to be possible it is probably not common, for if loggerhead post-hatchlings were travelling southwards after first being advected in the northern current system, occasional strandings of larger loggerhead post-hatchlings along the path of the EAC would be expected.

Although the analysis of currents and models can provide insight into the probable migratory routes of post-hatchling turtles in the northern Coral Sea, the lack of stranded individuals available from this region does not allow substantiation of these hypotheses. To do this, greater information on stranded post-hatchlings along the far north eastern coastline of Cape York and the southern and northern coastline of Papua New Guinea would be required.

Conclusion

The spatial and temporal distribution of post-hatchling loggerhead and green turtles in relation to rookery locations and the local prevailing oceanic currents, support the hypothesis that post-hatchlings from populations in the southwest Pacific region become entrained in oceanic currents. However, the data also indicate that the two species do not take the same migratory route after their departure from coastal waters. There is evidence that post-hatchling loggerhead turtles undergo trans-Pacific migrations within the southern sub-tropical gyre. This is shown by, (i) incremental size increase in direction of the current away from nesting beaches, (ii) loggerhead post-hatchlings occurring in New Zealand waters and on the eastern side of the South Pacific Ocean, and (iii) post-hatchlings larger than 13.7 cm CCL not being documented in the southwest Pacific.

In comparison the data suggest that although green post-hatchlings are not living in coastal waters, they remain in offshore oceanic waters in the southwest Pacific and do not undergo trans-Pacific migrations. This is indicated by, (i) green post-hatchlings occupying waters around offshore seamounts (whereas loggerhead post-hatchlings appear absent), (ii) the absence of green post-hatchlings in New Zealand or Peruvian and Chilean waters, and (iii) the occasional occurrence of larger size classes of green post-hatchlings stranded on the eastern Australian coast.

Sample collection and DNA extraction

In order to increase the genetic resolution of green and loggerhead turtle stocks in the southwest Pacific region, stored tissue from previous investigations into the genetic structure of southwest Pacific rookeries (Moritz, *et al.* 2002a, 2002b) was accessed for re-sequencing (Dr Nancy FitzSimmons; Applied Ecology Research Group, University of Canberra). In total 95 samples from loggerhead (n=40) and green (n=55) east Australian rookeries were re-sequenced. The samples for loggerhead turtles were from Wreck Island (WI) (n=15), Swains Reef (SR) (n=15) and Mon Repos (MR) (n=10) (Figure 3.1). The samples from green turtle rookeries were spread across the northern Great Barrier Reef (NGBR) (n=5 each from Bramble Cay and Raine Island), southern Great Barrier Reef (SGBR) (n=20), Coral Sea (CS) (n=15) and New Caledonia (NC) (n=10) (Figure 3.2). During the laboratory work a genetic sample from a juvenile green turtle that had recently recruited into coastal Queensland waters was supplied. This sample was subsequently found to represent haplotype C3 (Moritz, *et al.* 2002b) and was incorporated into this present study for the long sequence information that it could provide on this haplotype.

To obtain information on the genetic structure of the New Caledonian loggerhead rookery, skin samples were taken from 29 adult female turtles during a nesting survey conducted at La Roche Percee (S21°37.989; E165°27.807) in January, 2005 (Figure 3.1). La Roche Percee is the primary loggerhead turtle rookery in New Caledonia, beyond this beach loggerhead nesting is reported to occur sporadically and only at low densities (J. Pierre pers. comm., 2005). Skin samples were removed with a sterile scalpel blade from the upper shoulder region of the turtle when she had finished depositing eggs. All turtles were tagged with standard turtle flipper tags to avoid repeated sampling.

Tissue samples were stored in 20% dimethyl sulfoxide (DMSO) saturated with 5M NaCl (no EDTA), routinely used to preserve Chelonid tissue (Dutton, 1996). Tissue samples were removed from the DMSO, rinsed in distilled water, and minced up with a sterile scalpel blade to optimise DNA extraction. Genomic DNA was then isolated from approximately 0.1 mg of tissue by proteinase K digestion in 250 μl of Digsol extraction buffer containing, 50 mM Tris, 20 mM EDTA, 120 mM NaCl and 1% sodium dodecyl suphate (SDS). The DNA was then recovered from the solution using ethanol precipitation in the presence of 4 M ammonium acetate and resuspended in TE buffer (10 mM Tris, 0.1 mM EDTA, pH 7.5).

PCR amplification and sequencing

A 1120 nt length fragment anchored in the Cytochrome B and control region of the mitochondrial genome was amplified with polymerase chain reaction (PCR) methodology, using the primers TCR6 (5′-GTA CGT ACA AGT AAA ACT ACC GTA TGC C-3′) and TCR1 (5′- GGA TCA AAC AAC CCA ACA GG -3′) designed for sea turtles (Norman *et al.*, 1994).

not be in a current system that facilitates trans-Pacific migrations. The finding of one nesting loggerhead turtle with an otherwise exclusive Australian haplotype at a Japanese rookery may have resulted from such a situation.

Migratory routes of green post-hatchlings in the southwest Pacific

The spatial and size distribution of post-hatchling green turtles suggests an alternative route of migration to that taken by loggerhead post-hatchlings (Figure 7.2). The absence of records for post-hatchling sized green turtles throughout the southern Pacific (e.g. New Zealand and eastern Pacific waters, as found for loggerheads) and the occasional record of larger size-class post-hatchlings stranding along the eastern Australian coast suggests that, instead of undertaking trans-Pacific migrations, post-hatchling green turtles remain in oceanic waters in the southwest Pacific Ocean. Their occurrence in the stomachs of dolphin fish, and association with the East Australian Current suggests that they most likely remain in the warm water gyres that are formed by the EAC in the offshore waters off the eastern Australian shelf.

matter. Although the neustonic nature of the diet indicates a pelagic lifestyle, many of the items consumed by the post-hatchlings of both species occur in both coastal and offshore waters. However, the absence of benthic organisms, in addition to the presence of a few items that only occur offshore (e.g. *Porpita* sp. and cavolinids), provides strong support that these post-hatchlings lead an oceanic existence. The observation of a similar diet between post-hatchling loggerhead and green turtles contrasts with these species' feeding behaviour in the neritic life stages, when loggerhead turtles are primarily carnivorous and green turtles are primarily herbivorous.

The results presented in the dietary analysis (Chapter 5) concluded that post-hatchling loggerhead and green turtles have a diet dominated by zooplankton, in particular crustaceans, with minimal plant material. However, one caveat to the examination of stomach contents for the purpose of determining dietary preferences is the potential for over estimating organisms that persist in the gut, such as those with an endo- or exoskeleton. Thus, the conclusions reached from the dietary analysis could be due to the persistence of skeletal over plant tissue in the stomach of a sea turtle. However, the stable isotope analysis supported the findings of the dietary investigation for post-hatchling green turtles, i.e. they have diet relatively high in zooplankton. Analysis of the carbon isotopes also supported the conclusion of the dietary investigation, that post-hatchling green turtles procure their diet from offshore waters. Furthermore, the isotopic signatures of green turtles newly recruited to the coastal habitat provides evidence that the post-hatchlings of this species retain similar dietary habits throughout this life stage.

Migratory routes of post-hatchling loggerhead turtles in the southwest Pacific

The complete absence of records for post-hatchling loggerhead turtles larger than 13.7 cm CCL in Australian coastal waters, coupled with the progressive size increase of post-hatchlings, starting at southern Queensland nesting beaches, along the flow path of the subtropical gyre in the South Pacific Ocean, indicates that Australian post-hatchling loggerhead turtles make trans-Pacific migrations (Figure 7.1). Genetic studies have since confirmed the occurrence of southwest Pacific haplotypes among oceanic loggerhead turtles captured in the eastern Pacific (X. Velez pers. com., 2006), thus confirming trans-Pacific migration are undertaken by post-hatchling loggerhead turtles emerging from southwest Pacific rookeries. This migration route is comparable to the trans-oceanic migrations undertaken by loggerhead post-hatchlings from south eastern USA and Mexican rookeries across the northern Atlantic Ocean and from Japanese rookeries across the northern Pacific Ocean (Bolten *et al.*, 1998; Bowen *et al.*, 1995). Loggerhead hatchlings emerging from New Caledonia would be likely to take the same migratory route, with the South Equatorial and South East Australian Current systems first taking them via Australia's eastern coast. It would therefore follow that a portion of post-hatchling loggerhead turtles stranded along Australia's eastern coast would be of New Caledonian origin. The lack of genetic resolution between loggerhead turtle rookeries in the southwest Pacific Ocean means that this can not be confirmed by contemporary genetic techniques. However, the larger sized post-hatchling loggerhead turtles that become stranded are likely candidates for New Caledonian stock origin. It is also possible a number of the post-hatchling loggerhead turtles that originated from the offshore rookeries (New Caledonian and Vanuatu) are directed northwards at the SEC bifurcation or with the North Vanuatu Jet. If this happens these post-hatchlings would

Appendix A

Table A.1. Latitudes and longitudes for regional nesting locations referred to in this thesis.

Location	**Latitude**	**Longitude**
Bramble Cay	-9.1333	143.8667
Heron island	-23.4330	151.9167
Mon Repos	-24.7983	152.4333
Moreton Bay	-27 17	153 15
Moulter cay	-11.4500	144.0000
No. 7 sandbank	-13.4500	143.9833
No. 8 sandbank	-13.3667	143.9667
Raine Island	-11.6000	144.0200
La Roche Percee	-21.6125	165.4458
Swains Reef	-21.8000	152.4167
Wreck Island	-23.3333	151.9500
Wreck Rock	-24.3167	151.9667

Michelle Boyle Post-hatchling sea turtle Biology 10/06

Abstract

The post-hatchling stage of a sea turtle's life history has often been referred to as the 'lost years', reflecting the lack of understanding about this phase in their life. Obtaining information on where post-hatchlings go, or for how long, is significantly hindered by the elusiveness of a post-hatchling in its natural environment and the limitations of tagging technologies to track a hatchling as it leaves its nest. Consequently, much of what is understood of the post-hatchling life stage has been derived from indirect methods. As a result, our current understanding of post-hatchling biology is based on information gathered from stranded animals, opportunistic reports of sightings at sea, studies of hatchling behaviour, and more recently genetic based studies.

Although knowledge on the post-hatchling stage has progressed considerably in the last few years, studies have been limited primarily to loggerhead turtles in the northern Atlantic Ocean and northern Pacific Ocean. Thus there are substantial gaps in our knowledge of the life history of sea turtles for many regions of the world. The aim of this study is to increase the understanding of the ecology of loggerhead and green post-hatchling sea turtles in the southwest Pacific Ocean. The information acquired on the post-hatchling phase of sea turtle life history will help direct future regional management of these animals by providing region-specific information on the migratory routes and habitats occupied during the post-hatchling stage. This study also informs our global understanding of the sea turtle post-hatchling biology.

This study employed a multidisciplinary approach, incorporating ecological information from spatial and temporal distributions, diet and stable isotopes, and genetic methodologies. Post-hatchlings were sourced from strandings and from the stomachs of dolphin fish (*Coryphaena hippurus*). In addition, records were collated from the Queensland Environmental Protection Agency's database of marine wildlife strandings and deaths.

Data on the spatial and temporal distribution of post-hatchlings in relation to rookery location and oceanographic features compiled in this study provides evidence that loggerhead and green post-hatchlings from populations in the southwest Pacific region become entrained in oceanic currents and live a pelagic existence. Occupancy of an oceanic and pelagic habitat is supported by stable isotope signatures. In addition dietary investigations that show post-hatchlings in the southwest Pacific Ocean, from both of the investigated species, derive nutritional sustenance primarily from neustonic animal matter.

The spatial and temporal data on the two species of post-hatchlings however, indicates that the two species do not take the same migratory route after departing from the same coastal waters. The data provides strong evidence that loggerhead post-hatchling undergo trans-Pacific migrations within the southern Pacific sub-tropical gyre. This is suggested by; (i) incremental post-hatchling size increase in direction of this current away from nesting beaches, (ii) reports of loggerhead post-hatchlings are in New Zealand waters and on the eastern side of the southern Pacific, and (iii) loggerhead post-hatchlings larger than 13.7 cm CCL are not documented in the southwest Pacific Ocean. Although the current resolution of the genetic stocks in the southern Pacific does not allow differentiation between stocks on a regional scale, there is discrimination at the oceanic scale. Analysis of the haplotypes of the

loggerhead post-hatchlings shows that all specimens investigated in this study originated from southwest Pacific rookeries.

Whereas the data implies that loggerhead post-hatchlings embark on trans-Pacific migrations, it suggests that green post-hatchlings do not. Whilst this species also occupies offshore oceanic waters, it appears they remain in the southwest Pacific region. This is indicated by; (i) green post-hatchlings occupying waters around offshore seamounts (whereas loggerhead post-hatchlings appear absent), (ii) the absence of green post-hatchlings in New Zealand or southeast Pacific waters, and (iii) the occurrence of larger size classes of green post-hatchlings stranded on eastern Australian coast. Mixed stock analysis (using SPAM & TURTLE) performed with haplotypic information from post-hatchlings calculated that green post-hatchlings originate from the SGBR (60%), Coral Sea (27%) and New Caledonia (13%) rookeries.

This study is the first to describe the route that loggerhead and green post-hatchlings from the Australian region are taking. I demonstrate that these two species are undertaking significantly different migrations during this stage of their life. The principal findings of this study support the currently accepted view on the sea turtle's post-hatchling stage, for most species, is that of a pelagic oceanic existence.

MAGNET
SPOT 5 STARTUP

Date: Thu, 08 Feb 2007 09:28:43 -0800
From: Denise Parker <Denise.Parker@noaa.gov>
To: George H. Balazs <gbalazs@honlab.nmfs.hawaii.edu>
Subject: Re: Very Important- Sequence for passing the magnet to start the SPOT5s

Swipe the magnet once:
Stand by - 2 quick blinks, 3 second pause and 2 more quick blinks, then LED will stay solid for 2 seconds - pass magnet over again during "long" steady light and it should change to Deployed mode

Deployed mode is 10 quick blinks, a short pause and then stay solid for 2 seconds..

Note, if magnet is swiped during the long 2 second LED it will toggle/change the mode (either Standby or Deployed).

SAME AS SPOT 5

29 September 2004

SPLASH tag Diagram on page 7) displays the mode of the SPLASH, then offers a long LED flash. It takes a second swipe of the magnet during a long LED flash to change the mode.

To display the mode:

Swipe a magnet once across the controller reset switch position. The controller LED will flash in a sequence that displays the mode of the SPLASH tag.

- Standby mode LED pattern: ***2 double- flashes (2 flashes, a 3 second pause, and 2 more flashes)***
- Deployed mode LED pattern: ***10 flashes***

To change the mode:

Once the mode is displayed, the ***LED will stay on for a long flash (on for 2 seconds)***. This indicates you can change the mode with a magnet. It is only during this time the SPLASH mode may be changed with a magnet.

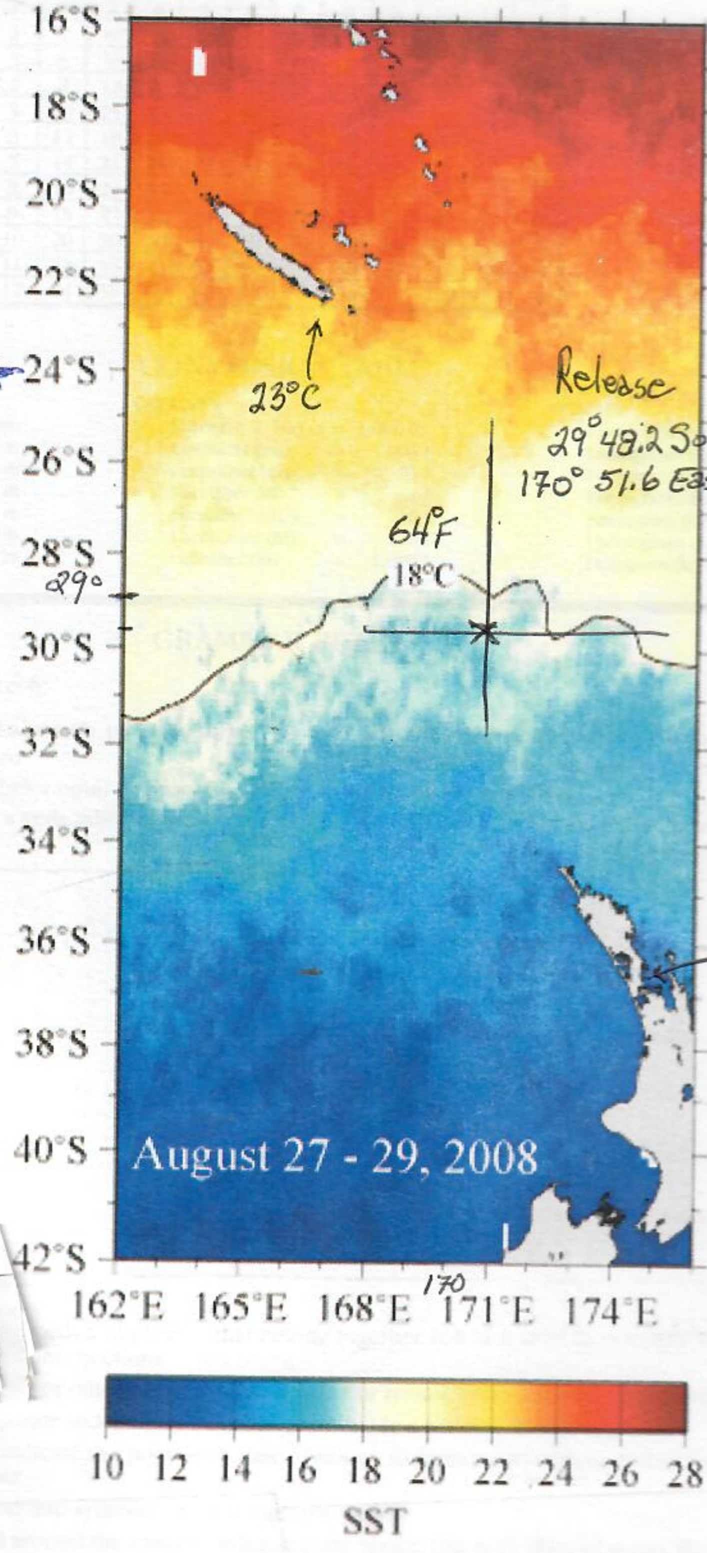
- If you keep the magnet away from the SPLASH during this long LED flash, the SPLASH will stay in its current mode.
- *If you swipe a magnet across the board during the long LED flash, you will toggle the mode.* If the SPLASH was toggled to the Standby mode, the LED will flash as described in "Standby mode" above (two double-flashes). If the SPLASH was toggled to the Deployed mode, the LED will flash as described in "Deployed mode" above (10 flashes).

Sealing the communications port

The tag is supplied with small white communications port plugs and silicone grease. These are designed to protect the communications port pins during the deployment.

Place a *very* small amount of the silicone grease in the comm port, then firmly press the comm port plug in place.

Note that the communications port is sealed against water intrusion and electrically-isolated during deployment. The comm port plug and silicone grease are just extra protection for the pins.



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