

# Weather Summary for Fiji Islands – July 2003 Rainfall Outlook till October 2003

## ***FIJI METEOROLOGICAL SERVICE***

### **In Brief**

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Below average and in some cases well below average rainfall in parts of the country in the last three to four months suggests that although the El Niño event has returned to neutral conditions it's effect on Fiji's rainfall may not be completely over.

In July rainfall was average to well below average except for two sites which recorded above average. A significant dry spell continues with Matei recording now six, Nadi Airport and Ono-I-Lau four and Savusavu Airport three consecutive months of below average rainfall. A number of other areas in the Western and Northern Division have received below average rainfall.

Day-time temperatures were generally below average and night-time temperatures around average across the country during the month. There were several relatively cool nights experienced across the country especially over

the last week of the month with the coolest nights experienced from 25-27th. No new air temperature records were set this month.

Heavy falls disrupted some activities on the final days of the South Pacific Games and Tailevu township was flooded on the 11th. The Navy's Search and Rescue team was activated on the 23rd as thirteen people drifted in strong winds and rough seas in Northern Waters.

Total sunshine hours were below average at all recording sites around the country.

### **Weather Patterns**

Fiji was affected by a number of troughs of low pressure and cold fronts in July. These systems were interspersed by ridges of high pressure which were the more dominant feature during the month. The transition between the two brought about contrasting weather, which was more pronounced over the southeastern parts of the main islands. Most parts of Fiji's waters experienced strong winds during the month, particularly when ridges affected the Group.

The 2003 South Pacific Games began with fine and cool weather brought about by a ridge from the south during the first week of July. However, from the 6-8th then the final days (11-12th) of the Games, Suva received some rain due to a cold front moved onto the country from the west. Though this system moved away from Fiji by the middle of the second week enhanced convection persisted till after the closing ceremony on the 12<sup>th</sup>. Moderate falls were recorded especially about the southeastern parts of the main islands.

places. Rain subsided from the 17<sup>th</sup>, except for the southeastern parts of the main islands as the ridge following the front nudged over the Group. However, on the 20<sup>th</sup>, the front moved back onto the country bringing further rain to most places, before finally clearing the Group on the 24<sup>th</sup>. The ensuing ridge brought some cooler temperatures and lowered relative humidity significantly till the 29<sup>th</sup>.

On the 30<sup>th</sup>, a trough moved onto the Group enhancing showers till the end of the month. This trough resulted in raised air temperature and relative humidity.

As in the previous month Rotuma continued to record rain almost daily throughout July, as the cooler and drier southeast trades merged with tropical northeast wind flow over the island. Occasionally, troughs moved across the island enhancing rainfall.

On the 16<sup>th</sup>, a second cold front moved eastward across Fiji, producing rain over most

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**TABLE 1: Rainfall from May to July 2003**

<u>Station</u>	<u>Actual Rainfall (mm)</u>	<u>Has rainfall in the last three months been below average, average or above average?</u>	<u>No. of Rain days in May (% of total rain)</u>	<u>No. of Rain days in June (% of total rain)</u>	<u>No. of Rain days in July (% of total rain)</u>
Penang Mill	171.7	Below Average	19 (74)	08 (11)	07 (15)
Monasavu Dam	664.7	Average	24 (39)	25 (32)	23 (29)
Vatukoula Mine	181.3	Average	11 (48)	10 (44)	06 (08)
Rarawai Mill, Ba	174.3	Average	09 (73)	06 (23)	03 (04)
Yasawa-I-Rara Is.	NA	NA	NA	NA	NA
Viwa Is.	108.1	Below Average	80 (25)	04 (63)	04 (12)
Lautoka Mill(Research)	148.0	Average	07 (36)	04 (55)	03 (09)
Nadi Airport	110.1	Below Average	10 (47)	04 (27)	04(26)
Nacocolevu, Sigatoka	210.9*	Average	10 (46)	06 (08)	09 (46)
Tokotoko, Navua	488.1	Below Average	21 (50)	20 (30)	17 (20)
Laucala Bay, Suva	438.3	Average	24 (59)	19 (19)	25 (22)
Nausori Airport	465.8	Average	25 (57)	20 (16)	23 (27)
Nabouwalu	319.2	Average	21 (64)	22 (15)	18 (21)
Labasa Airport	114.6	Below Average	08 (70)	04 (12)	04 (18)
Savusavu Airport	169.0*	Below Average	13 (45)	06 (15)	14 (40)
Udu Point	NA	NA	NA	NA	NA
Matei Airport	284.3	Below Average	19 (65)	08 (15)	16 (20)
Lakeba Is.	327.1	Average	15 (19)	15 (41)	13 (40)
Matuku Is.	NA		226.6mm	97.8mm	NA
Ono-I-Lau Is.	99.1	Well Below Average	08 (46)	05 (21)	08 (33)
Vunisea, Kadavu	393.2	Below Average	21 (44)	19 (22)	18 (34)
Rotuma	769.2*	Average	20 (22)	21 (39)	25 (25)

\* Data not available at the present time for Nacocolevu (27-28th) and Savusavu Airport (4th) in June. Data also not available in for Rotuma

## Rainfall in the last three months

### Rainfall in July

July rainfall was generally average to well below average. Matei has now recorded six, Nadi Airport and Ono-I-Lau four and Savusavu Airport three consecutive months of below average rainfall.

Rainfall recording sites in the Western Division in July recorded well below average to average rainfall except for Nacocolevu which recorded above average rainfall.

In the Northern and Eastern Divisions rainfall ranged from well below average at the Labasa Airport and Ono-I-Lau to above average at Lakeba and Vunisea. The remaining sites in the division received average rainfall during the month. Rotuma recorded above average rainfall.

In the Central Division all the sites recorded average rainfall.

### Rainfall in the three-months from May to July.

The Rainfall forecast for period from May to July in the April Fiji Islands Weather Summary was for rainfall to be variable but for most sites to receive below average to average rainfall. The skill level of the forecast for the above period was low due to the forecast period coinciding with the transition period from *Wet to Dry Season*.

Of the twenty sites that reported in time for this summary, nine reported receiving average and nine receiving below average rainfall around the country. The southern most island of Ono-I-Lau received well below average in the last three months.

Figure A

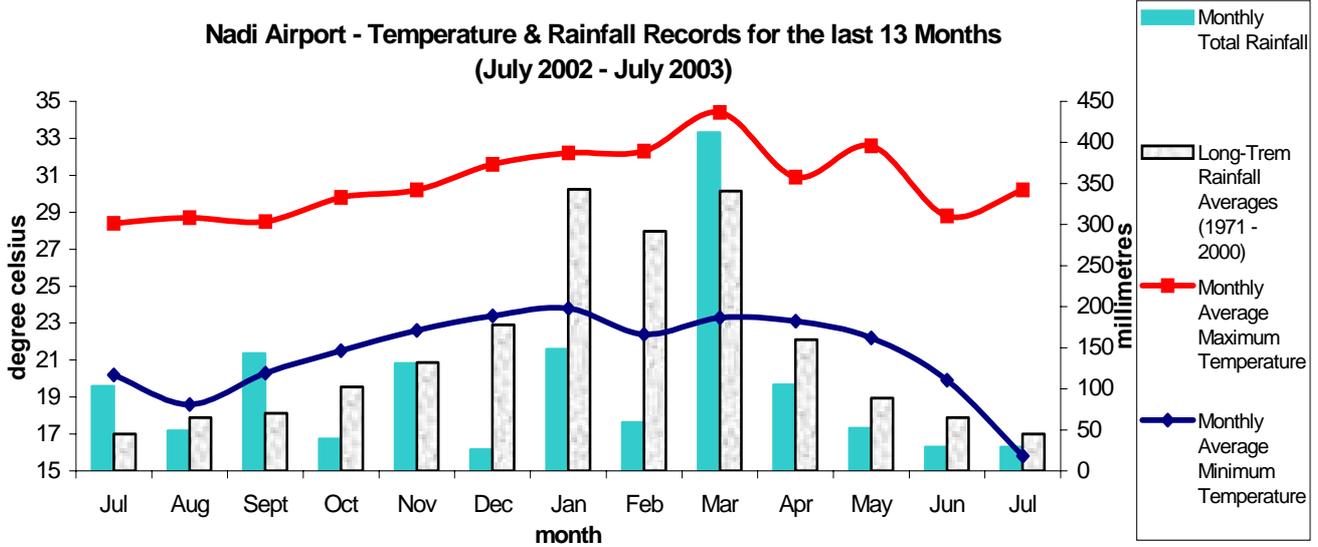


Figure B

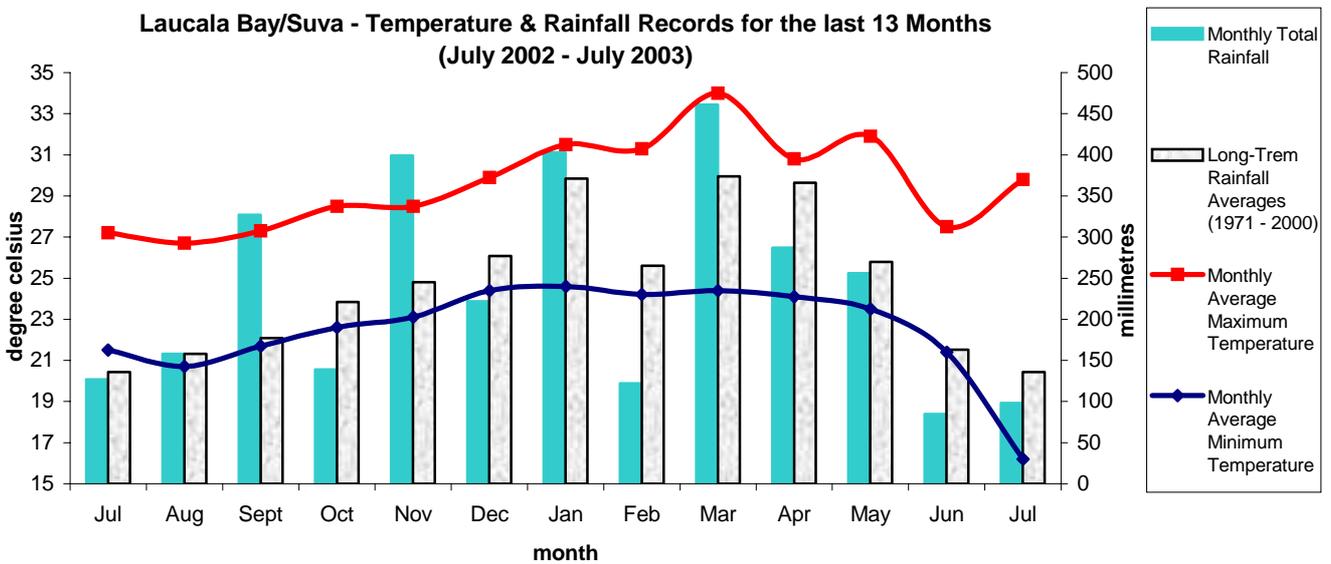
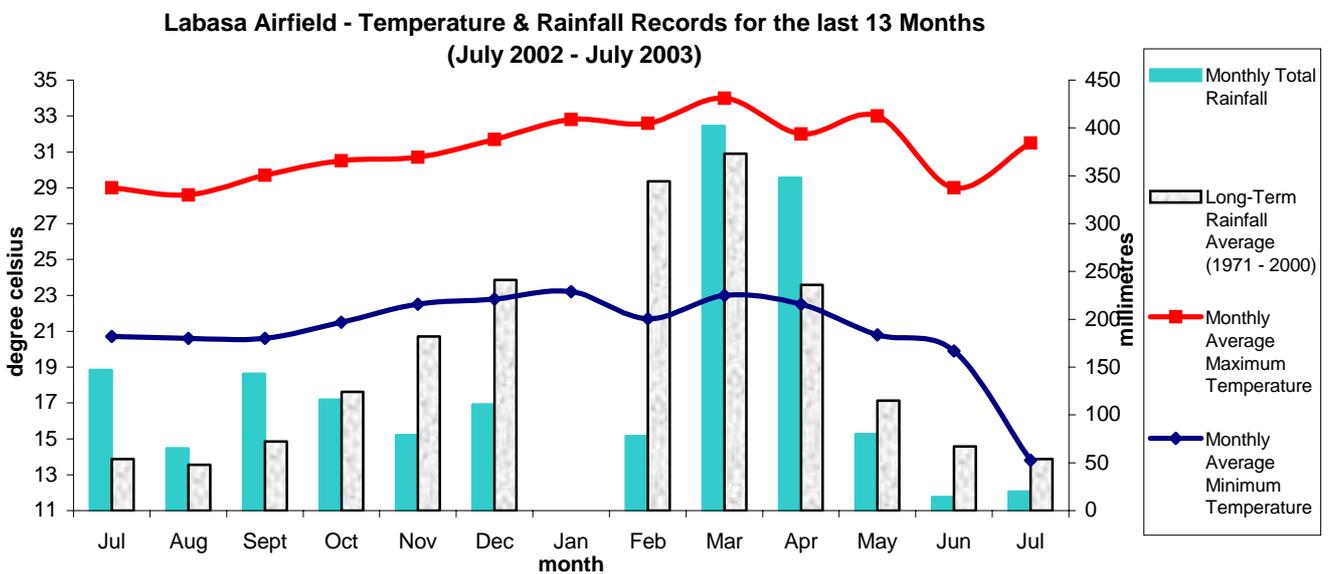


Figure C



## Climate in July

### Mean Day-time and Night-time Air Temperatures and 0900 hrs Relative Humidity

The day-time monthly temperatures were generally below average at most sites across the country. The greatest positive departures from normal were observed at Rotuma, Nabouwalu and Lautoka which recorded monthly averages of 0.8°C, 0.1°C and 0.1°C respectively above normal. The greatest negative departures were at Nadi Airport, Labasa Airport and Vunisea which recorded 0.8°C, 0.6°C and 0.6°C respectively below normal.

The night-time temperatures were generally around average. The greatest positive departures from normal were observed at Vatukoula, Rarawai Mill, Nadi Airport and Nacocolevu which recorded 1.4°C, 1.3°C, 1.0°C and

1.0°C above average respectively. The greatest negative departures were at Penang Mill, Ono-I-Lau and Tokotoko (Navua) which recorded 0.7, 0.4°C and 0.2°C respectively below normal July temperatures.

Relative Humidity (RH) at 0900hrs was generally above average at most of the sites except for Labasa Airport, Savusavu Airport, Rarawai Mill, Lautoka Mill and Penang Mill. The greatest positive departures were at Viwa, Ono-I-Lau and Matei Airport which recorded 15%, 6% and 4% above normal respectively. Rarawai Mill, Lautoka Mill and Penang Mill recording the greatest negative departure of 7%, 4% and 4% below normal.

### Soil Moisture and Runoffs

Soil moisture conditions generally ranged from moderate to limiting in the Central Division throughout the month at Suva and Navua sites. However at Nausori Airport the conditions were moderate during the first week then ample to excessive for the rest of the month.

In the Western Division, conditions were generally dry for most of the month at Nadi, Lautoka, Ba and Rakiraki. However at Nacocolevu the soil conditions were moderate during the first week then moderate to ample and returning to moderate over the last two weeks of the month. In contrast Monasavu recorded excessive to ample conditions throughout the month.

In the Northern Division, soil moisture was generally limiting to dry at Nabouwalu and Savusavu throughout the month. Matei and Labasa Airport recorded dry soil

moisture conditions throughout the month.

Soil moisture conditions at Lakeba were moderate during the first week then remained excessive to ample over the last three weeks of the month. At Vunisea the conditions were moderate in the first week then excessive over the two weeks and ample during the last week in July. Dry conditions prevailed at Ono-I-lau throughout the month while Rotuma experienced ample soil moisture conditions during the first week then excessive over the two weeks and returning to ample in the last week of the month.

There were significant runoffs recorded at Rotuma (187.8mm), Monasavu (118.2mm) and Vunisea (37.5mm) in July.

### Sunshine, Radiation & Winds

The total sunshine hours around the country were below average to average in July. Nadi Airport recorded 93%, Rotuma 90% Nacocolevu 80% Laucala Bay 75% of normal.

Global Solar Radiation were also below average at all the recording sites where Nadi Airport recorded 88%

and Laucala Bay 69% of normal in July.

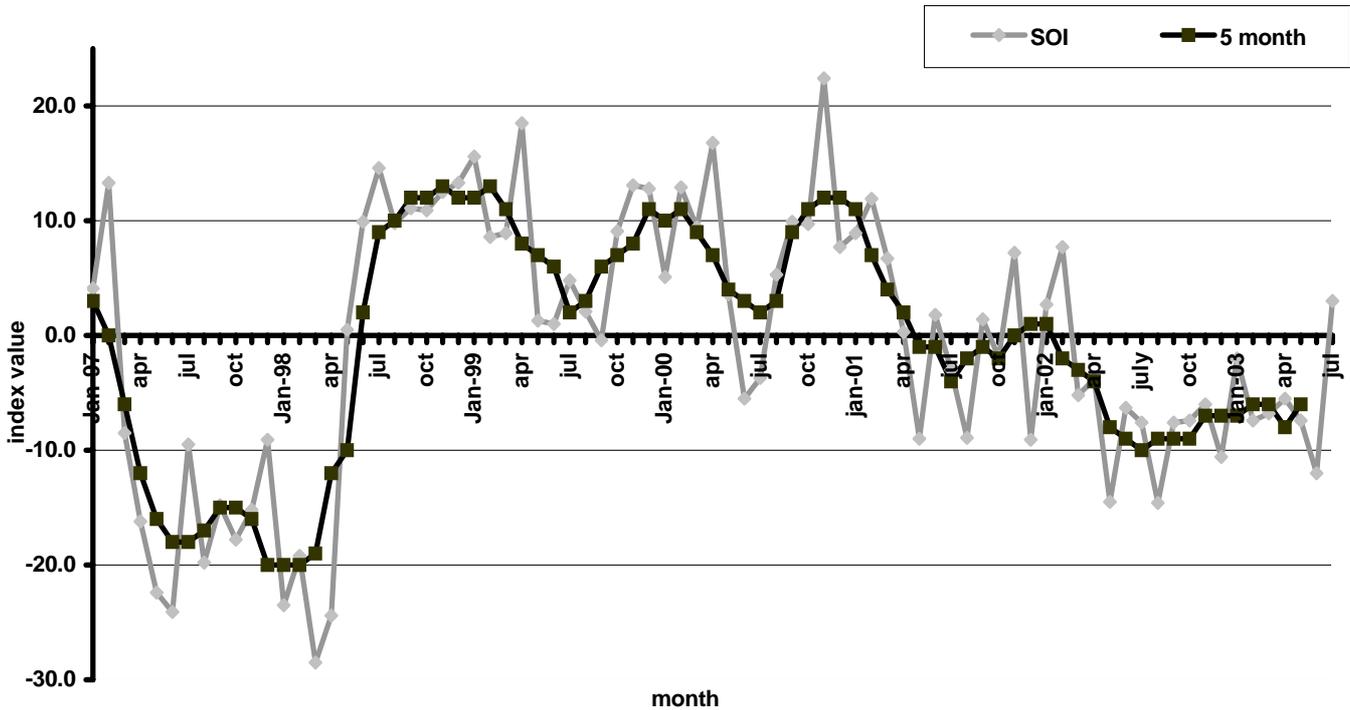
Wind speeds during the month was above average at Nausori Airport, around average at Nadi Airport and below average wind speeds were recorded at Rotuma, Nabouwalu and Vunisea this month

### Records set in July 2003

<u>Element</u>	<u>Station</u>	<u>Observed (record)</u>	<u>On</u>	<u>Rank</u>	<u>Previous (record)</u>	<u>Year</u>	<u>Records Began</u>
No	New	Records	in	July	2003		

Figure D

Southern Oscillation Index vs 5-Month Means  
 (January 1997 - July 2003)



**ENSO status and Rainfall Outlook to October 2003**

**Southern Oscillation Index:** The Southern Oscillation Index (SOI) for July was +3.0 (June was -12.0) with the five-month running mean of -6 centred on May (April was -8) (Figure D).

Neutral conditions continue in the Tropical Pacific Ocean. Surface observations in the central and eastern equatorial Pacific shows a decline in the warming trend that was observed earlier in the month. Sea surface temperatures are close to average while the subsurface temperatures continue to show warming trend for July in the central and eastern Pacific with cool waters entirely dissipating in the east. The NINO3 and NINO3.4 indices are -0.4°C and +0.5°C respectively. Most of the models continue to indicate heavy bias towards neutral conditions for the rest of the year. Nine out of twelve models show *Neutral* values for NINO3 in five months time with three predicting Cool conditions. In eight months time, all ten available models indicate Neutral conditions.

(The ENSO Update and SOI are provided by of the National Climate Centre, Australian Bureau of Meteorology and can be found at <http://www.bom.gov.au>)

**FMS Rainfall Prediction Model:** *This model is based on schemes, which have run successfully at the Australian Bureau of Meteorology's National Climate Centre. These a statistical scheme based on the relationship between SOI and subsequent three-month rainfall totals. In each case the probability of low, medium or high rainfall in the oncoming three-month period is provided. The scheme uses the SOI averaged over the most recent three-month period. The reliability of the model is high during the wet season (Nov-Mar) but decreases during the dry season (May-Sept) and during the transitions months, April and October.*

The model forecasts rainfall to be below average to average in the Western parts of Viti Levu and across most of Vanua Levu (except Udu Point, Savusavu and Matei - around average) the remaining parts of the country are predicted to receive around average rainfall (Figure E).

**Australian Rainman:** *This is a Rainfall Prediction Model was created from joint efforts between Australia Meteorological and Agricultural Agencies. The model incorporates the use of SOI to test its effects on the probability of rainfall in upcoming months. It shows the relationship between ENSO (El Niño - Southern Oscillation) events and rainfall. Due to public demand this model is currently used to present the probability of receiving rainfall in the coming individual months over a three-month period. Please note that the reliability of forecast for one month is lower than for a combined three month period.*

The model predicts variable rainfall across the country and across the next three months (Table. 2).

**Outlook for August to October 2003:**  
**Based on the model predictions and current climatic conditions, Fiji's rainfall is likely to be below average to average.**

**NOTE:** The confidence level in the outlook is 'low'.

## Preliminary Climatological Summary for June 2003

FIJI METEOROLOGICAL SERVICE

DATE 05/08/2003

PRELIMINARY CLIMATOLOGICAL DATA FOR MONTH 7 , 2003 : SUMMARY FOR DAYS 1 TO 31

	RAINFALL				AIR TEMPERATURES						SUNSHINE			
	TOTAL		RAIN MAX.		AVERAGE DAILY			EXTREME			TOTAL			
	MM	%	+	MM ON	MAX.	#	MIN.	#	MAX.	MIN.	HRS	%		
NADI AIRPORT	29	64	4	17 6	27.8	-0.8	19.6	1.2	30.2	11	15.8	25	203	93
SUVA/LAUCALA BAY	98	72	25	27 11	26.5	-0.3	20.8	0.1	29.8	6	16.2	29	102	75
NACOCOLEVU	98	139	9	53 6	27.2	-0.1	19.0	1.2	30.5	3	15.0	26	134	80
ROTUMA	303	121	25	73 21	29.9	0.8	24.7	0.6	32.0	19	23.0	28	189	95
*VIWA	13	23	4	5 16	27.6	-0.2	23.3	0.9	30.0	18	21.6	10		
*UDU POINT	faulty aws													
LABASA AIRFIELD	20	37	4	11 21	28.6	-0.6	18.8	0.6	31.5	4	13.8	25		
NABOUWALU	68	73	18	15 12	26.4	0.1	22.2	0.4	29.7	6	20.5	8		
SAVUSAVU AIRFIELD	68	71	14	16 12	26.7	-0.3	21.9	0.9	30.7	6	19.0	26		
MATEI AIRFIELD	58	57	16	17 21	26.8	-0.3	22.0	0.3	28.8	12	20.0	27		
*YASAWA-I-RARA	faulty aws													
VATUKOULA	14	29	6	6 6	28.8	-0.4	19.2	1.7	31.8	21	14.9	26		
MONASAVU	196	101	23	43 16	20.6	-0.3	15.5	0.2	25.6	4	11.2	26		
NAUSORI AIRPORT	128	108	23	59 11	26.1	-0.2	19.7	0.1	28.9	1	15.0	26		
NAVUA/TOKOTOKO	99	58	17	23 11	25.4	-0.6	19.5	-0.2	28.5	5	15.5	26		
LAKEBA	132	165	13	72 12	26.0	-0.4	21.0	-0.0	29.0	4	18.2	29		
*MATUKU	faulty aws													
VUNISEA	135	96	18	46 6	24.9	-0.6	20.0	0.4	28.1	5	16.9	29		
ONO-I-LAU	33	38	8	9 22	25.0	-0.0	19.8	-0.4	28.4	5	16.7	27		
BA/RARAWAI MILL	6	16	3	4 22	29.4	-0.2	18.3	1.3	32.2	31	12.8	26		
LAUTOKA AES	13	26	3	6 22	28.4	0.1	20.3	0.4	30.6	19	16.5	27		
PENANG MILL	25	45	7	12 16	27.2	-0.2	19.7	-0.7	30.5	4	17.2	27		

	PE	WATER BALANCE (MM)				TEMPERATURE ( C)			HUMIDITY	WIND	SUN RAD	SUN RAD				
		MAX.	LAST	DEF	NO	RO	NO	DLY				DRY	WET	RH%	VP	%OF
	.1MM	DS	ON	DS	DYS	DYS	MEAN	(AVERAGE	AT 9AM)	KT	POS	SQ.M				
NADI AIRPORT	32	75	1	75	70	23	0	0	23.7	23.6	20.6	76	22.1	5.7	61	12.9
SUVA/LAUCALA BAY	30	70	5	51	0	0	0	0	23.6	23.6	21.5	82	24.0	0.0	31	7.9
NACOCOLEVU	29	63	5	42	0	0	1	1	23.1	22.8	20.8	83	23.0	0.0	45	13
ROTUMA	37	20	10	3	0	0	188	8	27.3	27.7	25.0	80	29.5	4.9	55	15
VIWA	35	75	1	75	96	29	0	0	25.5	25.4	23.8	88	28.3			
*UDU POINT	faulty aws															
LABASA AIRFIELD	33	75	1	75	82	27	0	0	23.7	24.6	21.8	78	24.0			
NABOUWALU	32	75	2	75	28	11	0	0	24.3	24.3	21.8	79	24.1	13.5		
SAVUSAVU AIRFIELD	31	75	1	73	28	10	0	0	24.3	24.4	21.9	80	24.4			
MATEI AIRFIELD	32	75	1	75	41	16	0	0	24.4	24.8	22.7	83	26.1			
*YASAWA-I-RARA	faulty aws															
VATUKOULA	32	75	1	75	85	30	0	0	24.0	24.9	20.9	69	21.6			
MONASAVU	25	10	4	0	0	0	118	16	18.0	17.8	16.9	91	18.6			
NAUSORI AIRPORT	30	33	10	17	0	0	35	3	22.9	23.0	21.1	84	23.6	5.7		
NAVUA/TOKOTOKO	30	64	5	44	0	0	0	0	22.5	22.4	20.4	83	22.6	4.3		
LAKEBA	31	42	11	20	0	0	36	3	23.5	24.1	21.3	77	23.3			
*MATUKU	faulty aws															
VUNISEA	30	33	5	13	0	0	38	6	22.5	22.6	20.2	79	21.8	5.5		
ONO-I-LAU	28	75	1	75	54	21	0	0	22.4	22.4	19.9	78	21.3			
BA/RARAWAI MILL	32	75	1	75	93	30	0	0	23.8	24.5	20.8	71	21.8			
LAUTOKA AES	32	75	1	75	86	29	0	0	24.3	25.0	20.9	68	21.5			
PENANG MILL	32	75	1	75	74	27	0	0	23.4	23.1	20.5	79	22.2			

DS IS SOIL MOISTURE DEFICIT, LIMIT 75 MM; RO IS WATER SURPLUS (INDEX OF RUNOFF)  
 DEF (AE-PE) IS EVAPOTRANSPIRATION DEFICIT (INDEX OF IRRIGATION WATER NEEDED).  
 PE IS LONG TERM MEAN PENMAN POTENTIAL EVAPOTRANSPIRATION (CALCULATED OR ESTIMATED).  
 MEAN TEMPERATURE IS (MAX+MIN)/2; WIND IS MEAN SPEED AT 06,12,18,24 HOURS.  
 \$ : SOLAR RADIATION CALCULATED FROM SUNSHINE DURATION. # : DEPARTURE FROM NORMAL.  
 + : NUMBER OF DAYS WITH 0.1 MM OR MORE RAIN. \* : PERCENT OF NORMAL.

Note: This summary is prepared for rapid dissemination as soon as possible following the end of the month. The quantitative data are obtained daily on the phone or radiotelephone from a network of climate stations reporting 9 am observations; these data must be treated as provisional. Water balance calculations are approximate and are intended for guidance purposes only. Also, FMS does not guarantee accuracy and reliability of the forecast information presented in this summary but the Department should be sought for expert advice, any clarification or additional information. Any person wishing to re-print any information provided in this summary must seek permission from the Director of Meteorology.

### Three Month Rainfall Outlook Probabilities for August to October 2003

The forecast probabilities are presented as

FIGURE E: Three Month Forecast for Selected Stations in Fiji using the Fiji Meteorological Services Rainfall Prediction Model

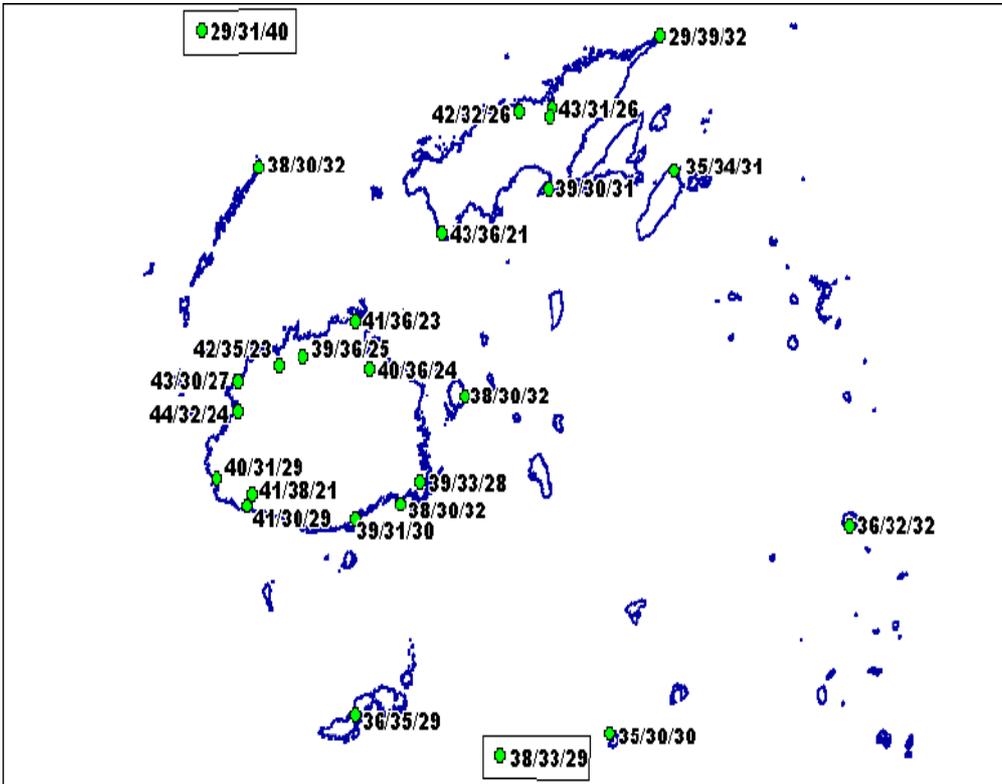
**DRY/NORMAL/WET**

‘DRY’ range refers to rainfall less than 33rd percentile.

‘NORMAL’ (average) range refers to rainfall between 33rd and 67th percentiles.

‘WET’ range refers to rainfall above 67th percentile.

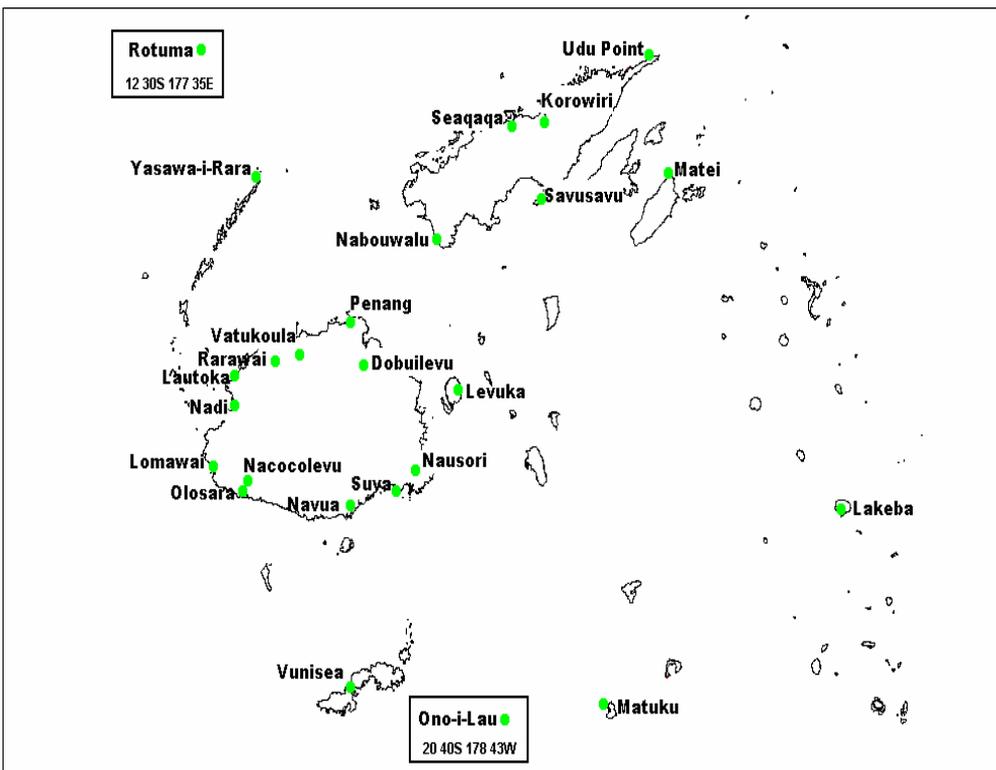
**Reference Table for 33rd and 67th Percentile**



Station	33% (mm)	67% (mm)
<b>Western Division</b>		
Dobuilevu	272	389
Vatukoula	167	269
Rarawai	171	289
Penang	177	274
Lautoka	168	257
Nadi	172	276
Lomawai	161	261
Nacocolevu	206	304
Olosara	216	320
Yasawa	157	259
<b>Central Division</b>		
Navua	555	796
Suva	385	600
Nausori	384	542
<b>Eastern Division</b>		
Levuka	306	476
Lakeba	227	335
Matuku	192	357
Ono-I-Lau	232	345
Vunisea	286	418
<b>Northern Division</b>		
Labasa Mill	173	246
Seaqaqa	166	292
Nabouwalu	249	453
Savusavu	300	417
Udu Point	270	422
Matei	360	495
<b>Rotuma</b>	<b>665</b>	<b>864</b>

Please note that the probabilities are listed beside of the corresponding station marker or dot.

FIGURE F: Reference Map of selected Climate/Rainfall sites in Fiji



**TABLE 3: Monthly Rainfall Outlook Probabilities for August to October 2003**

Station Name	August		September		October	
	Average*	Probability <sup>#</sup>	Average*	Probability <sup>#</sup>	Average*	Probability <sup>#</sup>
<b>Western Division</b>						
Dobuilevu	80	57	119	36	153	65
Vatukoula	68	41	78	33	99	50
Rarawai	65	31	74	30	107	41
Penang	73	23	96	44	114	44
Lautoka	70	35	72	33	102	47
Nadi	65	45	70	43	102	45
Lomawai	79	33	71	30	71	47
Olosara	98	31	103	32	91	40
Nacocolevu	83	30	92	33	98	52
Yasawa-I-Rara	63	24	66	44	105	32
<b>Central Division</b>						
Navua - Tamanoa	202	42	229	42	280	53
Suva	158	38	177	30	221	54
Nausori	147	47	165	46	205	49
<b>Eastern Division</b>						
Lakeba	102	40	101	49	123	54
Ono-I-Lau	118	21	108	37	86	58
<b>Northern Division</b>						
Korowiri	52	51	75	40	127	31
Seaqaqa	56	63	82	36	142	38
Nabouwalu	105	43	113	36	170	42
Savusavu	116	51	133	24	171	32
Udu Point	85	52	113	46	165	22
<b>Rotuma</b>	210	37	238	50	340	38

*Please note that the above figures should be used with caution, as there is some degree of uncertainty associated with them, and particularly the reliability of the model is low during the transition months and the dry season.*

\* 'Long-term Average' for the 30 year period from 1971-2000.

# Probability of expecting at least normal rainfall.