

### 3. NUTRIENT USAGE IN SOME EASTERN QUEENSLAND BASINS

#### 3.1 Nitrogen Usage

Details of nitrogen usage in each basin are included in appendix 1. Table 2 shows the usage at five-year intervals from 1910 to 1955 and annually from 1960 to 1990, for each of the basins.

**Table 2.** Fertilizer nitrogen usage (tN) in basins 108-114 (continued over)

	Daintree	Mossman	Barron	Mulgrave- Russell	Johnstone	Tully	Murray
	108	109	110	111	112	113	114
1910	-	-	-	-	-	-	-
1915	-	-	-	50	-	-	-
1920	-	10	-	100	10	-	-
1925	-	20	-	250	50	-	-
1930	10	30	10	430	200	50	-
1935	20	60	20	450	600	100	-
1940	30	90	100	675	1100	200	-
1945	40	120	80	1000	900	200	30
1950	55	260	100	1155	1130	345	55
1955	75	350	140	1590	1550	470	75
1960	95	450	180	2040	1990	600	95
1961	110	525	210	2380	2325	700	110
1962	115	550	222	2480	2430	730	115
1963	155	740	260	3010	3230	950	135
1964	155	775	490	3150	3370	1010	160
1965	180	860	605	3525	3790	1140	18
1966	200	870	620	3550	3830	1150	19
1967	210	875	645	3680	3640	1150	200
1968	200	820	650	3600	3760	1140	200
1969	205	825	650	3600	3720	1130	200
1970	210	840	700	3910	4020	900	200
1971	225	860	750	4120	4600	1000	220
1972	240	885	800	3860	4980	1200	240
1973	220	810	760	3850	4840	1140	250
1974	230	840	800	3965	5225	1300	230
1975	240	850	900	4020	5250	1260	240
1976	255	900	1050	4375	5800	1400	260
1977	305	1015	1200	4940	6540	1580	290
1978	245	850	1160	4020	5220	1260	260
1979	300	980	1390	4810	6230	1505	315
1980	365	1195	1690	5850	7580	1830	380
1981	365	1160	1540	5700	7230	1760	370
1982	335	1130	1485	5550	7050	1700	340
1983	337	1140	1480	5665	7000	1710	330
1984	338	1140	1450	5665	7015	1720	340
1985	400	1050	1445	5660	7005	1705	350
1986	400	1050	1440	5050	7000	1860	560
1987	420	1055	1610	4695	7260	2090	700
1988	450	1130	1650	4660	6970	2490	160
1989	440	945	1640	4660	6950	2480	1200
1990	340	820	1680	4720	7300	2660	1290

Table 2. Fertilizer nitrogen usage (tN) in basins 116-122 (continued over)

	Herbert 116	Black 117	Ross 118	Haughton 119	Burdekin 120	Don 121	Proserpine 122
1910	10	-	-	-	-	-	-
1915	50	-	-	10	-	-	-
1920	100	-	-	50	-	-	-
1925	200	-	-	75	-	5	50
1930	350	-	-	150	5	10	100
1935	400	-	-	160	20	20	150
1940	490	-	1	200	50	30	200
1945	500	-	2	220	40	40	260
1950	1100	-	3	600	210	80	310
1955	1500	-	4	650	220	90	360
1960	1930	-	5	785	270	107	680
1961	2255	-	5	1020	350	140	760
1962	2355	-	5	1105	380	140	820
1963	2950	-	6	1715	590	220	1045
1964	3270	-	7	1940	665	250	1205
1965	3580	-	8	2045	705	265	1245
1966	3590	-	9	2360	810	305	1005
1967	3600	-	10	2575	885	335	920
1968	3630	-	10	2725	940	355	1170
1969	3670	-	12	3240	1115	420	1170
1970	4200	-	10	2890	1000	380	1100
1971	4225	-	15	4150	1425	540	1200
1972	4905	-	16	4535	1560	595	1400
1973	4870	-	15	4865	1670	670	1550
1974	5090	-	18	5260	1815	736	1575
1975	5240	-	21	5980	2075	835	1640
1976	5800	-	23	6815	2365	995	1810
1977	6555	-	24	7115	2475	1135	1850
1978	5085	-	18	5450	1905	1030	1750
1979	6100	-	18	5870	2060	1080	1770
1980	7370	-	25	8860	3115	1375	2650
1981	7120	-	22	8015	2840	1280	2390
1982	6745	-	23	8215	2915	1330	2500
1983	6800	-	24	8940	3180	1525	2640
1984	6762	-	19	7400	2640	1390	2120
1985	6800	-	20	7050	2520	1365	1780
1986	7125	-	16	6760	2425	1235	2020
1987	7570	-	16	6875	2475	1285	2015
1988	9190	-	17	7115	2565	1250	2060
1989	9685	-	18	7880	2840	1340	2500
1990	9800	5	21	8805	3180	1445	3040

**Table 2.** Fertilizer nitrogen usage (tN) in basins 124-130 (continued over)

	O'Connell 124	Pioneer 125	Plane 126	Styx 127	Shoalwater 128	Waterpark 129	Fitzroy 130
1910	-	-	10	-	-	-	-
1915	50	60	90	-	-	-	-
1920	120	180	195	-	-	-	-
1925	170	240	250	-	-	-	-
1930	240	365	390	-	-	5	-
1935	350	450	400	-	-	10	-
1940	400	615	675	-	-	20	5
1945	400	600	650	-	-	25	5
1950	420	655	720	-	-	30	10
1955	510	795	930	-	-	50	15
1960	720	1075	1305	-	-	60	18
1961	930	1390	1685	-	-	70	23
1962	1045	1560	1890	-	-	80	26
1963	1415	2015	2495	-	-	90	52
1964	1330	2120	2490	-	-	100	87
1965	1535	2260	2785	-	-	110	130
1966	1595	2380	2985	-	-	120	140
1967	1665	2450	3015	-	-	125	200
1968	1785	2475	3070	-	-	130	250
1969	2085	2990	3735	-	-	145	320
1970	1990	2805	3555	-	-	160	235
1971	2290	3235	4100	-	-	170	340
1972	2325	3290	4180	-	-	185	340
1973	2535	3580	4545	-	-	200	350
1974	2575	3640	4615	-	-	211	325
1975	2680	3790	4805	-	-	260	425
1976	3405	4435	6160	-	-	306	790
1977	3670	4780	6835	-	-	350	1385
1978	3085	3925	6210	-	-	352	1380
1979	3115	4025	5625	-	-	340	1375
1980	4545	5860	8190	-	-	330	1475
1981	4245	5480	7665	-	-	315	1640
1982	4190	5360	7565	-	-	330	1800
1983	4285	5325	7510	-	-	350	2200
1984	4015	4985	6930	-	-	370	2635
1985	4010	4985	6905	-	-	420	2845
1986	3670	4555	6315	-	-	385	2620
1987	3745	4670	6570	-	-	410	3115
1988	3750	4695	6555	-	-	440	3595
1989	4125	5160	7215	-	-	450	5380
1990	4390	5490	7685	-	-	475	7290

**Table 2.** Fertilizer nitrogen usage (tN) in basins 132-138

	Calliope 132	Boyne 133	Baffle 134	Kolan 135	Burnett 136	Burrum 137	Mary 138
1910	-	-	-	-	-	-	-
1915	-	-	-	-	-	-	-
1920	-	-	-	-	10	-	-
1925	-	-	-	-	40	-	-
1930	-	-	-	-	60	-	-
1935	-	-	-	-	100	5	10
1940	-	-	-	-	120	20	25
1945	-	-	-	10	160	60	20
1950	-	-	5	35	360	115	110
1955	-	-	13	87	567	217	206
1960	1	-	22	150	715	330	275
1961	3	-	35	220	1000	600	425
1962	6	-	50	300	1250	750	550
1963	8	-	80	450	1600	890	730
1964	10	1	82	450	1590	900	732
1965	17	-	80	455	1590	912	760
1966	18	2	110	680	1970	1180	820
1967	20	2	170	860	2163	1250	950
1968	24	3	160	850	2155	1240	950
1969	30	4	160	780	2020	1300	870
1970	35	4	170	800	1880	1425	1000
1971	33	4	215	1040	2390	1800	1430
1972	28	4	230	1110	2630	1980	1630
1973	26	3	250	1190	2800	2210	1770
1974	25	4	280	1350	3200	2400	1960
1975	26	4	315	1570	3660	2720	2225
1976	27	4	330	1650	4000	3150	2660
1977	27	5	320	1620	3970	2920	2600
1978	28	5	300	1350	3800	2800	2500
1979	28	5	300	1370	3800	2640	2600
1980	28	5	420	1785	4720	3190	2705
1981	35	4	400	1800	4990	3250	3105
1982	40	5	380	1750	4800	3100	3050
1983	45	5	385	1760	4810	3100	3045
1984	53	6	400	1780	5000	3200	3060
1985	62	6	410	1980	5210	3380	3095
1986	70	6	400	1965	5180	3345	3100
1987	72	6	415	1950	5250	3390	3150
1988	70	7	430	1920	5440	3430	3140
1989	63	7	400	1790	5000	3000	2980
1990	62	7	405	1690	4545	2970	2800

Table 3 shows nitrogen usage in groups of basins (this grouping follows Australian Bureau of Statistics statistical divisions to some extent), at five-year intervals from 1910 to 1990.

**Table 3.** Fertilizer nitrogen usage, (tN) at five-year intervals from 1910 to 1990, in groups of basins.

	Daintree-Murray	Herbert-Don	Proserpine-Plane	Styx-Boyne	Baffle-Mary	Total
1910	0	10	10	0	0	20
1915	50	60	200	0	0	310
1920	120	150	595	0	10	875
1925	320	280	710	0	40	1350
1930	730	515	1095	5	60	2405
1935	1250	600	1350	10	115	3325
1940	2195	771	1890	25	165	5046
1945	2370	802	1910	30	250	5362
1950	3100	1992	2105	40	625	7862
1955	4250	2464	2595	65	1090	10464
1960	5450	3097	3780	78	1492	13897
1965	10280	6603	7825	257	3797	28762
1970	10780	8480	9450	434	5275	34419
1975	12760	14151	12915	715	10490	51031
1980	18890	20745	21245	1838	12820	75538
1985	17615	17755	17680	3333	14075	70458
1990	18810	23256	20605	7834	12410	82915

Table 4 shows nitrogen usage in 1990, for each of the basins, by major crop groupings.

In the area under investigation, the nitrogen content of fertilizers applied to crops and pastures and in stock feed supplements, approached 83 000 tonnes of nitrogen in 1990. This was about the same quantity as had been applied, cumulatively, in the period to 1945.

Nitrogen usage increased substantially in the post-war period, due to increasing areas of production of sugarcane, to a reduction in the area of legume green manure crops (planted to supply some of the sugarcane's nitrogen requirements) and to a lesser quantity of nitrogen being available from organic matter mineralisation, as poorer soils were utilised for cane growing.

The 1990 usage of nitrogen, in decreasing order, for the eight major nitrogen-using basins (accounting for 67% of the total) was as follows:

	tonnes (t)	
Herbert	9800	
Haughton	8805	(8940 t in 1983)
Plane	7685	(8190 t in 1980)
Johnstone	7300	(7580 t in 1980)
Fitzroy	7290	(has increased since 1990)
Pioneer	5490	(5860 t in 1980)
Mulgrave-Russell	4720	(5850 t in 1980)
O'Connell	4390	(4545 t in 1980)

(Other basins are included in table 8).

As indicated above, there has been a reduction in the use of nitrogen, particularly in sugarcane areas, since the peak of 1980. This has been largely due to reduced rates of application

following lower sugar prices and increasing adoption of green cane harvesting in the higher rainfall areas of north Queensland.

Over the 1980 to 1990 period, nitrogen usage has increased on irrigated crops, especially cotton, but including sugarcane in the Plane Creek and Bundaberg districts, as the areas with irrigation water supplies have been expanded.

Currently, sugarcane accounts for about 71% of the total nitrogen usage, field crops over 13%, pastures 8% and all fruit and vegetable crops 8%.

**Table 4.** Fertilizer nitrogen usage (tN) in some eastern Queensland basins in 1990

Basin	No.	Sugarcane	Fruit	Vegetables	Field Crops	Pastures	Total
Daintree	108	320	3	0	0	17	340
Mossman	109	812	5	0	0	3	820
Barron	110	25	106	489	693	367	1680
Mulgrave-							
Russell	111	4453	110	7	0	150	4720
Johnstone	112	4867	593	0	0	1840	7300
Tully	113	1890	522	4	0	244	2660
Murray	114	640	530	12	0	108	1290
Herbert	116	8848	44	85	29	794	9800
Black	117	0	1	1	1	2	5
Ross	118	0	3	2	3	13	21
Haughton	119	7783	30	480	500	12	8805
Burdekin	120	2654	20	246	200	60	3180
Don	121	851	6	584	0	4	1445
Proserpine	122	2786	2	1	18	233	3040
O'Connell	124	4146	1	1	2	240	4390
Pioneer	125	4626	1	1	2	860	5490
Plane	126	7468	4	1	2	210	7685
Styx	127	0	0	0	0	0	0
Shoalwater	128	0	0	0	0	0	0
Waterpark	129	0	430	15	5	25	475
Fitzroy	130	0	30	160	6950	150	7290
Calliope	132	0	26	12	16	8	62
Boyne	133	0	0	1	5	1	7
Baffle	134	360	15	10	20	0	405
Kolan	135	1500	50	120	20	0	1690
Burnett	136	844	350	506	2310	535	4545
Burrum	137	2655	15	130	20	150	2970
Mary	138	1250	380	90	460	620	2800
Total		58778	3277	2958	11256	6646	82915

### 3.2 Phosphorus Usage

Details of phosphorus usage in each basin are included in appendix 1. Table 5 shows the usage at five-year intervals from 1910 to 1955 and annually from 1960 to 1990, for each of the basins.

**Table 5.** Fertilizer phosphorus usage (tP) in basins 108-114 (continued over)

	Daintree	Mossman	Barron	Mulgrave- Russell	Johnstone	Tully	Murray
	108	109	110	111	112	113	114
1910	-	-	-	-	-	-	-
1915	-	-	-	-	-	-	-
1920	-	-	-	10	10	-	-
1925	-	10	-	30	30	10	-
1930	-	15	-	75	70	25	-
1935	-	30	10	120	108	40	-
1940	5	45	30	185	175	60	-
1945	10	50	30	220	225	80	5
1950	15	65	25	300	290	90	15
1955	15	65	25	315	310	90	15
1960	17	82	34	375	360	110	17
1961	22	105	40	480	470	140	35
1962	20	100	38	460	450	133	33
1963	30	160	60	740	735	210	55
1964	30	167	160	740	730	200	58
1965	35	175	180	780	800	226	60
1966	35	175	190	780	770	220	70
1967	40	180	230	800	800	226	80
1968	45	190	240	810	780	300	90
1969	60	215	300	840	1048	360	100
1970	70	236	330	870	1296	430	135
1971	72	240	403	880	1300	650	140
1972	80	250	436	880	1400	760	150
1973	80	245	445	880	1300	650	140
1974	85	250	490	870	1400	640	140
1975	80	260	485	865	1300	460	150
1976	85	280	460	900	1450	470	155
1977	85	300	465	920	1400	480	160
1978	80	280	455	900	1300	470	155
1979	90	300	563	950	1650	500	150
1980	100	350	600	1220	1950	1600	180
1981	120	245	660	1215	1890	515	160
1982	100	200	660	865	1700	485	150
1983	110	225	670	865	1650	520	150
1984	120	220	630	820	1600	500	160
1985	110	220	580	770	1550	520	170
1986	100	220	540	700	1500	510	160
1987	115	220	510	625	1450	527	200
1988	110	210	546	600	1400	520	210
1989	100	220	580	600	1600	520	215
1990	100	240	625	605	1700	530	220

**Table 5.** Fertilizer phosphorus usage (tP) in basins 116-122 (continued over)

	Herbert 116	Black 117	Ross 118	Haughton 119	Burdekin 120	Don 121	Proserpine 122
1910	-	-	-	-	-	-	-
1915	-	-	-	-	-	-	-
1920	10	-	-	-	-	-	-
1925	20	-	-	10	-	-	-
1930	44	-	-	30	10	-	10
1935	78	-	-	55	10	-	20
1940	136	-	-	100	20	10	35
1945	150	-	-	120	35	30	50
1950	200	-	-	160	50	55	70
1955	265	-	-	175	53	61	107
1960	350	-	-	200	56	60	130
1961	446	-	-	245	72	79	145
1962	424	-	-	284	83	92	170
1963	680	-	-	307	87	113	240
1964	705	-	-	348	100	127	300
1965	710	-	-	387	111	155	285
1966	700	-	-	317	86	113	258
1967	720	-	-	370	105	148	235
1968	720	-	-	350	101	127	220
1969	720	-	-	304	86	108	267
1970	720	-	-	339	92	123	290
1971	565	-	-	236	65	96	196
1972	646	-	-	256	72	127	308
1973	600	-	-	333	80	164	290
1974	525	-	-	271	73	134	282
1975	600	-	-	254	73	141	290
1976	700	-	-	266	73	129	330
1977	750	-	-	303	83	166	320
1978	700	-	-	259	76	197	229
1979	720	-	-	341	101	212	240
1980	1000	-	-	484	147	233	360
1981	950	-	-	532	164	266	377
1982	970	-	-	679	217	271	350
1983	950	-	-	485	157	264	360
1984	1020	-	-	450	146	269	267
1985	980	-	-	432	136	231	205
1986	1000	-	-	404	136	206	270
1987	1070	-	-	342	143	246	307
1988	1100	-	-	434	181	245	300
1989	1200	-	-	529	221	327	330
1990	1330	-	-	613	256	380	459



**Table 5.** Fertilizer phosphorus usage (tP) in basins 124-130 (continued over)

	O'Connell 124	Pioneer 125	Plane 126	Styx 127	Shoalwater 128	Waterpark 129	Fitzroy 130
1910	-	-	-	-	-	-	-
1915	-	-	-	-	-	-	-
1920	-	5	10	-	-	-	-
1925	-	10	20	-	-	-	-
1930	10	17	30	-	-	-	-
1935	20	35	60	-	-	-	-
1940	50	70	120	-	-	1	-
1945	70	100	160	-	-	5	-
1950	100	125	215	-	-	10	1
1955	148	180	315	-	-	19	7
1960	180	220	370	-	-	33	20
1961	208	253	426	-	-	36	9
1962	250	305	511	-	-	37	7
1963	366	445	749	-	-	41	14
1964	459	557	936	-	1	42	35
1965	435	527	888	3	5	43	69
1966	397	482	811	17	20	46	79
1967	365	444	746	35	40	42	100
1968	343	417	700	50	60	38	73
1969	410	496	837	45	50	38	98
1970	484	576	953	45	45	40	102
1971	449	533	882	50	40	45	81
1972	447	530	878	55	50	40	80
1973	446	530	877	60	80	38	90
1974	492	584	965	35	45	36	67
1975	512	609	1007	7	8	38	73
1976	546	648	1071	8	10	40	120
1977	524	622	1028	8	13	35	126
1978	477	566	936	15	35	37	127
1979	500	593	982	10	38	40	163
1980	576	684	1130	8	44	44	194
1981	609	732	1125	5	50	40	241
1982	578	695	1046	6	40	50	254
1983	593	713	1094	-	35	60	286
1984	524	632	965	5	30	77	311
1985	443	533	819	4	30	75	361
1986	428	518	789	3	28	70	288
1987	433	524	798	2	25	75	388
1988	458	550	846	2	22	70	389
1989	494	594	912	3	25	72	658
1990	539	648	995	3	27	73	786

**Table 5.** Fertilizer phosphorus usage (tP) in basins 132-138

	Calliope 132	Boyne 133	Baffle 134	Kolan 135	Burnett 136	Burrum 137	Mary 138
1910	-	-	-	-	-	-	-
1915	-	-	-	-	-	-	-
1920	-	-	-	-	10	-	5
1925	-	-	-	-	25	5	10
1930	-	-	-	-	45	10	15
1935	-	-	-	5	100	20	30
1940	-	-	-	10	150	30	45
1945	-	-	5	10	150	30	40
1950	-	-	10	35	200	80	100
1955	-	-	14	66	420	140	197
1960	1	-	18	80	448	160	220
1961	1	-	21	103	640	152	240
1962	1	1	22	110	690	160	260
1963	2	2	24	140	917	200	300
1964	2	2	26	150	924	230	330
1965	3	3	28	169	958	294	405
1966	28	3	30	203	1150	321	562
1967	56	4	33	210	1220	400	720
1968	100	5	37	215	1215	410	860
1969	95	5	40	220	1150	428	905
1970	90	6	46	232	1250	660	1101
1971	90	7	62	250	1282	690	1243
1972	100	7	69	280	1410	730	1350
1973	110	7	155	290	1467	740	1340
1974	131	8	95	300	1512	720	1300
1975	32	3	100	366	1636	680	738
1976	40	2	41	380	1718	710	1050
1977	26	2	46	370	1500	660	950
1978	30	2	99	350	1267	650	1020
1979	30	2	91	360	1212	660	1100
1980	28	2	62	378	1206	684	1260
1981	17	2	55	390	1426	730	1180
1982	18	2	49	360	1255	750	1150
1983	17	2	50	340	1070	650	1260
1984	17	2	64	330	1100	678	1210
1985	20	2	66	330	1007	610	1270
1986	15	2	66	300	980	580	1010
1987	14	2	102	350	1200	660	1100
1988	20	2	108	345	1100	582	950
1989	20	2	106	350	1160	600	1000
1990	20	2	105	360	1160	650	1050

Table 6 shows phosphorus usage, in groups of basins, at five-year intervals from 1910 to 1990.

Table 7 shows phosphorus usage in 1990, for each of the basins, by major crop groupings.

In the area under investigation, the phosphorus content of fertilizers applied to all crops and pastures, together with phosphorus in stock feed supplements, approached 13 500 tonnes of phosphorus in 1990. This was about the same quantity as had been applied, cumulatively, in the period to 1940.

**Table 6.** Fertilizer phosphorus usage (tP), at five-year intervals, from 1910 to 1990 in groups of basins

	Daintree-Murray	Herbert-Don	Proserpine-Plane	Styx-Boyne	Baffle-Mary	Total
1910	0	0	0	0	0	0
1915	0	0	0	0	0	0
1920	20	10	15	0	15	60
1925	80	30	30	0	40	180
1930	185	84	57	0	70	396
1935	308	143	135	0	155	741
1940	500	266	270	1	235	1272
1945	620	335	380	5	235	1575
1950	800	465	510	11	425	2211
1955	835	554	750	26	837	3002
1960	995	666	900	54	926	3541
1965	2256	1363	2135	126	1854	7734
1970	3367	1274	2303	328	3289	10561
1975	3600	1068	2418	161	3520	10767
1980	6000	1864	2750	320	3590	14524
1985	3920	1779	2000	492	3283	11474
1990	4020	2579	2641	911	3325	13476

**Table 7.** Fertilizer phosphorus usage (tP) in some eastern Queensland basins in 1990

Basin	No.	Sugarcane	Fruit	Vegetables	Field Crops	Pastures	Total
Daintree	108	85	0	0	0	15	100
Mossman	109	230	2	1	0	7	240
Barron	110	6	14	254	236	115	625
Mulgrave-Russell	111	597	3	0	0	5	605
Johnstone	112	895	141	20	4	640	1700
Tully	113	409	96	5	0	20	530
Murray	114	130	75	10	0	5	220
Herbert	116	1025	6	29	30	240	1330
Black	117	0	0	0	0	0	0
Ross	118	0	0	0	0	0	0
Haughton	119	300	40	116	33	124	613
Burdekin	120	112	10	64	40	30	256
Don	121	41	8	296	0	35	380
Proserpine	122	376	0	0	0	83	459
O'Connell	124	475	0	0	1	63	539
Pioneer	125	421	0	0	1	226	648
Plane	126	937	0	0	2	56	995
Styx	127	0	0	0	0	3	3
Shoalwater	128	0	0	0	0	27	27
Waterpark	129	0	70	1	0	2	73
Fitzroy	130	0	3	3	665	115	786
Calliope	132	0	8	0	2	10	20
Boyne	133	0	0	0	1	1	2
Baffle	134	85	2	1	2	15	105
Kolan	135	320	8	20	0	12	360
Burnett	136	240	85	110	600	125	1160
Burrum	137	580	1	25	4	40	650
Mary	138	175	80	65	180	550	1050
Total		7439	652	1020	1801	2564	13476

Phosphorus usage increased substantially between 1963 and 1980, largely due to the expansion of sugarcane production and to a lesser extent, to pasture improvement. In more recent years there has been a reduction in usage on sugarcane in those areas where ratoon cane is not fertilized with the nutrient on an annual basis.

The 1990 usage of phosphorus in decreasing order, for the eight major phosphorus-using basins (accounting for 62% of the total), was as follows:

	tonnes (t)	
Johnston	1700	(1950 t in 1980)
Herbert	1330	(1000 t in 1980)
Burnett	1160	(1718 t in 1976)
Mary	1050	(1350 t in 1972)
Plane	995	(1130 t in 1980)
Fitzroy	786	(has increased since 1990)
Burrum	650	( 750 t in 1982)
Pioneer	648	( 732 t in 1981)

(Other basins are included in table 8).

**Table 8.** Fertilizer nitrogen and phosphorus usage in 1990

Nitrogen	tN	Phosphorus	tP
Herbert	9800	Johnstone	1700
Haughton	8805	Herbert	1330
Plane	7685	Burnett	1160
Johnstone	7300	Mary	1050
Fitzroy	7290	Plane	995
Pioneer	5490	Fitzroy	786
Mulgrave-Russell	4720	Burrum	650
Burnett	4545	Pioneer	648
O'Connell	4390	Barron	625
Burdekin	3180	Haughton	613
Proserpine	3040	Mulgrave-Russell	605
Burrum	2970	O'Connell	539
Mary	2800	Tully	530
Tully	2660	Proserpine	459
Kolan	1690	Don	380
Barron	1680	Kolan	360
Don	1445	Burdekin	256
Murray	1290	Mossman	240
Mossman	820	Murray	220
Waterpark	475	Baffle	105
Baffle	405	Daintree	100
Daintree	340	Waterpark	73
Calliope	62	Shoalwater	27
Ross	21	Calliope	20
Boyne	7	Styx	3
Black	5	Boyne	2
Styx	0	Black	0
Shoalwater	0	Ross	0

As indicated above, there has been a reduction in the use of phosphorus since the peak of 14 524 tonnes in 1980. It will be noted that, of the top eight nitrogen and phosphorus usage basins, five (Johnstone, Herbert, Pioneer, Plane and Fitzroy) have both high nitrogen and phosphorus consumption.

Sugarcane accounted for 55% of the total 1990 phosphorus usage, pastures 19%, field crops nearly 14%, and all fruit and vegetable crops over 12%.

### 3.3 1990 Nitrogen and Phosphorus Usage Relative to Basin Areas

The intensity of nutrient usage varies considerably between basins. While rates of nitrogen and phosphorus on the major crop, sugarcane, are not very different from area to area, the proportion of the basin occupied by sugarcane varies.

As a consequence, average nitrogen rates in 1990 varied from about 37 kg/ha of basin area in Pioneer to less than 1 kg/ha over a considerable area of central coastal Queensland (tables 9 and 10). Average phosphorus rates were highest in Johnstone (over 7 kg P/ha of basin area) but less than 1 kg/ha in 12 of the basins (occupying 86% of the total basin area of 38 million hectares).

**Table 9.** Basin areas, total nitrogen and phosphorus usage and average rates applied in 1990

Basin	No.	Area (000 ha)	Total Usage		Average Rates	
			tN	tP	kg N/ha	kg P/ha
Daintree	108	212.50	340	100	1.60	0.47
Mossman	109	49.00	820	240	16.73	4.90
Barron	110	217.50	1680	625	7.72	2.87
Mulgrave-Russell	111	202.00	4720	605	23.37	3.00
Johnstone	112	233.00	7300	1700	31.33	7.30
Tully	113	168.50	2660	530	15.79	3.15
Murray	114	114.00	1290	220	11.32	1.93
Herbert	116	1013.10	9800	1330	9.67	1.31
Black	117	107.50	5	0	0.05	0.00
Ross	118	181.50	21	0	0.11	0.00
Haughton	119	365.00	8805	613	24.12	1.68
Burdekin	120	12986.00	3180	256	0.24	0.02
Don	121	388.50	1445	380	3.72	0.98
Proserpine	122	248.50	3040	459	12.23	1.85
O'Connell	124	243.50	4390	539	18.03	2.21
Pioneer	125	149.00	5490	648	36.85	4.35
Plane	126	267.00	7685	995	28.78	3.73
Styx	127	305.50	0	3	0.00	0.01
Shoalwater	128	370.50	0	27	0.00	0.07
Waterpark	129	184.00	475	73	2.58	0.40
Fitzroy	130	14264.50	7290	786	0.51	0.06
Calliope	132	225.50	62	20	0.27	0.09
Boyne	133	254.00	7	2	0.03	0.01
Baffle	134	386.00	405	105	1.05	0.27
Kolan	135	298.00	1690	360	5.67	1.21
Burnett	136	3315.00	4545	1160	1.37	0.35
Burrum	137	334.00	2970	650	8.89	1.95
Mary	138	959.50	2800	1050	2.92	1.09
Total		38042.60	82915	13476	2.18	0.35

**Table 10.** Average nitrogen and phosphorus rates applied in some eastern Queensland basins in 1990

	kg N/ha		kg P/ha
Pioneer	36.85	Johnstone	7.30
Johnstone	31.33	Mossman	4.90
Plane	28.78	Pioneer	4.40
Haughton	24.12	Plane	3.70
Mulgrave-Russell	23.37	Tully	3.15
O'Connell	18.03	Mulgrave-Russell	3.00
Mossman	16.73	Barron	2.87
Tully	15.79	O'Connell	2.21
Proserpine	12.23	Burrum	1.95
Murray	11.32	Murray	1.93
Herbert	9.67	Proserpine	1.85
Burrum	8.89	Haughton	1.68
Barron	7.72	Herbert	1.31
Kolan	5.67	Kolan	1.21
Don	3.72	Mary	1.09
Mary	2.92	Don	0.98
Waterpark	2.58	Daintree	0.47
Daintree	1.60	Waterpark	0.40
Burnett	1.37	Burnett	0.35
Baffle	1.05	Baffle	0.27
Fitzroy	0.05	Calliope	0.09
Calliope	0.27	Shoalwater	0.07
Burdekin	0.24	Fitzroy	0.06
Ross	0.11	Burdekin	0.02
Black	0.05	Styx	0.01
Boyne	0.03	Boyne	0.01
Styx	0.00	Black	0.00
Shoalwater	0.00	Ross	0.00

### 3.4 1990 Nitrogen and Phosphorus Usage Relative to Basin Run-off

There are large differences in the ratio of 1990 nutrient nitrogen and phosphorus usage to the average run-off volume for the different basins (tables 11 and 12).

The Haughton Basin, with high nitrogen use and low average run-off, has the highest nitrogen run-off ratio of 11.6 kg N/1000 ML. The Herbert Basin, with the highest total nitrogen use in 1990, has a ratio of less than two.

The Johnstone River Basin, with the highest phosphorus usage, and highest average phosphorus rate over the total basin area, has a lower ratio of phosphorus applied to run-off volume than the Burrum and eight other basins. The ratio of phosphorus application in 1990 to average run-off was 0.9 kg P/1000 ML for Burrum, to less than 0.01 for Boyne, Styx, Black and Ross, with an overall average of 0.23.

The significance of these ratios is not known. The actual sites of fertilizer use are not necessarily the origins of the run-off from the various river basins. Nevertheless the ordering of the basins might provide a relative measure of the potential importance of each basin in contributing to nutrient contents of rivers adjacent to the Great Barrier Reef.

**Table 11.** Nitrogen and phosphorus application in 1990 relative to mean annual run-off volume

	No.	Run-off (000 ML)	tN	tP	Ratio of Nutrient Use to Run-off Volume	
					kg N/1000 ML	kg P/1000 ML
Daintree	108	3560	340	100	0.096	0.028
Mossman	109	687	820	240	1.194	0.349
Barron	110	1153	1680	625	1.457	0.542
Mulgrave-						
Russell	111	4193	4720	605	1.126	0.144
Johnstone	112	4698	7300	1700	1.554	0.362
Tully	113	3683	2660	530	0.722	0.144
Murray	114	1628	1290	220	0.792	0.135
Herbert	116	4991	9800	1330	1.964	0.266
Black	117	509	5	0	0.010	0.000
Ross	118	372	21	0	0.056	0.000
Haughton	119	756	8805	613	11.647	0.811
Burdekin	120	10100	3180	256	0.308	0.025
Don	121	689	1445	380	2.097	0.552
Proserpine	122	1431	3040	459	2.124	0.321
O'Connell	124	1668	4390	539	2.632	0.323
Pioneer	125	994	5490	648	5.523	0.652
Plane	126	1370	7685	995	5.609	0.726
Styx	127	825	0	3	0.000	0.004
Shoalwater	128	832	0	27	0.000	0.032
Waterpark	129	700	475	73	0.679	0.104
Fitzroy	130	7127	7290	786	1.023	0.110
Calliope	132	340	62	20	0.182	0.059
Boyne	133	401	7	2	0.017	0.005
Baffle	134	750	405	105	0.540	0.140
Kolan	135	464	1690	360	3.642	0.776
Burnett	136	1743	4545	1160	2.608	0.666
Burrum	137	718	2970	650	4.136	0.905
Mary	138	2309	2800	1050	1.213	0.455
Total		58691	82915	13476	1.413	0.230

**Table 12.** Ratios of nitrogen and phosphorus usage in 1990 to mean annual run-off volume

kg N/1000 ML		kg P/1000 ML	
Haughton	11.65	Burrum	0.91
Plane	5.61	Haughton	0.81
Pioneer	5.52	Kolan	0.78
Burrum	4.14	Plane	0.73
Kolan	3.64	Burnett	0.67
O'Connell	2.63	Pioneer	0.65
Burnett	2.61	Don	0.55
Proserpine	2.12	Barron	0.54
Don	2.10	Mary	0.46
Herbert	1.96	Johnstone	0.36
Johnstone	1.55	Mossman	0.35
Barron	1.46	Proserpine	0.32
Mary	1.21	O'Connell	0.32
Mossman	1.19	Herbert	0.27
Mulgrave-Russell	1.13	Mulgrave-Russell	0.14
Fitzroy	1.02	Baffle	0.14
Murray	0.79	Tully	0.14
Tully	0.72	Murray	0.14
Waterpark	0.68	Fitzroy	0.11
Baffle	0.54	Waterpark	0.10
Burdekin	0.31	Calliope	0.06
Calliope	0.18	Shoalwater	0.03
Daintree	0.10	Daintree	0.03
Ross	0.06	Burdekin	0.03
Boyne	0.02	Boyne	0.01
Black	0.01	Styx	0.00
Shoalwater	0.00	Black	0.00
Styx	0.00	Ross	0.00
Average	1.41		0.23