ADDENDUM TO INTERNAL REPORT 165:

MATHEMATICAL DOCUMENTATION FOR A LOTIC ECOSYSTEM MODEL

Coniferous Forest Biome
U.S. / International Biological Program

by

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INTRODUCTION

The mathematical documentation for a lotic ecosystem model was completed in August 1978, and made available through the Coniferous Forest Biome Central Office in Internal Report 165. Since the completion of this report, we have found several errors in the FLEXFORM and have found it desirable to include examples of the model output for a standard run. This addendum corrects the mistakes in the FLEXFORM and provides output for Version I of the Standard Run, the version that corresponds to the input tables and parameters listed on pages 41 - 46 and pages 48 - 52 of the Internal Report 165. Moreover, an example of an annual summary table of system dynamics is included to illustrate the interpretive value of such information. Output also is plotted in two forms: (1) state variable dynamics, and (2) trajectories of the specific growth rates defined on pages 5 - 8 of the documentation.

ERRORS AND OTHER DEFICIENCIES

1. The definition of z_{17} is incorrect in the original documentation. This has been corrected from $\frac{2k}{360}$ to $\frac{2\pi k}{360}$. Also, z_1 and z_{17} were actually programmed as follows:

   $$z_1 = b_4 + b_5 \sin (0.01745k - 1.5708)$$
   $$z_{17} = b_{43} + b_{44} \sin (0.01745k - 1.5708)$$

   While the definition given in the documentation is theoretically correct, the second definition is included so that the verification of model behavior, with regard to computer implementation, will be computationally consistent.

2. The expression for g_{48} is correct, but the definition of terms in the expression should read "g_{27} is the consumption of invertebrate predator biomass - - - -", <u>not</u> "g_{26} is - - -".

3. In the original documentation, the values for b_{64} and b_{84} were reversed (see expression for g_{59} on page 26 and parameters on pages 44 and 45). The correct values are $b_{64} = 3$ and $b_{84} = 15$. This is a serious error that can affect output significantly.

4. The FLEX algorithm requires that $j<i$ when any G function g_i is a function of another G function g_j. Although FLEX 2 has the capability of searching for the correct order, we specify the correct index order

for computational purpose as follows: 1, 2, 3, 5, 6, 7, 9, 10, 11, 14, 15, 19, 21, 22, 23, 24, 26, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 51, 52, 53, 54, 55, 56, 59, 61, 62, 63, 64, 65, 66, 20, 27, 30, 48, 57, 58, 60, 25, 28, 13, 4, 8, 12. Only G functions have this numbering problem.

5. On page 32 of the documentation, it is stated that for y_2 and y_{15} to y_{41} values for x_i are values used to calculate the G and F function values over the preceding time step -- not the current, updated state variable values. To avoid confusion, the following functions have been added:

$$g_{61} = x_2$$
$$g_{62} = x_3$$
$$g_{63} = x_4$$
$$g_{64} = x_5$$
$$g_{65} = x_6$$
$$g_{66} = x_7$$

These functions are calculated in the order specified in (4) above and should be substituted for their respective x's in the y_1 and y_{15} to y_{41} function definitions (pages 32 - 40).

6. y_{15} is specified incorrectly on page 32 of the original documentation. It was

$$y_{15} = (b_{92}\, g_{51} - g_1)x_2$$

and has been changed to

$$y_{15} = (b_{92}\, g_{51} - g_1)\, /x_2$$

[With the changes suggested in (5) above the expression for y_{15} would then be $y_{15} = (b_{92}\ g_{51} - g_1)\ /g_{61}$]

7. On page 31 of the original documentation, it is not specified what information is passed by $f_{14,14}$ to the Y functions. This information consisted of the then current x_i values for use with Y functions in generating plot variables. The changes recommended in (5) above alleviate the need for the statements at the bottom of page 31.

OUTPUT FOR STANDARD RUN

State Variable Values and Related Information

Typical output includes: (1) an introductory page listing run conditions, initial state variable values, and B parameters; (2) a list of state variable values for the desired time period, three years in the case presented here; (3) summary tables, indicating annual dynamics of selected variables of interest for each year; and (4) a list of the driving data for the case under consideration. The Y headings at the top of each page are state variables associated with grazing: Y(2,1); shredding: Y(3,1); collecting: Y(4,1); vertebrate predation: Y(5,1); invertebrate predation: Y(6,1); periphyton: Y(7,1); FPOM: Y(8,1); CSLPOM: Y(9,1); CSLPOM + CFLPOM: Y(13,1); and SLPOM + FLPOM: Y(14,1). The acronyms correspond to definitions on page 1 of the FLEXFORM. The summary tables present the annual mean, maximum, and minimum state variable values for grazing, shredding, collecting, invertebrate predation, vertebrate predation, periphyton, FPOM, CSLPOM, CFLPOM, SLPOM, and FLPOM. Furthermore, other biological variables of interest also are included (e.g. annual process production, assimilation, respiration, export, and losses to predation as well as a total input - output energy budget). The list of driving data corresponds to the input tables listed in the appendix of the documentation (pages 48 - 52).

E: 79/06/29. TIME: 23.15.46. LOTIC ECOSYSTEM MODEL STANDARD RUN
SINGLE MODULE MODEL

MONITOR PRINT INTERVAL	1	MONITOR LUN	0
LINE PRINT PRINT INTERVAL	5	LINE PRINT LUN	6
DOCUMENT PRINT INTERVAL	5	DOCUMENT LUN	7

	MODULO	INITIAL VALUE
K	360	0
KP	1	0
KPP	1	1

NUMBER OF X STATES 70
NUMBER OF Y OUTPUTS 205
NUMBER OF Z INPUTS 85

NUMBER OF DEFINED B PARAMETERS 114
NUMBER OF DEFINED F FUNCTIONS 70
NUMBER OF DEFINED G FUNCTIONS 330
NUMBER OF DEFINED H FUNCTIONS 0

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INITIAL X:	0.	1.816	1.400	2.177	3.509	.2600	.9240	10.40	122.0	24.00
	31.00	1.000	17.00	.6600	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
B PARAMETERS:	0.	.1390E-01	.5700E-01	12.00	6.000	.1140	.5810	.1970E-03	-9+.40	9420.
	1080.	.4480E-01	.8830E-01	10.20	.2950E-02	1.070	.6330	1.100	160.0	1.500
	4.000	.8000	1.000	4.000	.5000	0.	0.	3.500	3.500	0.
	.9350E-01	.4650	.8950	.5600	1.900	1.510	.2940	2.030	.1280E-03	.1280E-03
	.1380E-02	.1330E-02	12.00	4.000	.1370	.2330E-02	.1740E-01	0.	0.	.3000
	.8600	.1000E+00	.1870E-02	.2500E-02	.2600E-01	.1880E-01	.4200	.8200	.5000E-01	100.0
	0.	0.	0.	3.000	.1000E-01	.2800E-01	.5830	.1000E-02	.5000	.1920E-01
	.2100E-02	.7000	0.	.7400E-02	.1080E-02	.1000E+00	.4000	258.0	2.950	.1870
	.1460E-01	.2960E-01	.1460E-01	15.00	.8000	12.00	.3500	.7000	.2370	1000.
	2400.	.5500	.1800	.2100	0.	.3000	.3000	.3000	.1670	1.000
	.4460E-02	.4460E-02	.4460E-02	-1.000	.1440E-03	0.	.5850E-01	.9110E-03	.1990E-03	.5850E-01
	-1.000	-1.000	-1.000	-1.000						

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
MASTER TIME VECTOR: 0										
0	1.8160	1.4000	2.1770	3.5090	.2000	.9240	10.4000	122.0000	146.0000	32.0000
5	1.7934	1.4939	2.3237	3.5071	.2862	.8510	10.7973	122.6444	146.3460	28.6285
10	1.7291	1.5908	2.4742	3.5146	.3150	.8284	11.0747	122.0857	145.3842	25.9953
15	1.6449	1.6909	2.6265	3.5312	.3479	.8308	10.2850	119.5937	142.2967	23.7758
20	1.2729	1.7951	2.7746	3.5516	.3825	.5390	9.2443	114.4077	135.8984	21.7888
25	1.0498	1.9045	2.9196	3.5734	.4188	.7122	8.0857	109.8247	130.3784	20.5237
30	.9693	2.0183	3.0605	3.5946	.4576	.9436	9.0202	105.5289	125.2652	19.7561
35	1.0305	2.1361	3.1975	3.6308	.5000	1.0528	10.0495	100.8116	119.7113	19.1942
40	1.1723	2.2584	3.3301	3.6809	.5461	1.2796	11.5895	96.0727	114.1756	18.8850
45	1.4273	2.3874	3.4609	3.7443	.5947	1.5663	13.4081	91.0865	108.3821	18.7930
50	1.8274	2.5175	3.5871	3.8305	.6459	1.8097	15.3739	85.7370	102.1800	18.8427
55	2.4026	2.6375	3.7019	3.9557	.6999	1.7266	17.1724	79.9191	95.4152	18.9607
60	2.9979	2.7456	3.8048	4.1213	.7570	1.0328	18.9953	73.7856	88.2457	19.1591
65	2.8135	2.8084	3.8841	4.3431	.8172	.9704	19.4235	67.2168	80.5214	19.3563
70	2.4687	2.7758	3.9211	4.6402	.8801	.7765	17.2731	59.9349	71.9045	19.3193
75	1.9998	2.6412	3.8980	4.9696	.9443	.9497	15.7065	52.8823	63.5191	19.1323
80	2.0301	2.4741	3.8018	5.3191	1.0094	1.0094	16.7802	47.1218	56.6441	18.8950
85	2.0857	2.3624	3.6170	5.6900	1.0748	1.0229	17.4731	41.8952	50.3723	18.7537
90	2.1180	2.2961	3.3539	6.0588	1.1397	1.0318	17.9909	36.9920	44.4827	18.5023
95	2.1043	2.2484	3.0287	6.4246	1.2044	1.0220	18.5115	32.2739	38.8386	18.2743
100	2.0118	2.1843	2.6594	6.8023	1.2696	1.0030	19.0564	27.7464	33.4333	18.1231
105	1.8613	2.1605	2.2671	7.1722	1.3342	.9796	19.6133	23.4560	28.3407	18.0414
110	1.6609	1.9955	1.9158	7.4906	1.3911	.9430	20.1889	19.4978	23.6527	17.9200

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
115	1.4039	1.3710	1.6579	7.7164	1.4390	.8368	20.7586	15.9720	19.4565	17.6592
120	1.0905	1.7452	1.4804	7.8409	1.4662	.8040	21.4321	12.9164	15.7830	17.2673
125	.7897	1.6417	1.3663	7.8593	1.4501	.7832	22.0912	10.2507	12.5473	16.8624
130	.6296	1.5593	1.2827	7.7997	1.4047	.7349	22.1160	7.8515	9.6182	16.4580
135	.5481	1.4914	1.2211	7.6922	1.3442	.8157	21.9655	5.6445	6.9172	16.1081
140	.5105	1.4331	1.1737	7.5570	1.2770	.8273	21.6445	3.5773	4.3865	16.0614
145	.4899	1.3616	1.1344	7.4074	1.2074	.8301	21.2109	1.5866	1.9774	16.7214
150	.4750	1.2195	1.1019	7.2470	1.1367	.8275	19.3855	.4611	.6050	18.1290
155	.4623	1.0074	1.0800	7.0704	1.0558	.8265	17.9387	.4658	.6242	20.1956
160	.4542	.9010	1.0656	6.8857	.9712	.8274	16.4075	.5914	.7915	22.5564
165	.4491	.8504	1.0547	6.6986	.8398	.8267	15.1711	.9642	1.2541	24.7472
170	.4442	.8351	1.0444	6.5134	.8157	.8249	14.2769	1.5487	1.9546	26.7212
175	.4382	.8199	1.0347	6.3332	.7486	.8231	13.5352	2.4562	3.0267	28.4937
180	.4312	.8023	1.0256	6.1582	.6877	.8217	12.8965	3.6924	4.4642	29.9497
185	.4221	.7834	1.0174	5.9885	.6320	.8152	12.3339	5.2829	6.2812	30.7513
190	.4044	.7643	1.0102	5.8243	.5807	.8061	11.8238	7.2128	8.4415	30.7403
195	.3792	.7456	1.0043	5.6653	.5335	.7997	11.3544	9.3690	10.6107	30.0486
200	.3505	.7277	.9997	5.5117	.4898	.7947	10.9201	11.6041	13.2316	28.8517
205	.3199	.7116	.9967	5.3632	.4495	.7900	10.5133	13.7879	15.5875	27.2936
210	.2884	.6973	.9956	5.2200	.4122	.7847	10.1497	15.8253	17.7188	25.4538
215	.2599	.6837	.9963	5.0833	.3778	.8009	9.8152	17.6538	19.6211	23.3866
220	.2539	.6690	.9993	4.9548	.3462	.8431	9.5264	19.2136	21.2143	21.3933
225	.2735	.6535	1.0043	4.8342	.3173	.8397	9.2318	20.4132	22.4484	19.3122
230	.3165	.6300	1.0090	4.7233	.2904	.9254	9.0738	21.2597	23.3861	18.9873

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
235	.3782	.5891	1.0063	4.6531	.2052	.9359	8.8632	21.8875	24.1788	18.5787
240	.4480	.5342	.9969	4.5992	.2415	.9179	8.6035	22.4094	24.9399	19.1349
245	.5074	.4801	.9810	4.5555	.2194	.8723	8.2834	22.3149	25.6826	21.3631
250	.5284	.4413	.9590	4.5099	.1966	.8287	7.8594	23.2289	26.4715	25.1485
255	.5173	.4148	.9311	4.4043	.1791	.8131	7.4399	23.9104	27.6145	30.0974
260	.4962	.3981	.9087	4.4121	.1607	.8088	7.0492	25.1462	29.3410	35.5745
265	.4723	.3894	.9071	4.3441	.1433	.8047	6.7280	27.2659	31.9582	40.4637
270	.4462	.3879	.9263	4.2622	.1270	.8013	6.4609	30.4940	35.7090	43.9264
275	.4306	.3934	.9601	4.1725	.1124	.8628	6.2321	34.7017	40.4800	46.0570
280	.4767	.4093	.9985	4.0831	.1001	1.0198	6.0083	39.5713	45.9504	47.1080
285	.5966	.4256	1.0418	3.9946	.0899	1.2093	5.9387	44.9289	51.8467	47.4909
290	.7951	.4534	1.0908	3.9076	.0814	1.3339	5.9633	50.1617	57.8591	48.0248
295	1.0785	.4903	1.1458	3.8223	.0749	1.4099	6.1549	55.2836	63.8219	49.6634
300	1.4143	.5375	1.2065	3.7395	.0711	1.1701	6.3329	60.0583	69.7171	52.3153
305	1.5860	.5935	1.2744	3.6611	.0697	.8397	6.1739	64.4446	75.4926	55.6702
310	1.5380	.6549	1.3543	3.5853	.0691	.8324	6.4770	69.2180	82.0199	60.0041
315	1.5104	.7221	1.4491	3.5106	.0691	.8471	6.6799	74.1715	89.0106	64.4113
320	1.3667	.7951	1.5559	3.4378	.0694	.8442	5.9058	78.6399	95.5509	66.7965
325	1.3657	.8738	1.6723	3.3697	.0704	.8935	6.1107	84.4378	103.5154	66.9495
330	1.3727	.9573	1.8000	3.3091	.0724	.7745	5.7339	90.0453	110.7487	63.9933
335	1.1988	1.0474	1.9360	3.2537	.0752	.7728	5.2177	95.1864	116.9361	58.9792
340	1.1447	1.1427	2.0832	3.2023	.0786	.9003	5.6329	100.7691	123.3342	53.2457
345	1.1995	1.2426	2.2436	3.1599	.0835	.9863	6.3097	105.8894	128.9109	46.8894
350	1.2822	1.3462	2.4154	3.1304	.0906	1.0008	7.0870	110.0192	133.1559	40.7954

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
355	1.3699	1.4531	2.5995	3.1160	.0994	.9584	8.8087	113.8085	137.0625	35.9677
MASTER TIME VECTOR: 360										
0	1.4265	1.5636	2.7963	3.1175	.1095	.9206	10.4366	116.2576	139.5910	31.9952
5	1.4714	1.6764	3.0038	3.1338	.1212	.9452	11.0063	116.6224	139.7204	28.5431
10	1.5284	1.7985	3.2204	3.1643	.1348	.9083	11.4562	115.7683	138.3893	25.9388
15	1.5393	1.9255	3.4461	3.2068	.1501	.8596	10.7317	112.9932	134.8809	23.7408
20	1.2032	2.0612	3.6742	3.2556	.1669	.8148	8.7588	107.5873	128.2369	21.7680
25	1.0195	2.2064	3.9054	3.3067	.1854	.7182	8.7102	102.6474	122.2598	20.5113
30	.9552	2.3625	4.1419	3.3635	.2058	.9494	9.8231	97.8614	116.5341	19.7486
35	1.0307	2.5317	4.3879	3.4276	.2281	1.0611	11.0511	92.5521	110.2468	19.1897
40	1.1905	2.7165	4.6450	3.4984	.2526	1.2831	12.8735	87.0630	103.7900	18.8823
45	1.4705	2.9197	4.9158	3.5742	.2793	1.5433	15.0519	81.1544	96.8687	18.7914
50	1.9024	3.1339	5.1940	3.6681	.3084	1.7051	17.4499	74.6914	89.3078	18.8417
55	2.5004	3.3431	5.4838	3.8044	.3394	1.6447	19.6956	67.5671	80.9498	18.9601
60	2.8204	3.5413	5.7240	3.9839	.3722	.9904	21.7832	59.9112	71.9206	19.1587
65	2.7081	3.6655	5.9529	4.2452	.4071	.9703	22.6935	51.6531	62.1295	19.3561
70	2.4418	3.7145	6.1366	4.5507	.4442	.7765	20.6069	42.6932	51.4498	19.3192
75	2.0261	3.6177	6.2357	4.8764	.4835	.9497	19.1827	33.8842	40.9015	19.1322
80	2.0947	3.4806	6.2813	5.2236	.5250	1.0094	20.8401	26.0850	31.5243	18.9950
85	2.1823	3.4222	6.1722	5.5934	.5663	1.0229	22.0645	18.7231	22.6348	18.7537
90	2.2434	3.4348	5.9315	5.9872	.6134	1.0318	23.1438	11.5253	13.9392	18.5023
95	2.2535	3.4841	5.5705	6.4063	.6604	1.0220	24.3525	4.2977	5.2161	18.2743
100	2.1763	2.9385	5.1032	6.8520	.7099	1.0030	22.2534	.5809	.7183	18.1231
105	2.0285	2.1191	4.5230	7.3240	.7535	.9796	17.9462	.5720	.7146	18.0414

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
110	1.8104	1.6146	3.9362	7.8123	.8073	.9430	15.1607	.5088	.7149	17.9200
115	1.5228	1.3954	3.4708	8.2041	.8536	.8368	13.4467	.5705	.7136	17.6532
120	1.1741	1.1193	3.1193	8.4427	.8961	.8040	12.5303	.5701	.7080	17.2879
125	.8333	.9963	2.8541	8.5233	.9341	.7852	11.8442	.6423	.7931	16.8624
130	.6600	.9106	2.6394	8.5060	.9524	.7887	11.1713	.7877	.9700	16.4580
135	.5637	.8546	2.4704	8.4143	.9513	.8093	10.5754	.9229	1.1348	16.1081
140	.5170	.8160	2.3318	8.2826	.9377	.8229	10.0664	1.0159	1.2496	16.0614
145	.4914	.7853	2.2114	8.1306	.9158	.8281	9.6229	1.0335	1.2960	16.7214
150	.4743	.7603	2.1058	7.9644	.8879	.8271	9.2233	1.0452	1.3590	18.1290
155	.4597	.7406	2.0126	7.7883	.8555	.8273	8.8922	1.1351	1.5128	20.1956
160	.4500	.7232	1.9301	7.6050	.8198	.8292	8.6019	1.4199	1.9019	22.5564
165	.4443	.7068	1.8569	7.4189	.7819	.8291	8.3446	2.0404	2.6768	24.7472
170	.4397	.6906	1.7917	7.2310	.7428	.8274	8.1138	3.0252	3.8603	26.7212
175	.4343	.6732	1.7338	7.0446	.7030	.8254	7.9001	4.3577	5.4286	28.4937
180	.4280	.6550	1.6827	6.8607	.6631	.8236	7.6950	6.0191	7.3521	29.9497
185	.4195	.6368	1.6379	6.6799	.6232	.8168	7.4926	8.0287	9.6394	30.7518
190	.4024	.6193	1.5988	6.5023	.5833	.8072	7.2853	10.3677	12.2507	30.7403
195	.3773	.6028	1.5655	6.3297	.5436	.8005	7.0733	12.9204	15.0490	30.0486
200	.3493	.5878	1.5377	6.1603	.5044	.7953	6.8606	15.5366	17.8755	28.8517
205	.3194	.5746	1.5151	5.9966	.4661	.7903	6.6517	18.0839	20.5932	27.2936
210	.2881	.5632	1.4971	5.8372	.4292	.7849	6.4507	20.4663	23.1027	25.4538
215	.2593	.5525	1.4826	5.6841	.3952	.8010	6.2538	22.6223	25.3415	23.3866
220	.2539	.5408	1.4717	5.5388	.3637	.8432	6.1056	24.4920	27.2499	21.3933
225	.2735	.5256	1.4648	5.4010	.3347	.8697	5.9778	25.9833	28.7784	19.9122

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
230	.3165	.5099	1.4565	5.2797	.3076	.9254	5.8763	27.1003	29.9888	18.9879
235	.3781	.4770	1.4387	5.1866	.2821	.9359	5.7721	27.9663	31.0240	18.5787
240	.4478	.4329	1.4116	5.1177	.2581	.9180	5.6283	28.5835	31.9874	19.1349
245	.5070	.3694	1.3760	5.0621	.2355	.8725	5.4185	29.2362	32.8668	21.3631
250	.5279	.3584	1.3322	5.0094	.2140	.8290	5.1518	29.7571	33.7956	25.1485
255	.5168	.3373	1.2811	4.9603	.1938	.8133	4.8680	30.5162	35.0325	30.0974
260	.4957	.3242	1.2380	4.9043	.1746	.8090	4.6054	31.8100	36.8360	35.5745
265	.4719	.3175	1.2237	4.8281	.1562	.8049	4.3395	33.9776	39.5209	40.4637
270	.4458	.3167	1.2373	4.7343	.1388	.8015	4.2080	37.2503	43.3351	43.9264
275	.4302	.3216	1.2697	4.6311	.1233	.8030	4.0532	41.5038	48.1683	46.0570
280	.4762	.3321	1.3072	4.5293	.1102	1.0203	3.9221	46.4197	53.6993	47.1080
285	.5960	.3487	1.3595	4.4298	.0993	1.2102	3.9183	51.7327	59.6650	47.4909
290	.7941	.3718	1.4003	4.3332	.0904	1.3860	4.0073	57.1290	65.7540	48.0248
295	1.0762	.4023	1.4569	4.2401	.0843	1.4143	4.2388	62.3276	71.8080	49.6634
300	1.4109	.4411	1.5204	4.1520	.0812	1.1777	4.4817	67.1838	77.8014	52.3153
305	1.5860	.4873	1.5919	4.0705	.0807	.8404	4.4538	71.5416	83.6672	55.6702
310	1.5347	.5377	1.6771	3.9918	.0811	.8324	4.6980	76.5430	90.3544	60.0041
315	1.5038	.5927	1.7797	3.9137	.0821	.8480	4.8689	81.6317	97.5197	64.4113
320	1.3882	.6523	1.8946	3.8374	.0838	.8452	4.3003	86.1622	104.1582	66.7965
325	1.3755	.7163	2.0194	3.7664	.0858	.8363	4.4760	92.1047	112.3220	66.9495
330	1.3622	.7843	2.1540	3.7042	.0883	.7762	4.2191	97.9125	119.7083	63.9933
335	1.1876	.8565	2.2955	3.6476	.0937	.7734	3.8165	103.0449	126.0397	58.9792
340	1.1320	.9329	2.4467	3.5952	.0989	.9030	4.1251	108.8265	132.7053	53.2457
345	1.1855	1.0126	2.6112	3.5528	.1060	.9734	4.6440	114.2026	136.6148	46.8894

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
350	1.2680	1.0948	2.7866	3.5247	.1156	1.0112	5.2394	118.6344	143.2427	40.7954
355	1.3570	1.1791	2.9741	3.5132	.1269	.9702	6.5309	122.8425	147.6656	35.9677
MASTER TIME VECTOR: 720										
0	1.4162	1.2658	3.1742	3.5188	.1400	.9296	7.7807	125.7548	150.7599	31.9952
5	1.4619	1.3552	3.3835	3.5399	.1552	.9521	8.1636	126.5616	151.4288	28.5431
10	1.5177	1.4482	3.5998	3.5757	.1726	.9144	8.4933	126.1896	150.6824	25.9389
15	1.5281	1.5460	3.8221	3.6240	.1921	.8628	7.9793	123.8670	147.6863	23.7408
20	1.1885	1.6497	4.0401	3.6783	.2137	.8177	6.4025	118.7927	141.4821	21.7680
25	1.0051	1.7596	4.2548	3.7340	.2374	.7199	6.3297	114.3694	136.1262	20.5113
30	.9396	1.8768	4.4694	3.7952	.2635	.9536	7.1272	110.2662	131.2178	19.7486
35	1.0130	2.0024	4.6895	3.8643	.2921	1.0732	8.0336	105.7326	125.8579	19.1897
40	1.1709	2.1380	4.9167	3.9414	.3232	1.3116	9.3846	101.1740	120.5134	18.8823
45	1.4486	2.2858	5.1542	4.0252	.3561	1.6076	11.0146	96.3402	114.8782	18.7914
50	1.8815	2.4403	5.3964	4.1271	.3910	1.8396	12.8351	91.0943	108.7769	18.8417
55	2.5039	2.5893	5.6299	4.2682	.4279	1.6841	14.5923	85.3073	102.0270	18.9601
60	3.0346	2.7292	5.8498	4.4534	.4668	1.0033	16.3217	79.1271	94.7807	19.1587
65	2.8555	2.8267	6.0381	4.7010	.5079	.9704	16.3503	72.4116	86.8606	19.3561
70	2.5318	2.8337	6.1735	5.0293	.5515	.7765	15.1400	64.8314	77.8670	19.3192
75	2.0753	2.7423	6.2325	5.3891	.5970	.9497	13.9074	57.3695	68.9737	19.1322
80	2.1143	2.6195	6.1903	5.7726	.6443	1.0094	15.0269	51.1470	61.5304	18.9950
85	2.1797	2.5553	6.0111	6.1810	.6930	1.0229	15.8356	45.3427	54.5531	18.7537
90	2.2221	2.5419	5.7013	6.6157	.7428	1.0318	16.5461	39.7331	47.8048	18.5023
95	2.2175	2.5521	5.2759	7.0781	.7936	1.0220	17.3633	34.1635	41.1291	18.2743
100	2.1311	2.5472	4.7553	7.5694	.8457	1.0030	18.3078	28.6308	34.5090	18.1231

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
105	1.9818	2.5238	4.1652	8.0900	.8979	.9796	19.3780	23.1831	28.0170	18.0414
110	1.7725	2.4009	3.6056	8.6085	.9484	.9430	20.5549	17.9346	21.7659	17.9200
115	1.4954	2.3583	3.1720	9.0239	.9966	.8368	21.7874	13.0421	15.9053	17.6592
120	1.1507	2.2200	2.8381	9.3278	1.0428	.8040	23.1237	8.6236	10.5605	17.2879
125	.8161	2.0621	2.5662	9.5132	1.0823	.7852	24.1590	4.7216	5.7984	16.8624
130	.6345	1.9024	2.3218	9.5936	1.1161	.7929	24.5659	1.3175	1.6207	16.4580
135	.5413	1.4370	2.1237	9.5704	1.1305	.8167	22.3127	.5349	.6577	16.1081
140	.5022	1.1210	1.9844	9.4446	1.1069	.8307	19.7363	.5123	.6310	16.0614
145	.4837	.9486	1.8788	9.2701	1.0685	.8338	17.5600	.4808	.6080	16.7214
150	.4712	.8350	1.7948	9.0701	1.0184	.8302	15.6385	.5732	.7508	18.1290
155	.4589	.7608	1.7257	8.8553	.9630	.8284	14.0314	.7703	1.0302	20.1956
160	.4502	.7343	1.6670	8.6331	.9058	.8294	12.7744	1.0940	1.4653	22.5564
165	.4448	.7180	1.6157	8.4080	.8492	.8289	11.7926	1.6907	2.2127	24.7472
170	.4402	.7020	1.5703	8.1833	.7942	.8271	10.9770	2.6473	3.3683	26.7212
175	.4348	.6850	1.5301	7.9616	.7411	.8251	10.2919	3.9503	4.9084	28.4937
180	.4285	.6671	1.4947	7.7440	.6900	.8233	9.7071	5.5821	6.8031	29.9497
185	.4200	.6492	1.4637	7.5309	.6409	.8165	9.1986	7.5620	9.0614	30.7518
190	.4028	.6320	1.4370	7.3229	.5934	.8070	8.7447	9.8713	11.6435	30.7403
195	.3762	.6157	1.4146	7.1202	.5476	.8003	8.3336	12.3942	14.4126	30.0486
200	.3498	.6008	1.3959	6.9232	.5039	.7951	7.9601	14.9806	17.2100	28.8517
205	.3195	.5873	1.3799	6.7319	.4635	.7902	7.6208	17.4990	19.8997	27.2936
210	.2882	.5754	1.3657	6.5466	.4260	.7849	7.3135	19.8548	22.3837	25.4538
215	.2598	.5642	1.3564	6.3687	.3915	.8010	7.0393	21.9863	24.5995	23.3866
220	.2539	.5520	1.3492	6.1997	.3598	.8432	6.8091	23.8338	26.4874	21.3933

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
225	.2736	.5393	1.3455	6.0392	.3305	.8897	6.6216	25.3051	27.9975	19.9122
230	.3165	.5200	1.3403	5.8960	.3034	.9254	6.4703	26.4041	29.1919	18.9879
235	.3781	.4863	1.3261	5.7813	.2779	.9359	6.3234	27.2555	30.2137	18.5787
240	.4477	.4412	1.3033	5.6911	.2539	.9181	6.1416	27.9618	31.1674	19.1349
245	.5069	.3968	1.2724	5.6145	.2312	.8726	5.8969	28.5077	32.0408	21.3631
250	.5273	.3650	1.2339	5.5408	.2099	.8290	5.5932	29.0252	32.9666	25.1485
255	.5166	.3435	1.1884	5.4710	.1899	.8133	5.2852	29.7832	34.2024	30.0974
260	.4955	.3301	1.1504	5.3954	.1708	.8091	4.9361	31.0773	36.0059	35.5745
265	.4717	.3232	1.1390	5.3017	.1526	.8049	4.7586	33.2459	38.6913	40.4637
270	.4456	.3224	1.1535	5.1924	.1356	.8015	4.5595	36.5196	42.5061	43.9264
275	.4300	.3273	1.1857	5.0750	.1202	.8631	4.3897	40.7739	47.3401	46.0570
280	.4760	.3379	1.2229	4.9595	.1074	1.0205	4.2412	45.6906	52.8717	47.1080
285	.5958	.3547	1.2654	4.8469	.0966	1.2107	4.2241	51.0035	58.8365	47.4909
290	.7937	.3781	1.3142	4.7376	.0877	1.3869	4.3003	56.3990	64.9245	48.0248
295	1.0759	.4091	1.3694	4.6324	.0814	1.4159	4.5226	61.5958	70.9763	49.6634
300	1.4110	.4485	1.4310	4.5325	.0780	1.1796	4.7529	66.4501	76.9672	52.3153
305	1.5892	.4953	1.5001	4.4399	.0771	.8405	4.7038	70.9073	82.8318	55.6702
310	1.5354	.5465	1.5820	4.3507	.0771	.8324	4.9519	75.8030	89.5115	60.0041
315	1.5042	.6023	1.6804	4.2627	.0776	.8479	5.1227	80.8859	96.6687	64.4113
320	1.3564	.6627	1.7907	4.1763	.0785	.8452	4.5206	85.4166	103.3077	66.7963
325	1.3755	.7276	1.9106	4.0966	.0801	.8963	4.6952	91.3558	111.4630	66.9495
330	1.3622	.7966	2.0400	4.0255	.0828	.7762	4.4185	97.0633	118.8461	63.9933
335	1.1876	.8698	2.1763	3.9602	.0863	.7734	3.9358	102.2971	125.1763	58.3792
340	1.1321	.9474	2.3224	3.8932	.0905	.9030	4.3134	108.0709	131.8306	53.2457

TIME	Y(2, 1)	Y(3, 1)	Y(4, 1)	Y(5, 1)	Y(6, 1)	Y(7, 1)	Y(8, 1)	Y(9, 1)	Y(13, 1)	Y(14, 1)
345	1.1657	1.0283	2.4812	3.8485	.0963	.5733	4.8481	113.4347	137.7227	46.8894
350	1.2681	1.1116	2.6500	3.8125	.1045	1.0110	5.4623	117.8511	142.3304	40.7954
355	1.3563	1.1969	2.8298	3.7938	.1145	.9701	6.8024	122.0350	146.7231	35.9677
MASTER TIME VECTOR: 1080										
0	1.4154	1.2842	3.0207	3.7931	.1261	.9298	8.0996	124.9217	149.7857	31.9952

79/06/29. 23.15.46. LOTIC ECOSYSTEM MODEL STANDARD RUN

DT YEAR TSPAN 1 1 360	GRAZER	SHREDDER	COLLECTOR	INV-PRED	VRT-PRED	PERIPHYTN	FPOM	CSLPOM	CFLPOM	SLPOM	FLPOM
MEAN	1.076	1.282	1.050	.562	4.954	.930	12.094	47.612	9.082	28.850	1.095
SD	.692	.743	.999	.452	1.478	.216	5.369	39.265	8.074	14.065	.692
MAX	2.998	2.810	3.922	1.466	7.864	1.849	22.118	122.666	24.000	63.911	3.508
MIN	.253	.388	.905	.069	3.113	.520	5.218	.450	.140	15.311	.399
PRODUCTION	3.360	6.961	9.077	1.111	4.067	60.504					
TURNOVER	3.122	5.428	4.906	1.977	.821	65.046					
ASSIM-INPUT	26.827	43.845	50.383	4.914	DRIFT 5.187 6.968 BOTTOM	70.472	470.836	473.849			
RESPIRATION	23.467	36.684	41.306	3.803	6.088	9.969	137.660	109.265			
PRED/LOSSES	3.114	4.332	5.762	.886		48.776	239.919	299.939			
BY VRT-PRD	1.733	2.294	3.189								
BY INV-PRD	1.382	2.038	2.573								
EXPORT					MORT 4.459	10.486	93.171	71.059			
EMERGENCE	.635	2.465	2.096	.375		1.245 DOM					
%RESPIRATION	86.%	84.%	83.%	75.%	64.%	14.%	29.%	23.%			
%PRED/LOSSES	11.%	10.%	12.%	18.%		69.%	51.%	62.%			
%EXPORT/EMERGE	2.%	6.%	5.%	7.%	36.%	17.%	20.%	15.%			
EMERGE RATE	.00166	.00668	.00394	.00204							

BUDGET	INPUTS	OUTPUTS	BALANCE	.0000000
PRIMARY PROD	70.472			
ALLOCHTHONOUS	479.881			
RESPIRATION		370.241		
EXPORT/EMERGE		186.592	NET LIVE	-.152
TOTALS	550.353	556.833	NET	-6.479

79/06/29. 23.15.46. LOTIC ECOSYSTEM MODEL STANDARD RUN

OF YEAR TSPAN 1 2 360	GRAZER	SHREDDER	COLLECTOR	INV-PRED	VRT-PRED	PERIPHYTN	FPOM	CSLPOM	CFLPOM	SLPOM	FLPOM
MEAN	1.077	1.315	2.792	.397	5.266	.927	9.674	45.635	8.596	26.846	1.096
SD	.696	1.090	1.580	.290	1.669	.194	5.863	40.363	8.332	14.066	.692
MAX	2.833	3.719	6.267	.954	8.531	1.705	24.902	125.273	24.968	63.911	3.503
MIN	.253	.316	1.224	.081	3.113	.543	3.816	.569	.134	15.311	.389
PRODUCTION	2.947	5.584	12.648	.725	5.159	60.097					
TURNOVER	2.735	4.246	4.529	1.826	.976	64.797					
ASSIM-INPUT	26.615	42.127	77.135	3.411	DRIFT 5.914 8.026 BOTTOM	70.028	562.344	473.849			
RESPIRATION	23.668	36.542	64.487	2.686	8.780	9.931	108.344	105.711			
PRED/LOSSES	2.287	3.188	7.574	.443		48.391	367.309	289.503			
BY VRT-PRD	1.611	2.218	5.060								
BY INV-PRD	.676	.970	2.313								
EXPORT					MORT 4.753	10.462	89.397	67.467			
EMERGENCE	.671	2.694	4.696	.251		1.235 DOM					
%RESPIRATION	89.%	86.%	84.%	79.%	65.%	14.%	19.%	23.%			
%PRED/LOSSES	9.%	8.%	10.%	13.%		69.%	65.%	63.%			
%EXPORT/EMERGE	3.%	6.%	6.%	7.%	35.%	17.%	16.%	15.%			
EMERGE RATE	.00166	.00668	.00334	.00204							

BUDGET	INPUTS	OUTPUTS	BALANCE	.0000000
PRIMARY PROD	70.028			
ALLOCHTHONOUS	480.726			
RESPIRATION		360.151		
EXPORT/EMERGE		181.630	NET LIVE	.511
TOTALS	550.754	541.781	NET	8.974

79/06/29. 23.15.46. LOTIC ECOSYSTEM MODEL STANDARD RUN

DT YEAR TSPAN 1 3 360	GRAZER	SHREDDER	COLLECTOR	INV=PRED	VRT=PRED	PERIPHYTN	FPOM	CSLPOM	CFLPOM	SLPOM	FLPOM
MEAN	1.077	1.230	2.710	.445	5.889	.936	10.164	51.313	9.715	28.846	1.096
SD	.704	.841	1.649	.339	1.905	.216	5.526	41.302	8.519	14.066	.692
MAX	3.035	2.842	6.235	1.131	9.600	1.860	24.562	126.643	25.005	63.911	3.508
MIN	.253	.322	1.139	.077	3.519	.546	3.996	.481	.119	15.311	.389
PRODUCTION	3.283	6.303	12.626	.946	5.574	60.798					
TURNOVER	3.047	5.126	4.660	2.123	.947	64.974					
ASSIM=INPUT	26.925	41.560	74.200	3.961	DRIFT 6.104 9.241 BOTTOM	70.810	548.579	473.849			
RESPIRATION	23.643	35.257	61.572	3.015	9.771	10.012	116.662	114.834			
PRED/LOSSES	2.622	3.917	8.362	.675		48.956	353.333	285.608			
BY VRT-PRD	1.830	2.601	5.640								
BY INV=PRD	.793	1.316	2.722								
EXPORT					MORT 5.300	10.590	78.265	74.381			
EMERGENCE	.661	2.368	4.419	.284		1.251 DOM					
%RESPIRATION	88.%	85.%	83.%	76.%	65.%	14.%	21.%	24.%			
%PRED/LOSSES	10.%	9.%	11.%	17.%		69.%	64.%	60.%			
%EXPORT/EMERGE	2.%	6.%	6.%	7.%	35.%	17.%	14.%	16.%			
EMERGE RATE	.00166	.00868	.00394	.00204							

BUDGET	INPUTS	OUTPUTS	BALANCE	.0000000
PRIMARY PROD	70.810			
ALLOCHTHONOUS	480.948			
RESPIRATION		374.767		
EXPORT/EMERGE		177.521	NET LIVE	.125
TOTALS	551.757	552.288	NET	-.531

1031.0	1041.5	1051.9	1062.4	1072.9	1083.3
1093.8	1104.3	1114.7	1125.2	1135.7	1146.1
1156.6	1167.1	1177.5	1188.0	1245.9	1303.9
1361.8	1419.7	1477.7	1535.6	1593.5	1651.5
1709.4	1767.3	1825.3	1883.2	1941.1	1999.1
2057.0	2018.9	1980.9	1942.3	1904.7	1866.7
1828.6	1790.5	1752.5	1714.4	1676.3	1638.3
1600.2	1562.1	1524.1	1486.0	1401.9	1317.7
1233.6	1149.5	1065.3	981.2	897.1	812.9
728.8	644.7	560.5	476.4	392.3	308.1
224.0	220.5	216.9	213.4	209.9	206.3
202.8	199.3	195.7	192.2	188.7	185.1
181.6	173.1	174.5	171.0	169.7	168.5
167.2	165.9	164.7	163.4	162.1	160.9
159.6	158.3	157.1	155.8	154.5	153.3
152.0	148.4	144.8	141.2	137.6	134.0
130.4	126.8	123.2	119.6	116.0	112.4
108.8	105.2	101.6	98.0	103.4	108.8
114.2	119.6	125.0	130.4	135.8	141.2
146.6	152.0	157.4	162.8	168.2	173.6
179.0	174.8	170.6	166.4	162.2	158.0
153.8	149.6	145.4	141.2	137.0	132.8
128.6	124.4	120.2	116.0	148.9	181.9
214.8	247.7	280.7	313.6	346.5	379.5
412.4	445.3	478.3	511.2	544.1	577.1
610.0	638.1	666.1	694.2	722.3	750.3
788.4	806.5	834.5	862.6	890.7	918.7
946.8	974.9	1002.9	889.0	898.5	907.9
917.4	926.9	936.3	945.8	955.3	964.7
974.2	983.7	993.1	1002.6	1012.1	1021.5
.014	.004	.004	.004	.002	.003
.004	.002	.011	.035	.003	.005
.014	.004	.004	.004	.002	.003
.004	.002	.011	.035	.003	.005
.014	.004	.004	.004	.002	.003
.004	.002	.011	.035	.003	.005
11.200	6.200	6.020	5.840	5.660	5.480
5.300	5.300	11.800	14.000	13.450	10.200
9.200	5.800	125.500	113.333	98.000	71.333
51.167	31.000	26.500	25.500	26.000	44.500
63.000	29.000	19.000	14.500	15.542	16.583
17.625	18.667	19.708	20.750	12.500	11.975
11.450	10.925	10.400	9.760	9.120	8.480
7.840	7.200	8.300	7.350	6.400	7.600
7.600	7.400	7.200	7.000	8.383	9.767
11.150	10.000	9.000	8.425	7.850	7.275
6.700	8.200	21.667	15.500	12.600	12.400
25.050	37.700	50.350	63.000	88.538	52.000
31.500	25.000	17.500	14.250	11.000	10.762
10.524	10.286	10.048	9.810	9.573	9.335
9.097	8.859	8.621	8.383	8.145	7.907
7.669	7.431	7.194	6.956	6.718	6.480
6.242	6.004	5.766	5.528	5.290	5.052
4.814	4.576	4.339	4.101	3.863	3.625
3.387	3.149	2.911	2.673	2.435	2.197
1.959	1.722	1.484	1.246	1.008	.770
.770	.770	.770	.770	.770	.770
.770	.770	.770	.770	.770	.770
.770	.770	.770	.770	.770

1.300	1.550	1.450	1.860	1.380	1.930
1.400	1.200	3.100	2.100	3.100	5.350
4.400	4.100	18.040	7.900	3.900	2.040
2.160	1.900	1.700	1.575	1.450	2.412
3.375	4.333	5.300	83.333	14.600	13.343
12.036	10.829	9.571	8.314	7.057	5.800
10.325	14.650	19.375	23.900	28.425	32.950
37.475	42.000	37.371	32.743	28.114	23.485
18.857	14.229	9.600	9.600	10.000	10.200
10.400	10.600	10.800	11.000	11.200	9.533
7.867	6.200	.770	.770	.770	.770
.770	.770	.770	.770	.770	.770
.8060	.7700	.7400	.7150	.6958	.6850
.6752	.6690	.6810	.6960	.7110	.7260
.7412	.7552	.7356	.7050	.6794	.6696
.6602	.6598	.6646	.6624	.6374	.6102
.5862	.5776	.5706	.5692	.6582	.7776
.9162	1.0576	1.1146	1.1670	1.2194	1.2682
1.2502	1.1716	1.0870	1.0024	.9180	.8300
.7308	.6356	.6242	.6404	.6566	.7048
.9610	1.2502	1.5370	1.8172	1.9644	1.9134
1.9628	1.8116	1.7612	1.7394	1.9032	2.0972
2.2908	2.4840	2.6780	2.7616	2.5048	2.1848
1.8640	1.5432	1.2228	.9962	.8860	.8480
.1669	.1584	.1501	.1423	.1393	.1436
.1478	.1522	.1579	.1616	.1596	.1570
.1545	.1517	.1459	.1390	.1346	.1375
.1408	.1455	.1512	.1540	.1485	.1425
.1367	.1319	.1275	.1238	.1376	.1571
.1711	.1836	.1798	.1748	.1638	.1638
.1587	.1463	.1329	.1195	.1061	.0927
.0797	.0677	.0759	.0907	.1056	.1208
.1381	.1558	.1694	.1708	.1751	.1849
.1947	.2045	.2142	.2320	.3003	.3756
.4529	.5292	.6055	.6595	.6054	.5242
.4430	.3618	.2806	.2303	.2184	.2334
.0	.0	.0	.0	.02	.02
.02	.1	.3	.1	.06	.03
.02	.015	.01	.01	.01	.01
.01	.01	.0	.0	.0	.0
.0	.0	.0	.3	.006	.0277
.007	.0027	.003	.0036	.0038	.004
.0069	.0038	.01	.015	.042	.03
.02	.01	.0	.0	.0	.0
.0	.0	.0	.0	.1	.2
.6	1.0	.2	.1	.1	.1
.1	.1	.1	.1	.35	.6
.1	.1	.1	.0	.0	.0
.01	.022	.046	.072	.111	.116
.129	.089	.046	.043	.033	.027
.018	.025	.037	.049	.106	.169
.291	.168	.048	.036	.028	.017

TITLE OF THIS RUN:
LOTIC ECOSYSTEM MODEL STANDARD RUN
TITLE OF SPEC FILE:
PLOT1 SPECS
TITLE OF THIS RUN:
LOTIC ECOSYSTEM MODEL STANDARD RUN
TITLE OF SPEC FILE:
PLOT2 SPECS
TITLE OF THIS RUN:
LOTIC ECOSYSTEM MODEL STANDARD RUN
TITLE OF SPEC FILE:
PLOT3 SPECS

Plots of State Variables.

The next four pages illustrate line-printer plots of selected variables of interest, namely state variables associated with six biological processes, and illumination intensity, allochthonous input, and concentrations of nutrients (NO_3^-), FPOM, and conditioned detritus. Each variable is designated on the first page with its plot symbol, plot scale, and appropriate FLEX I.D. The plot duration corresponds to three years. The trajectories of state variables for six biological processes (grazing, shredding, collecting, invertebrate predation, vertebrate predation, and periphyton processes) are drawn for year 3 to illustrate system dynamics at a near steady state.

SINGLE MODULE MODEL
TITLE: LOTIC ECOSYSTEM MODEL STANDARD RUN
DATE: 79/06/29. TIME: 23.15.46. PAGE: 1

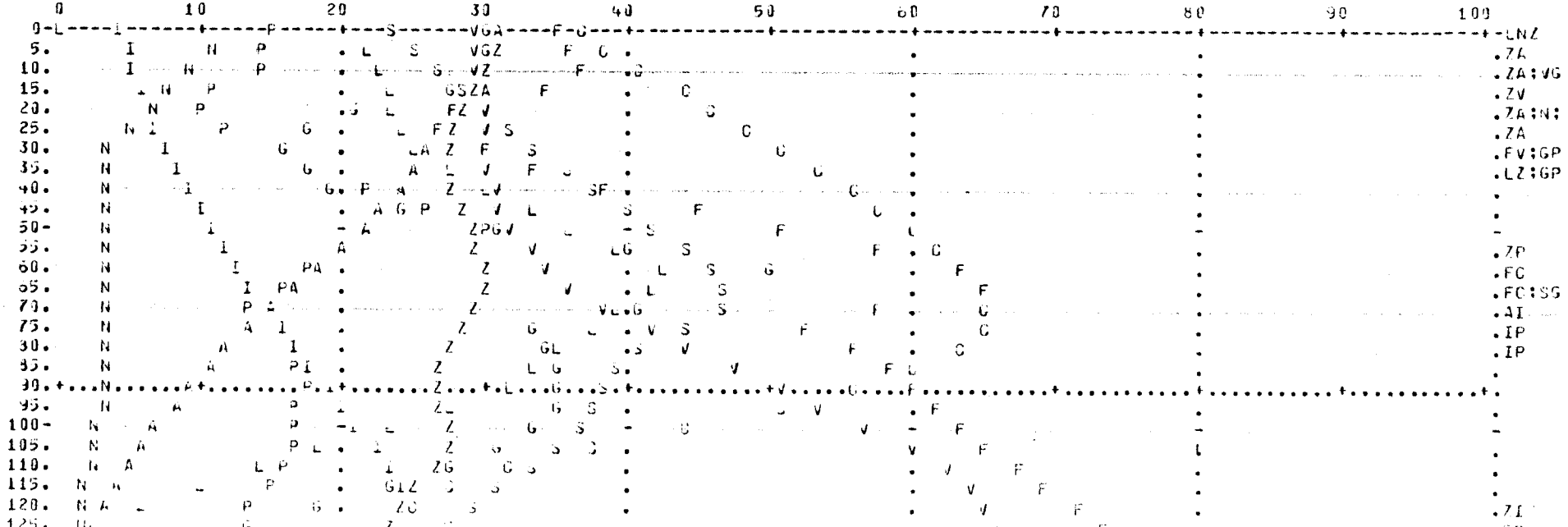
I	NAME	SYMBOL	FLEX ID	MAXIMUM	MINIMUM	SCALE
1	LIGHT,	L	Z(2, 1)	.48000E+04	0.	.25000E-01
2	NUTRIENT,	N	Z(3, 1)	.12000E+00	0.	.10000E+04
3	ZALLOCIM,	Z	G(43, 1)	.30000E+01	0.	.40000E+02
4	ALLOCH,	A	Y(13, 1)	.48000E+03	0.	.25000E+00
5	FPOM,	F	Y(9, 1)	.30000E+02	0.	.40000E+01
6	VERTPRED,	V	Y(5, 1)	.12000E+02	0.	.10000E+02
7	INVERTPRD,	I	Y(6, 1)	.60000E+01	0.	.20000E+02
8	COLLECTOR,	C	Y(4, 1)	.60000E+01	0.	.20000E+02
9	SHREDDER,	S	Y(3, 1)	.60000E+01	0.	.20000E+02
10	GRAZER,	G	Y(2, 1)	.60000E+01	0.	.20000E+02
11	PERIPHYTON	P	Y(7, 1)	.60000E+01	0.	.20000E+02

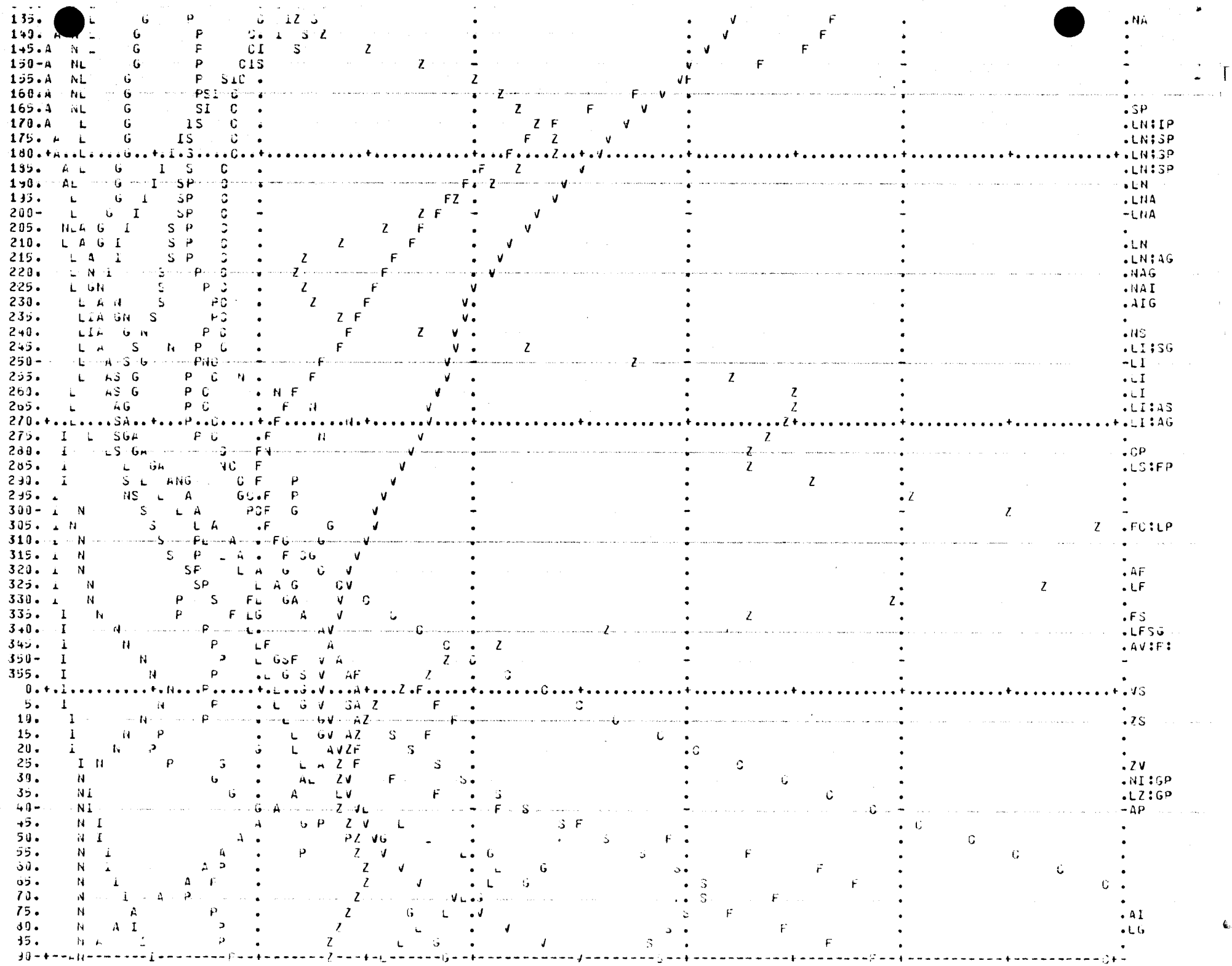
START TIME: 0

END TIME: 1080

SYMBOL UNSCALED VALUES

L	0.000	960.000	1920.000	2880.000	3840.000	4800.000
N	0.000	.024	.048	.072	.096	.120
Z	0.000	.600	1.200	1.800	2.400	3.000
A	0.000	96.000	192.000	288.000	384.000	480.000
F	0.000	6.000	12.000	18.000	24.000	30.000
V	0.000	2.400	4.800	7.200	9.600	12.000
I	0.000	1.200	2.400	3.600	4.800	6.000
C	0.000	1.200	2.400	3.600	4.800	6.000
S	0.000	1.200	2.400	3.600	4.800	6.000
G	0.000	1.200	2.400	3.600	4.800	6.000
P	0.000	1.200	2.400	3.600	4.800	6.000




135.
140.
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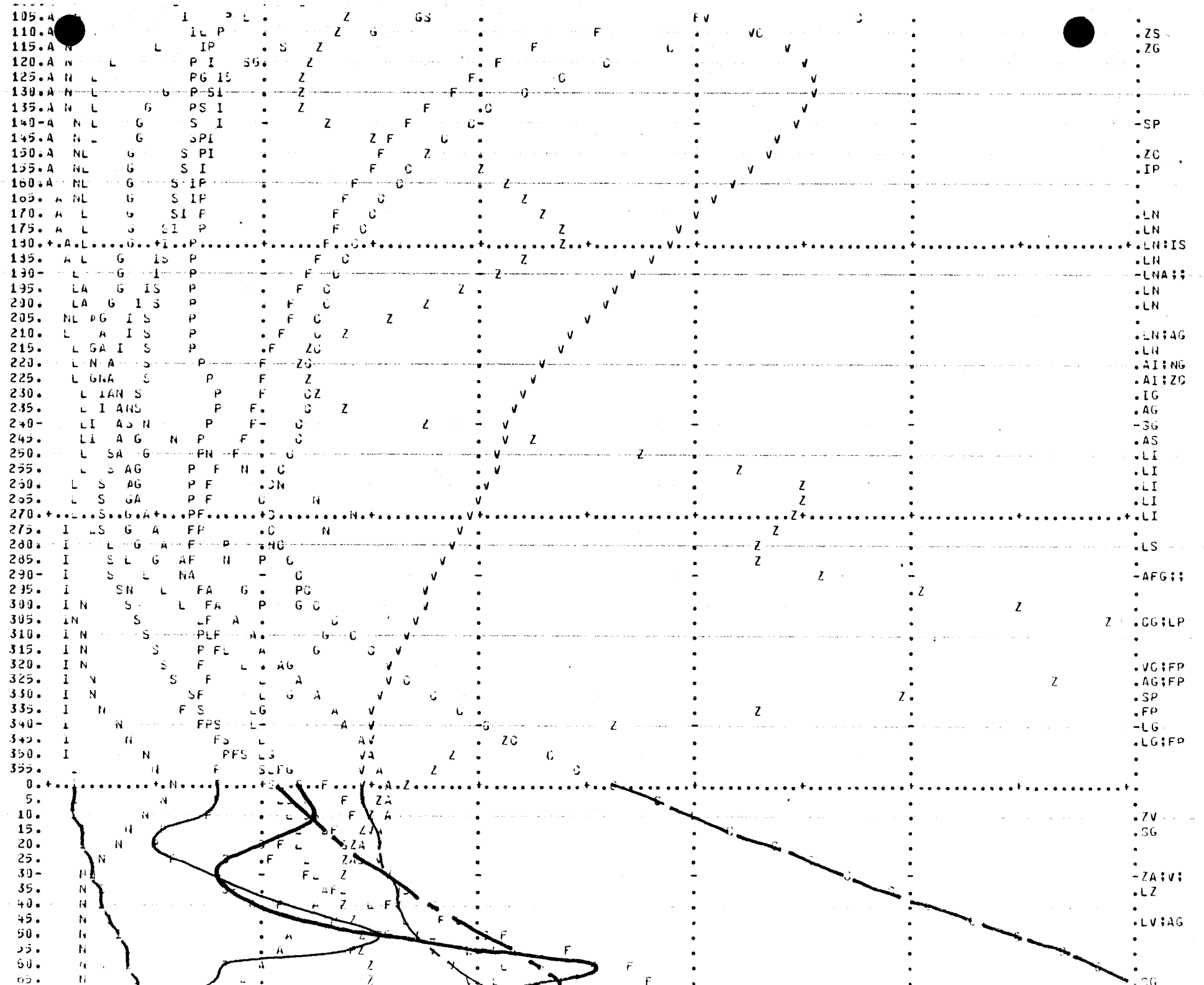
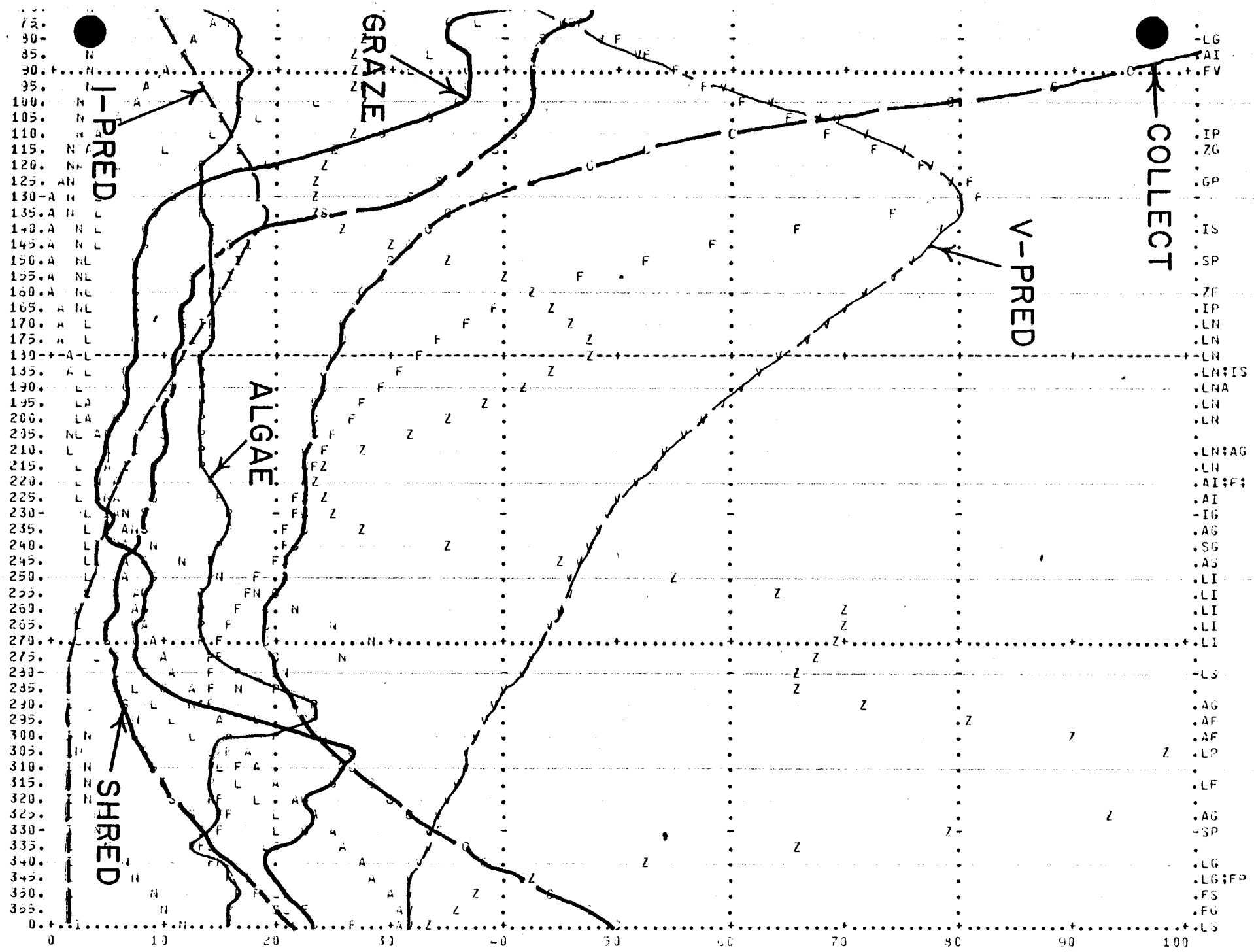
285.
290.
295.
300-
305.
310.
315.
320.
325.
330.
335.
340.
345.
350-
355.
0.
5.
10.
15.
20.
25.
30.
35.
40-
45.
50.
55.
60.
65.
70.
75.
80.
85.
90-
.NA
.SP
.LN:IP
.LN:SP
.LN:SP
.LN:SP
.LN
.LNA
-LNA
.LN
.LN:AG
.NAG
.NAI
.AIG
.NS
.LI:SG
-LI
.LI
.LI
.LI:AS
.LI:AG
.CP
.LS:FP
.FC:LP
.AF
.LF
.FS
.LFSG
.AV:F:
.VS
.ZS
.ZV
.NI:GP
.LZ:GP
-AP
.AI
.LG




I-PRED
GRAZE
ALGAE
SHRED
V-PRED
COLLECT

Plots of Specific Growth Rates

The next four pages show line-printer plots of the specific growth rates defined on pages 5 - 8 of Internal Report 165. Patterns for processes of grazing and shredding are drawn to illustrate the interpretative value of such information. The large difference between g_o and g_1 in the plot for grazing indicates resource limitation, while the plot for shredding suggests that this process is regulated more by emergence and predation than by resource supply.

SINGLE NODE MODEL
TITLE: LOTIC ECOSYSTEM MODEL STANDARD RUN
DATE: 79/08/29. TIME: 23.15.46. PAGE: 1

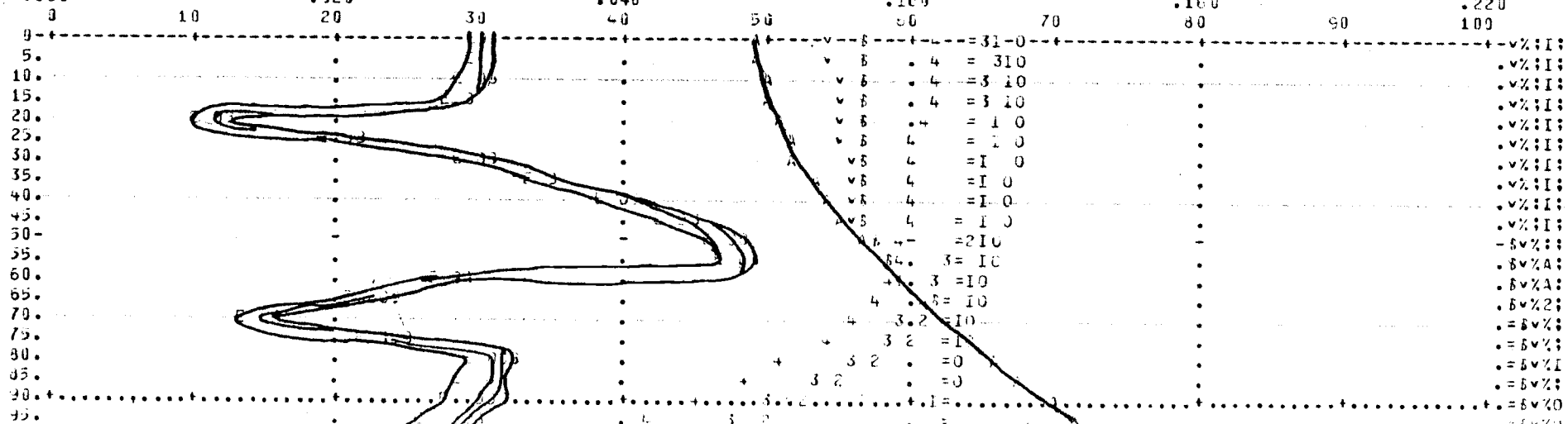
I	NAME	SYMBOL	FLEX 13	MAXIMUM	MINIMUM	SCALE
1	=OPTIMLV,	=	Y(33, 1)	.70000E-01	-.80000E-01	.80000E+03
2	$OLOSSV,	$	Y(34, 1)	.70000E-01	-.80000E-01	.80000E+03
3	¥ILOSSV,	¥	Y(35, 1)	.70000E-01	-.80000E-01	.80000E+03
4	%IGRWPCV,	%	Y(36, 1)	.70000E-01	-.80000E-01	.80000E+03
5	OPTIMALG,	O	Y(24, 1)	.70000E-01	-.80000E-01	.80000E+03
6	APTIMALG,	A	Y(1, 1)	.22000E+00	-.80000E-01	.40000E+03
7	IGROWTHG,	I	Y(25, 1)	.70000E-01	-.80000E-01	.80000E+03
8	8IGROWTHG,	8	Y(15, 1)	.22000E+00	-.80000E-01	.40000E+03
9	2EALOSSG,	2	Y(26, 1)	.70000E-01	-.80000E-01	.80000E+03
10	CEALOSSG,	C	Y(16, 1)	.22000E+00	-.80000E-01	.40000E+03
11	3VPLOSSG,	3	Y(27, 1)	.70000E-01	-.80000E-01	.80000E+03
12	DVPLOSSG,	D	Y(17, 1)	.22000E+00	-.80000E-01	.40000E+03
13	4IPLOSSG,	4	Y(28, 1)	.70000E-01	-.80000E-01	.80000E+03
14	EIPLOSSG,	E	Y(18, 1)	.22000E+00	-.80000E-01	.40000E+03

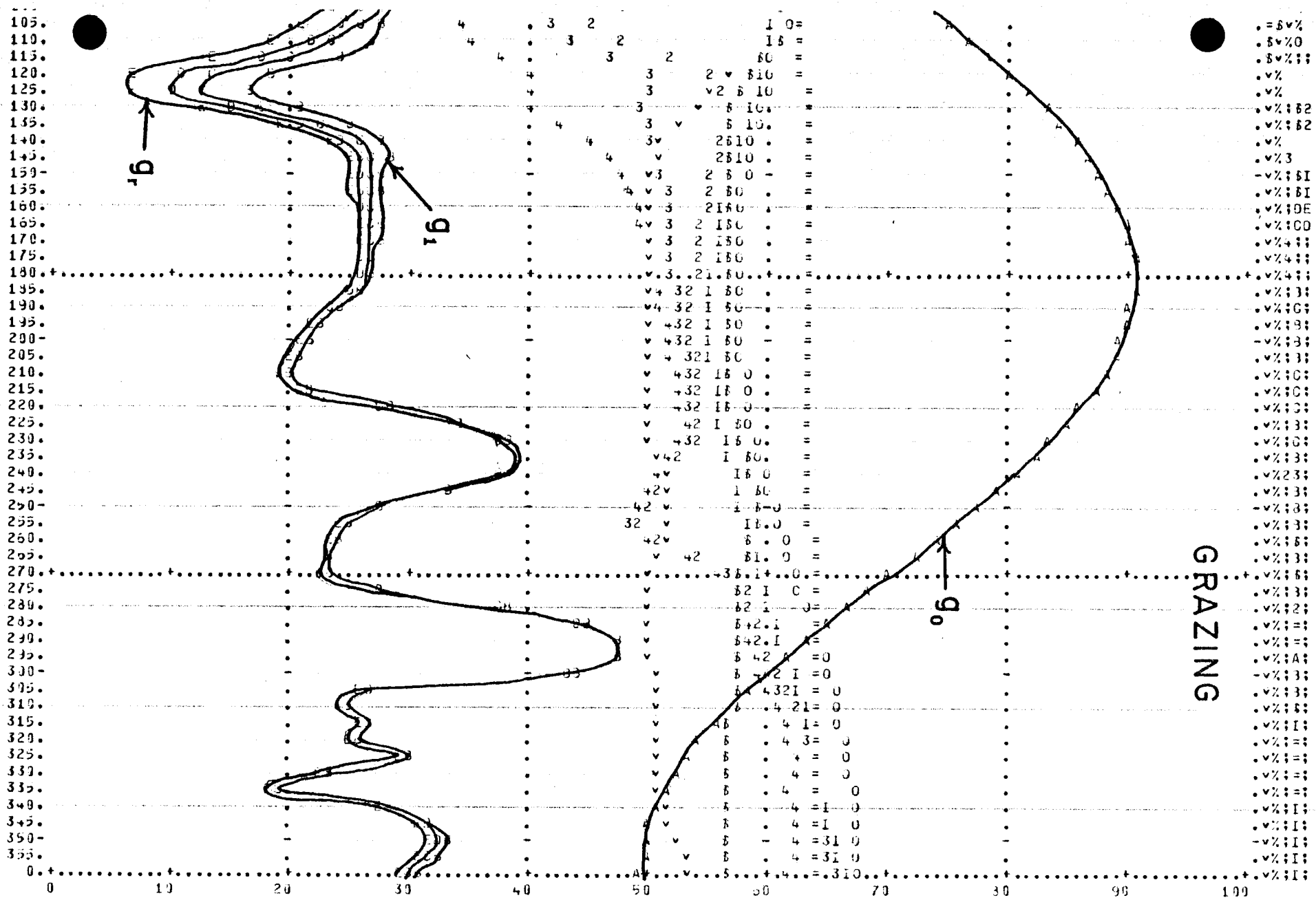
START TIME: 720

END TIME: 1080

SYMBOL UNSCALED VALUES

=	-.080	-.050	-.020	.010	.040	.070
$	-.080	-.050	-.020	.010	.040	.070
¥	-.080	-.050	-.020	.010	.040	.070
%	-.080	-.050	-.020	.010	.040	.070
O	-.080	-.050	-.020	.010	.040	.070
A	-.080	-.020	.040	.100	.160	.220
I	-.080	-.050	-.020	.010	.040	.070
8	-.080	-.020	.040	.100	.160	.220
2	-.080	-.050	-.020	.010	.040	.070
C	-.080	-.020	.040	.100	.160	.220
3	-.080	-.050	-.020	.010	.040	.070
D	-.080	-.020	.040	.100	.160	.220
4	-.080	-.050	-.020	.010	.040	.070
E	-.080	-.020	.040	.100	.160	.220




GRAZING
g_r
g_1
g_o
0
10
20
30
40
50
60
70
80
90
100

SINGLE MODULE MODEL
TITLE: LOTIC ECOSYSTEM MODEL STANDARD RUN
DATE: 79/06/29. TIME: 23.15.46. PAGE: 1

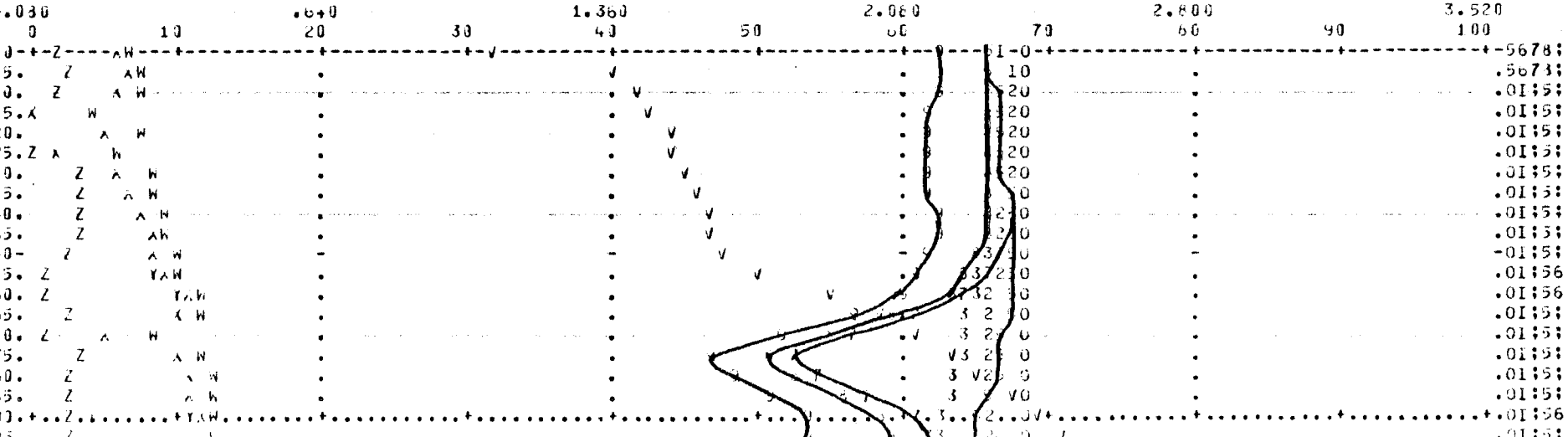
I	NAME	SYMBOL	FLEX ID	MAXIMUM	MINIMUM	SCALE
1	OPTIMALI,	O	Y(29, 1)	.70000E-01	-.80000E-01	.80000E+03
2	5OPTIMLS,	5	Y(19, 1)	.70000E-01	-.80000E-01	.80000E+03
3	VPTIMALP,	V	Y(37, 1)	.35200E+01	-.80000E-01	.33333E+02
4	IGROWTHI,	I	Y(30, 1)	.70000E-01	-.80000E-01	.80000E+03
5	6IGROWTHS,	6	Y(20, 1)	.70000E-01	-.80000E-01	.80000E+03
6	WIGROWTHP,	W	Y(38, 1)	.35200E+01	-.80000E-01	.33333E+02
7	7EXLOSSP,	7	Y(21, 1)	.70000E-01	-.80000E-01	.80000E+03
8	XEXLOSSP,	X	Y(39, 1)	.35200E+01	-.80000E-01	.33333E+02
9	2EXLOSSI,	2	Y(31, 1)	.70000E-01	-.80000E-01	.80000E+03
10	8VPLOSSS,	8	Y(22, 1)	.70000E-01	-.80000E-01	.80000E+03
11	YEXLOSIP,	Y	Y(40, 1)	.35200E+01	-.80000E-01	.33333E+02
12	3PLOSSI,	3	Y(32, 1)	.70000E-01	-.80000E-01	.80000E+03
13	9IPLOSSS,	9	Y(23, 1)	.70000E-01	-.80000E-01	.80000E+03
14	ZPLOSSP,	Z	Y(41, 1)	.35200E+01	-.80000E-01	.33333E+02

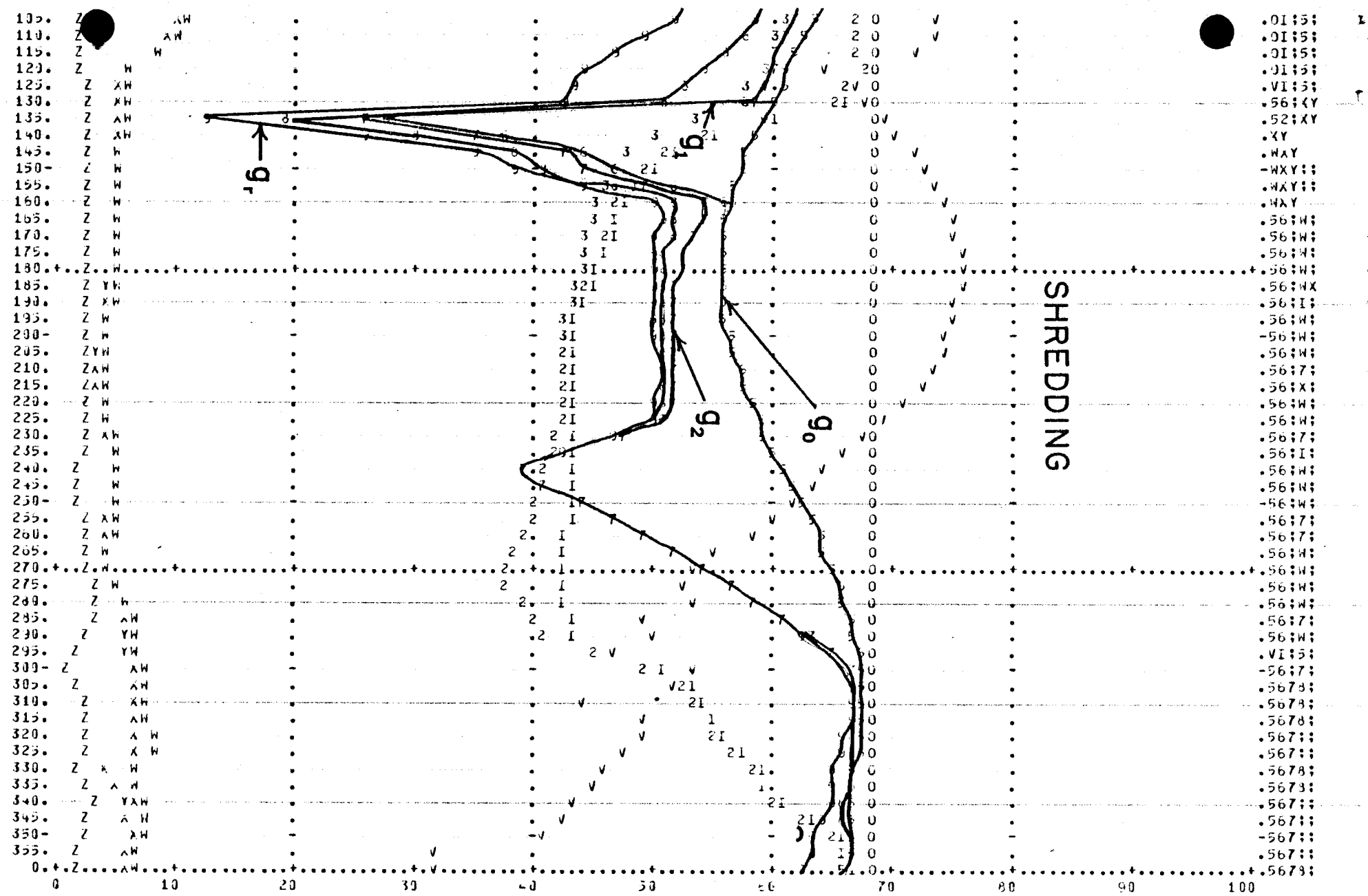
START TIME: 720

END TIME: 1080

SYMBOL UNSCALED VALUES

O	-.080	-.050	-.020	.010	.040	.070
5	-.080	-.050	-.020	.010	.040	.070
V	-.080	.640	1.360	2.080	2.800	3.520
I	-.080	-.050	-.020	.010	.040	.070
6	-.080	-.050	-.020	.010	.040	.070
W	-.080	.640	1.360	2.080	2.800	3.520
7	-.080	-.050	-.020	.010	.040	.070
X	-.080	.640	1.360	2.080	2.800	3.520
2	-.080	-.050	-.020	.010	.040	.070
8	-.080	-.050	-.020	.010	.040	.070
Y	-.080	.640	1.360	2.080	2.800	3.520
3	-.080	-.050	-.020	.010	.040	.070
9	-.080	-.050	-.020	.010	.040	.070
Z	-.080	.640	1.360	2.080	2.800	3.520




SHREDDING
g_r
g_1
g_2
g_0
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10
20
30
40
50
60
70
80
90
100