

M E C BIOLOGICAL PROJECT
SAN ONOFRE NUCLEAR GENERATING STATION
MONITORING STUDIES ON
ICHTHYOPLANKTON AND ZOOPLANKTON
FINAL REPORT
APPENDICES VOLUME 1

Prepared by Arthur M. Barnett, Principal Investigator

Contributing Staff:

William Watson
Linda G. Gleye
Susan D. Watts
Karen D. Green
Thomas D. Johnson
Douglas N. Beanan

Consultant:

Janice D. Callahan

MARINE ECOLOGICAL CONSULTANTS OF SOUTHERN CALIFORNIA
531 Encinitas Boulevard Suite 110
Encinitas, California 92024

8 October 1987

REPORT NUMBER MEC03287055 - FINAL

The appendices given in this volume, except Appendices B and C.1, have been revised and updated by the appendices given in: MEC Biological Project San Onofre Nuclear Generating Station Monitoring Studies on Ichthyoplankton and Zooplankton Final Report Appendices Volume 2: Revisions and Addenda. Specifically, Appendices A, C.2, C.3, and E of this volume are replaced by Appendices A.2, C.2, C.3, and E. respectively, of Volume 2. Appendix A.1 of Volume 2 is a new appendix. The Appendix D figures in this volume that show patterns of distribution in the cross-shelf strata (e.g., Figures D-76, D-27, D-48) are replaced by the corresponding figures of distributions given in Appendix D of Volume 2.

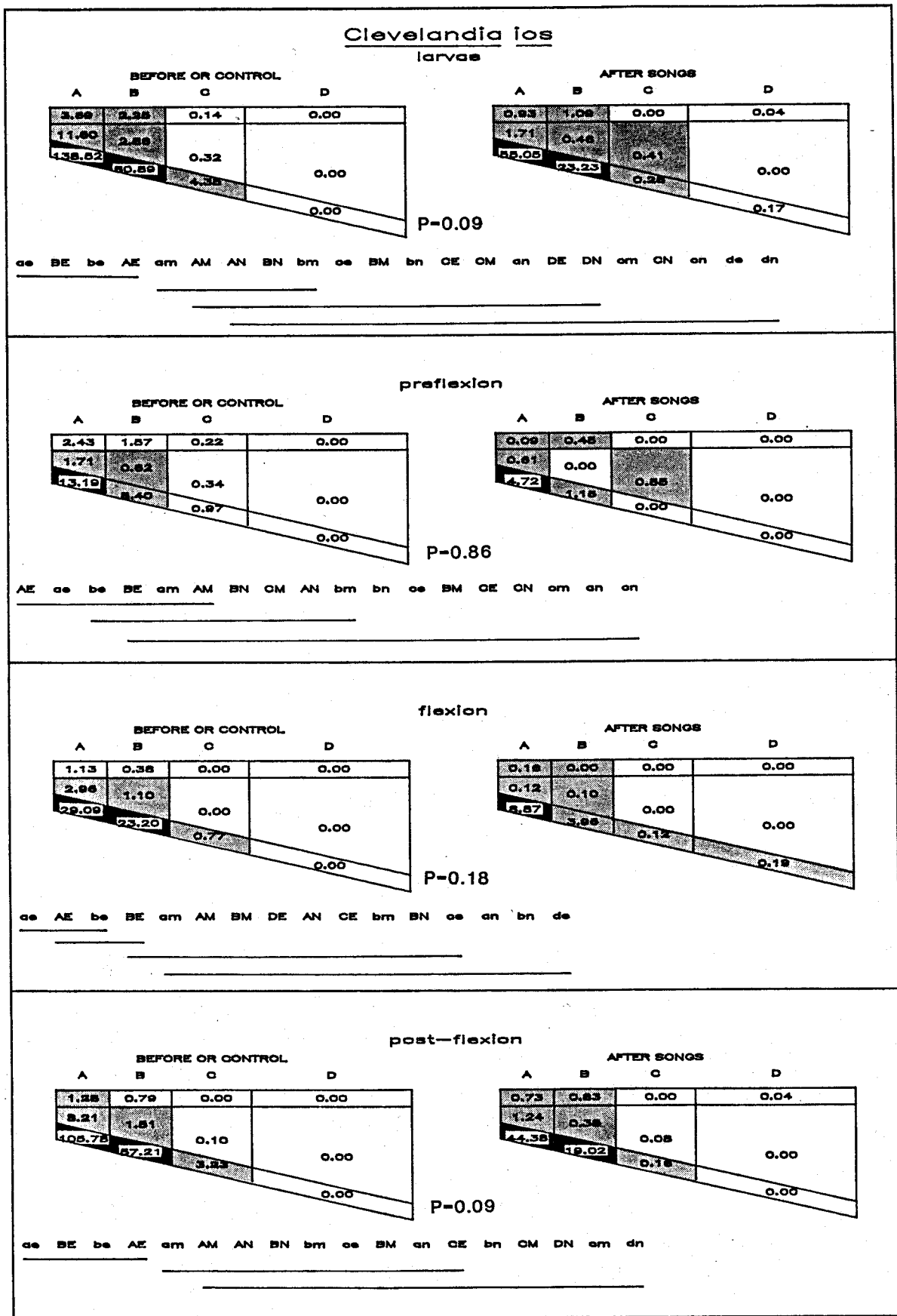
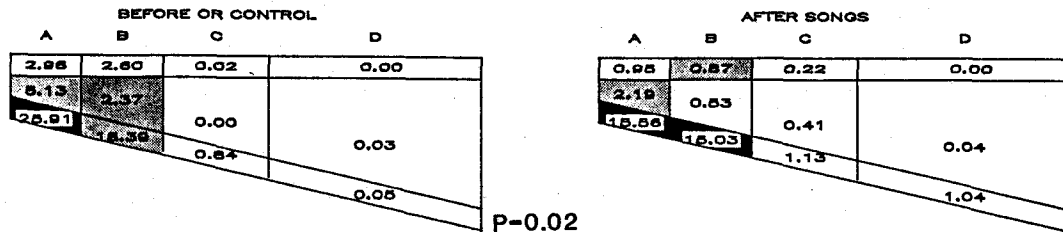


Figure D-6 . Cross-shelf distributional patterns for *Clevelandia ios*. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown

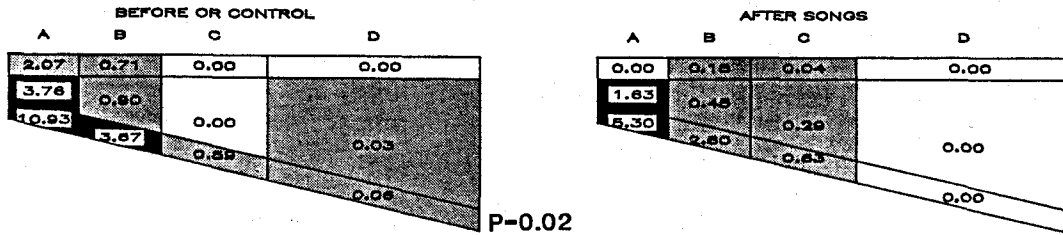
D-7

Quietula y-cauda
larvae



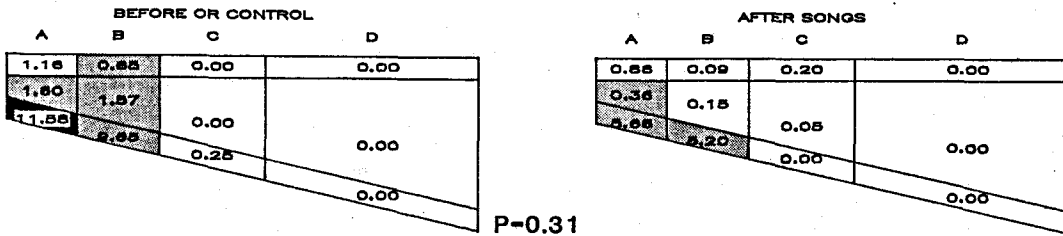
ae BE AE be am AM bm BN BM CE an bn ce CM AN CN dm de on DE om DM

preflexion



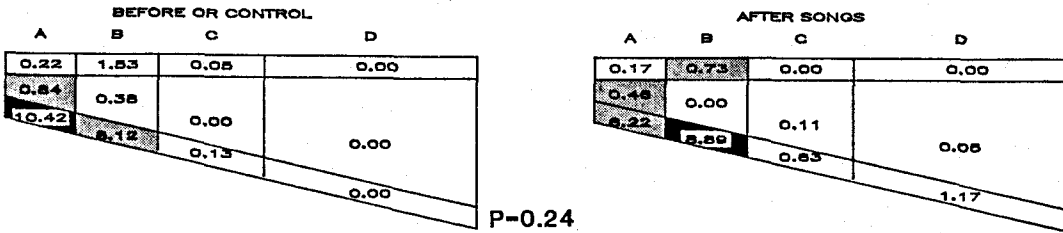
AE ae am be AM BM BE bm CE CM BN an bn ce dm CN de om on AN DE DM

flexion



ae AE be BE am AM bm bn CN AN BM BN an CM ce CE om on

post-flexion



BE ae be AE BN am AM an bn bm ce DE CE CM AN DM an am de dm BM CN

Figure D-27. Cross-shelf distributional patterns for Quietula y-cauda. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown

Ilypnus gilberti

larvae

BE ae AE be AM CE am BM bm BN ce an bn AN om CM on de dm dn CN DM DE DN

BEFORE OR CONTROL			
A	B	C	D
6.47	14.30	0.31	0.02
25.91	10.12		
48.95	128.59	0.89	0.09
		8.17	
			0.37

AFTER SONGS			
A	B	C	D
4.70	11.07	0.84	0.23
9.67	7.68		
21.18	120.48	4.12	0.38
		32.01	
			34.78

P=0.09

BE ae AE be AM CE am BM bm BN ce an bn AN om CM on de dm dn CN DM DE DN

preflexion

BEFORE OR CONTROL			
A	B	C	D
3.47	1.38	0.08	0.02
7.35	3.42		
27.83	28.78	0.36	0.07
		3.17	
			0.20

AFTER SONGS			
A	B	C	D
1.78	1.38	0.29	0.23
4.23	2.88		
18.80	19.39	1.47	0.38
		3.67	
			0.00

P=0.06

AE BE ae be AM am BM bm CE ce an bn BN AN CM om CN de on dm dn DM DN DE

flexion

BEFORE OR CONTROL			
A	B	C	D
1.41	7.20	0.20	0.00
8.89	3.81		
25.55	25.65	0.27	0.01
		1.04	
			0.00

AFTER SONGS			
A	B	C	D
1.13	3.55	0.14	0.00
3.08	2.17		
15.85	11.78	0.61	0.00
		1.08	
			0.00

P=0.18

ae BE AE be AM am BN BM bm an CE bn ce AN CM am on dm CN DM

post-flexion

BEFORE OR CONTROL			
A	B	C	D
1.72	3.45	0.09	0.00
10.21	3.45		
27.98	29.83	0.31	0.00
		1.58	
			0.17

AFTER SONGS			
A	B	C	D
1.79	6.13	0.42	0.00
2.39	2.81		
23.48	79.28	2.05	0.00
		27.31	
			34.78

P=0.02

BE ae AE be CE am BM bm AM BN an ce bn AN am de en CM DE CN

Figure D-48 . Cross-shelf distributional patterns for *Ilypnus gilberti*. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown

Gobiesox rhesodon
larvae

BEFORE OR CONTROL

A	B	C	D
0.04	0.08	0.18	0.00
1.38	0.90		
11.94	18.84	0.32	
		2.07	0.16
			1.00

AFTER SONGS

A	B	C	D
0.00	0.00	0.00	0.00
3.12	3.60		
13.42	28.27	0.14	
		29.88	0.20
			0.00

P=0.11

BE CE be AE ae ce BM am AM bm am de dm bn en an CM DM AN BN CN DE

preflexion

BEFORE OR CONTROL

A	B	C	D
0.05	0.03	0.18	0.00
0.99	0.74		
10.95	12.94	0.34	
		1.88	0.12
			0.41

AFTER SONGS

A	B	C	D
0.00	0.00	0.00	0.00
2.97	2.47		
12.76	21.82	0.18	
		16.07	0.00
			0.00

P=0.55

BE AE be ae CE ce BM am AM bm am de dm en an bn CM AN BN ON DE DM

flexion

BEFORE OR CONTROL

A	B	C	D
0.00	0.00	0.00	0.00
0.56	0.28		
1.99	8.22	0.00	
		0.65	0.00
			0.65

AFTER SONGS

A	B	C	D
0.00	0.00	0.00	0.00
0.12	1.82		
1.82	7.82	0.00	
		11.88	0.00
			0.00

P=.005

CE be BE ce ce AE BM am bm de AM DE

post-flexion

BEFORE OR CONTROL

A	B	C	D
0.00	0.00	0.00	0.00
0.08	0.00		
2.38	8.13	0.00	
		0.38	0.00
			0.60

AFTER SONGS

A	B	C	D
0.00	0.00	0.00	0.00
0.38	0.00		
0.00	3.75	0.00	
		12.01	0.37
			0.00

P=0.14

CE be BE ce ce de am AM DM dm AE DE

Figure D-69 . Cross-shelf distributional patterns for Gobiesox rhesodon. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown.

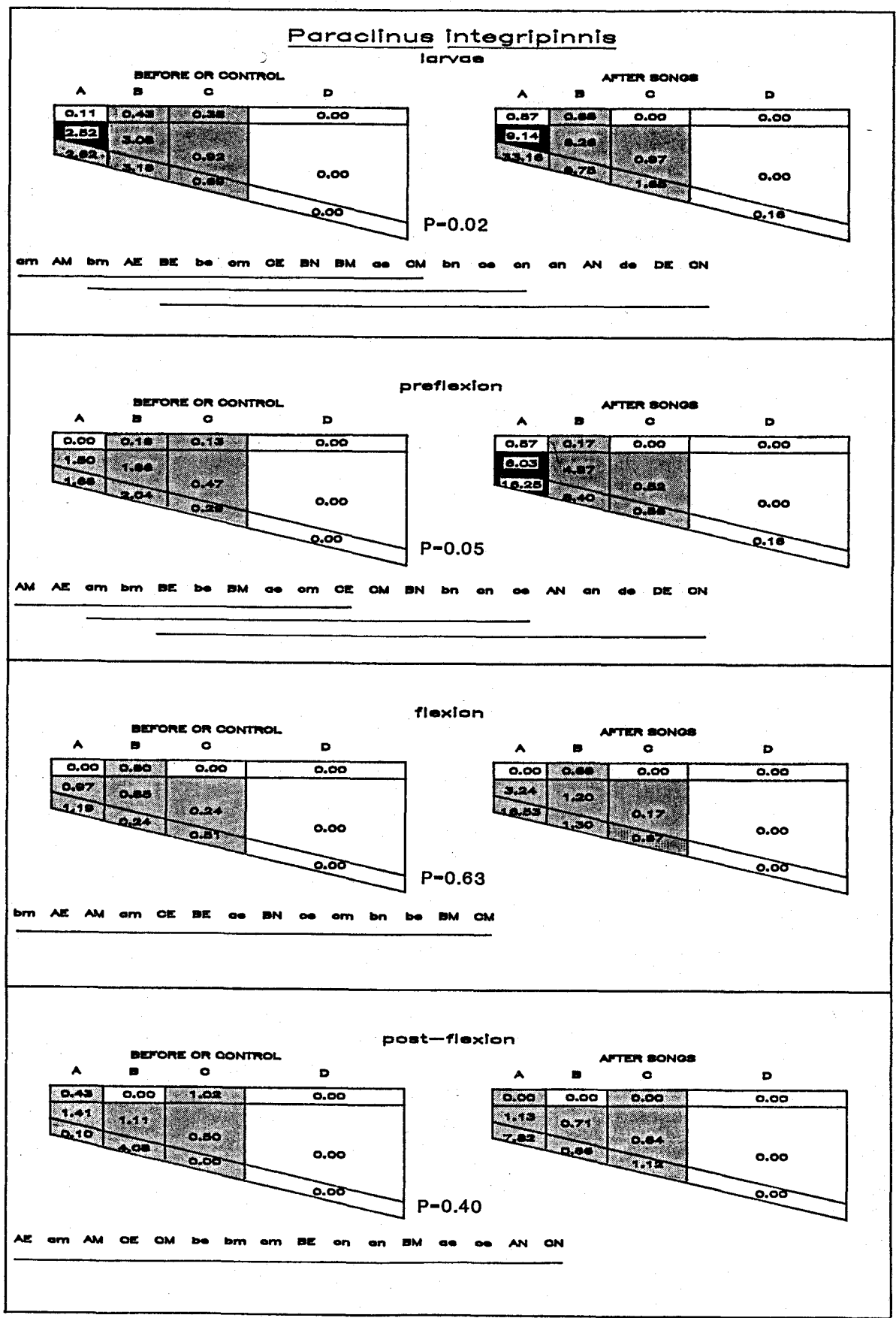


Figure D-90 . Cross-shelf distributional patterns for *Paraclinus integripinnis*. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown.

D-91

Gibbonsia type a
larvae

BEFORE OR CONTROL				AFTER SONGS			
A	B	C	D	A	B	C	D
0.20	0.56	0.00	0.00	0.00	0.06	0.00	0.00
2.18	1.92			6.70	4.36		
3.80	3.05	0.32	0.10	7.58	2.38	0.37	0.09
		0.77				2.45	
			0.35				0.63

P=0.34

AM BM am AE be bm BE ce ee CE om CM an de dm bn DE DM BN AN

preflexion

BEFORE OR CONTROL				AFTER SONGS			
A	B	C	D	A	B	C	D
0.07	0.03	0.00	0.00	0.00	0.07	0.00	0.00
1.78	1.17			4.81	3.17		
3.99	2.09	0.28	0.05	7.24	2.05	0.24	0.10
		0.27				1.70	
			0.39				0.17

P=0.23

AM BM am AE ce be bm BE ee CE om an de dm bn CM BN DE DM AN

flexion

BEFORE OR CONTROL				AFTER SONGS			
A	B	C	D	A	B	C	D
0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.06	1.95			4.22	1.91		
0.00	2.21	0.20	0.12	1.33	0.61	0.30	0.00
		0.15				1.41	
			0.00				1.01

P=0.04

BM AM am be bm AE BE CM ee an om dm CE DE ee de AN DM

post-flexion

BEFORE OR CONTROL				AFTER SONGS			
A	B	C	D	A	B	C	D
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.48	0.29			0.47	1.60		
0.48	0.75	0.00	0.00	0.00	0.38	0.00	0.00
		0.82				0.61	
			0.00				0.00

P=0.17

AM BM am ee BE CE ee be bm AE

Figure D-111. Cross-shelf distributional patterns for *Gibbonsia* type a. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown.

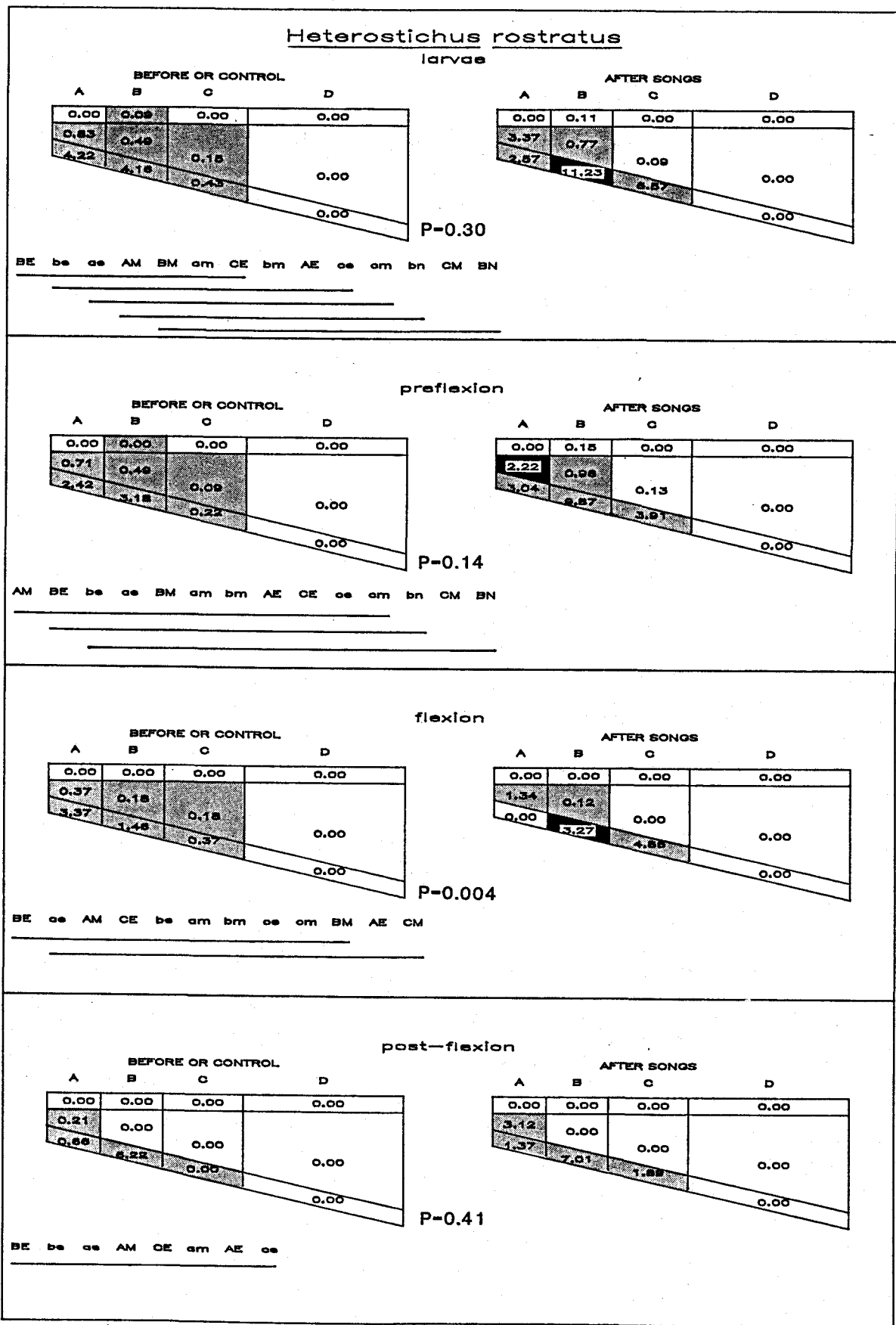


Figure D-132. Cross-shelf distributional patterns for Heterostichus rostratus. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown

D-133

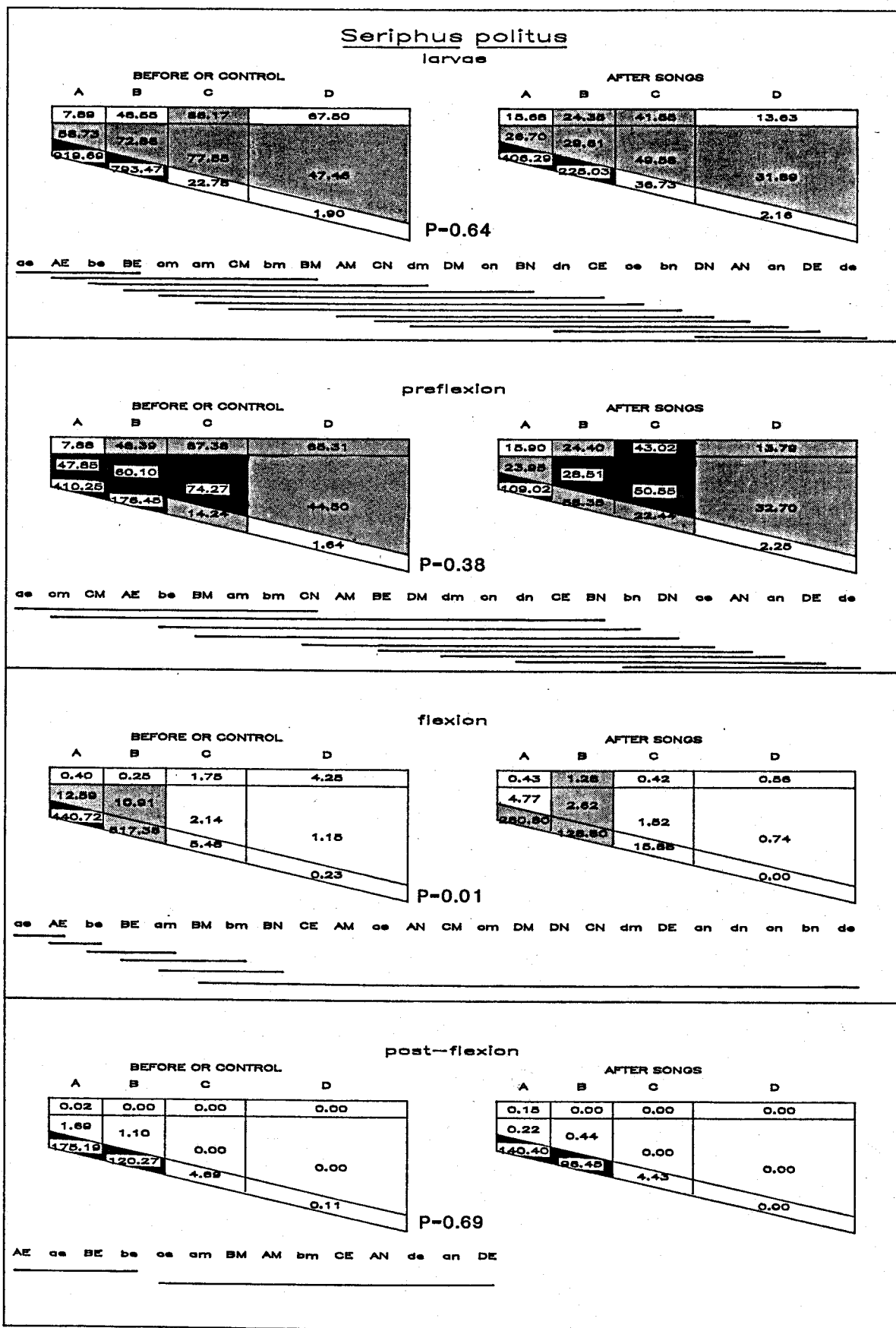


Figure D-153. Cross-shelf distributional patterns for Seriphus politus. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown

D-154

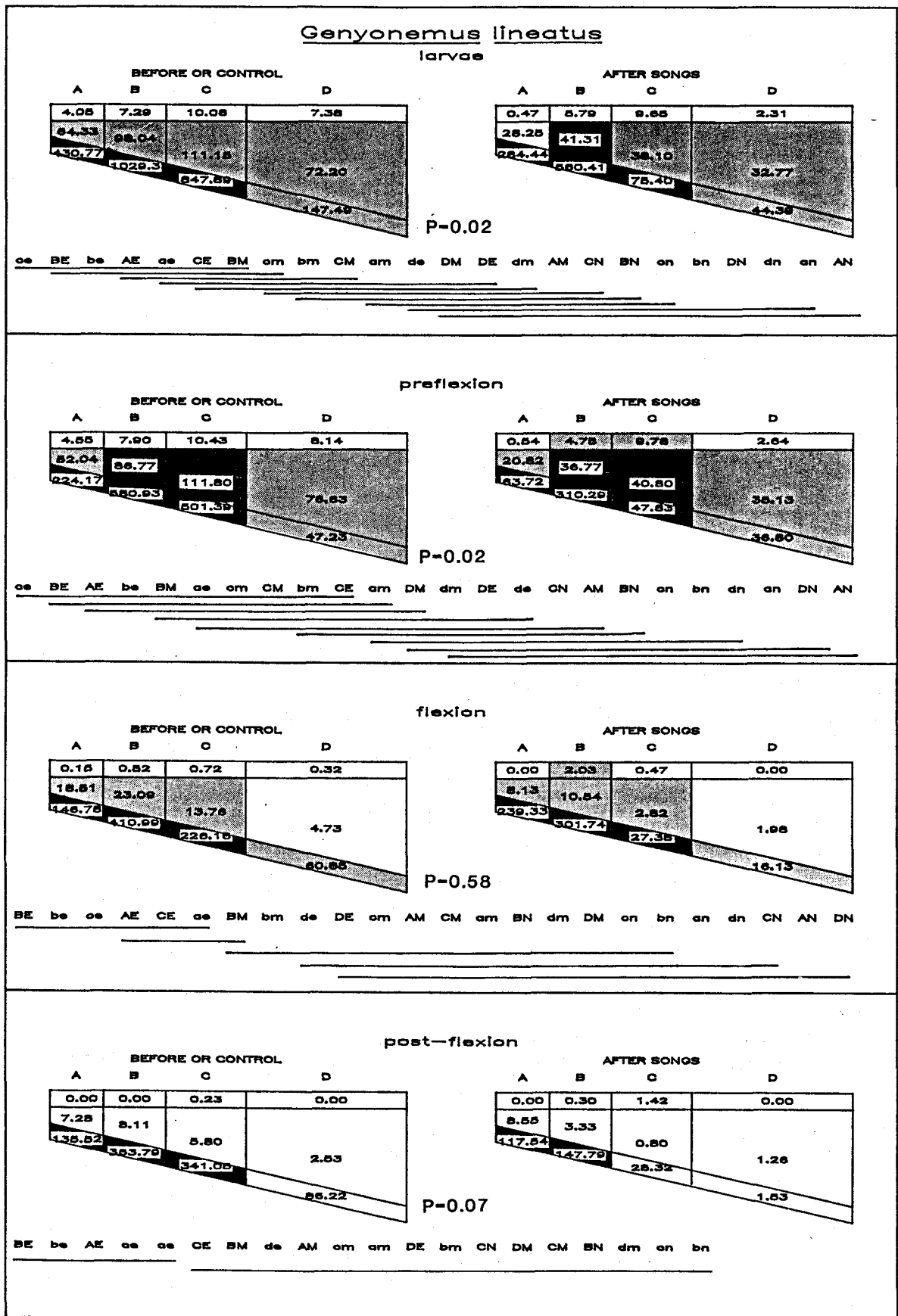


Figure D-174. Cross-shelf distributional patterns for *Genyonemus lineatus*. Shading denotes strata groupings based on the results of the Bonferroni t-test. Strata designations are ordered from highest to lowest mean rank abundance. Strata not significantly separable are underlined. Upper case strata designations (e.g., AM=Block A midwater) are for SONGS in the After data set, lower case are strata in the Before-Control data set (SONGS in the Before period and Control in both periods). Only strata in which larvae occurred were tested. The results of the MANOVA are also shown.

D-175