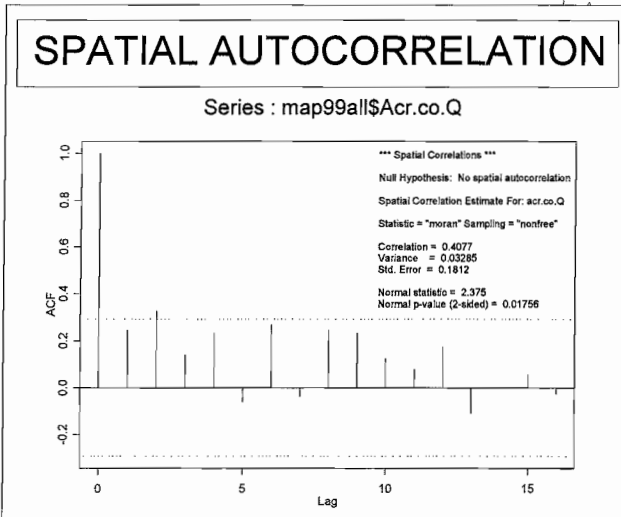


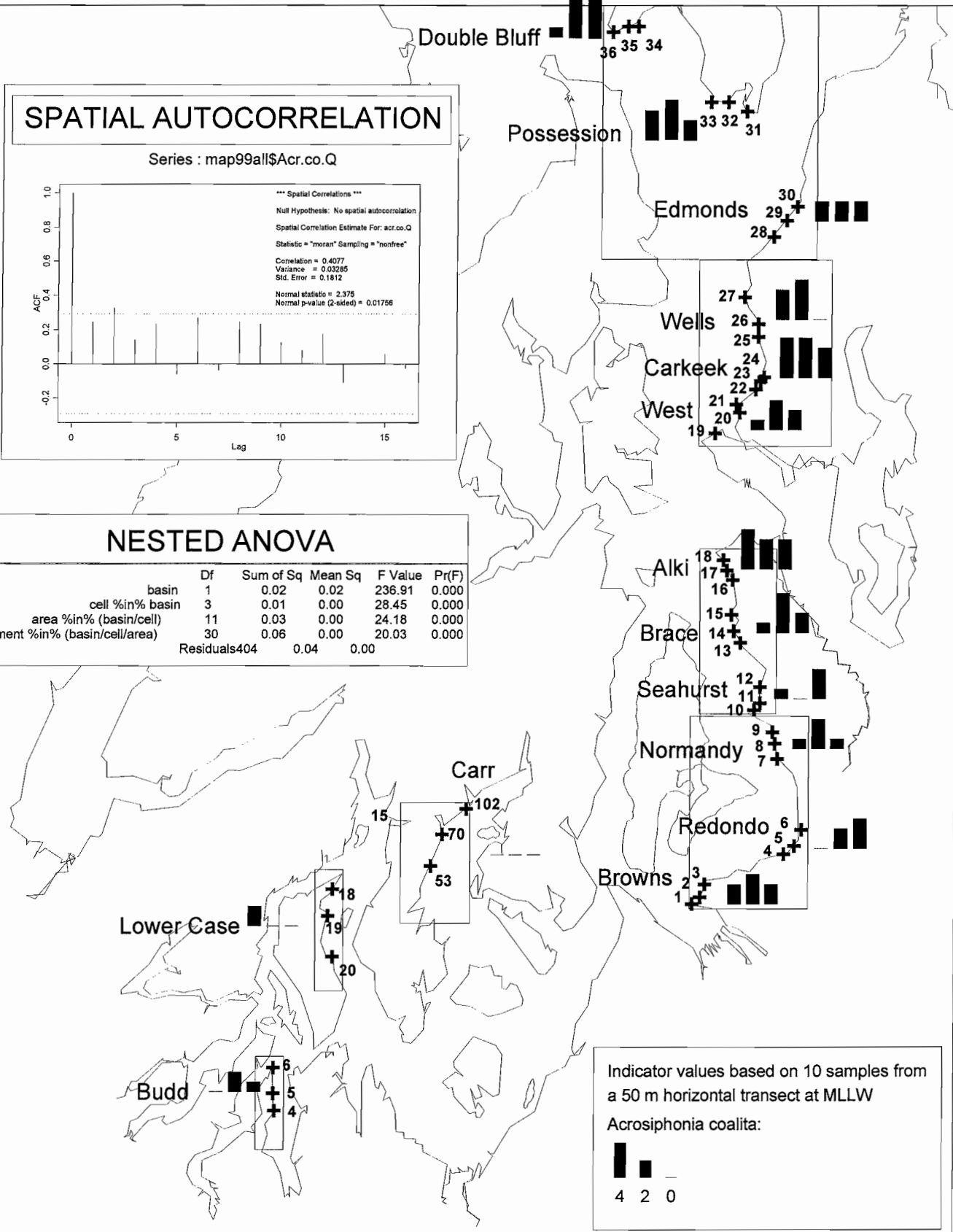
## **APPENDIX E**

# Appendix E1. Spatial distribution of *Acrosiphonia coalita* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions



### NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.02	0.02	236.91	0.000
cell %in% basin	3	0.01	0.00	28.45	0.000
area %in% (basin/cell)	11	0.03	0.00	24.18	0.000
segment %in% (basin/cell/area)	30	0.06	0.00	20.03	0.000
Residuals	404		0.04	0.00	



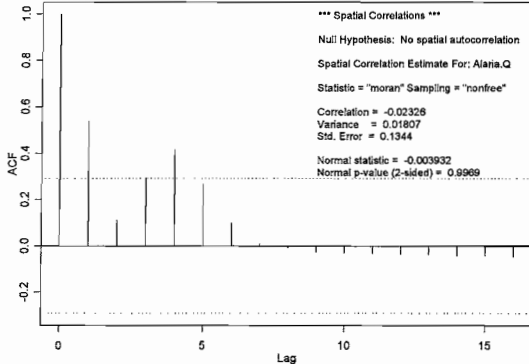
Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Acrosiphonia coalita*:

4 2 0

# Appendix E2. Spatial distribution of *Alia gausapata* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

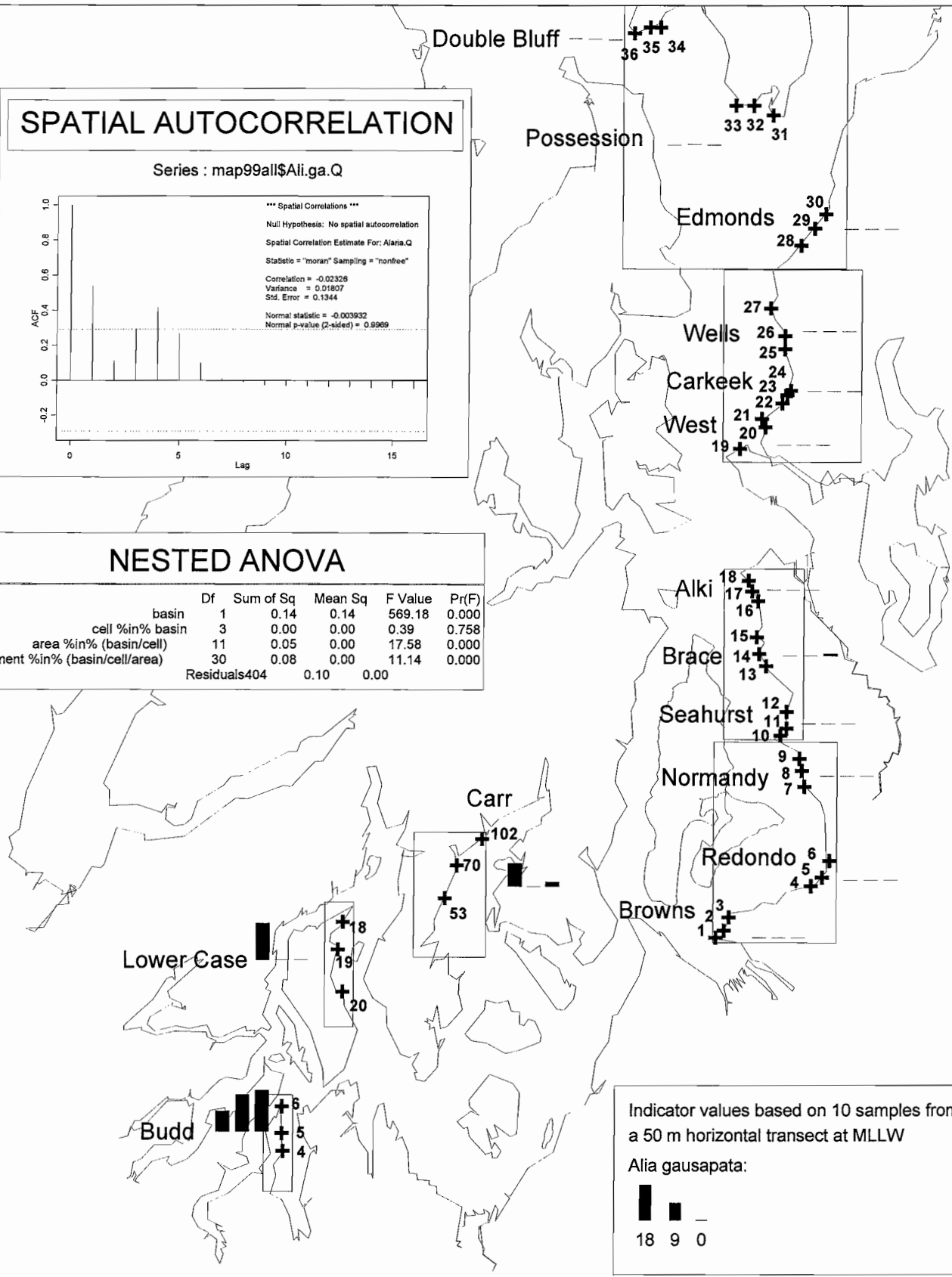
## SPATIAL AUTOCORRELATION

Series : map99all\$Ali.ga.Q



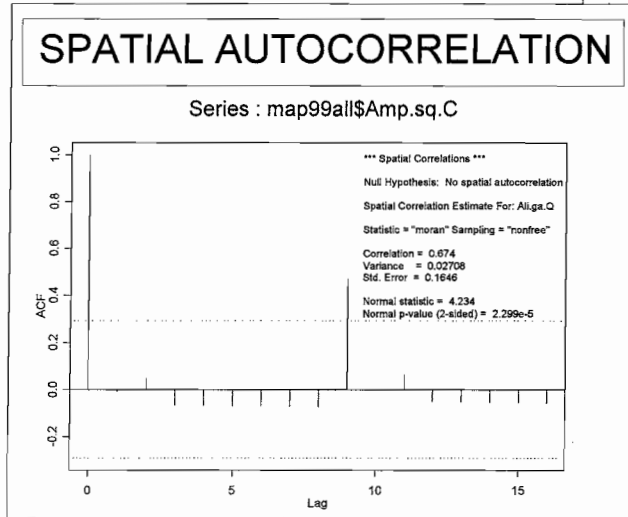
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.14	0.14	569.18	0.000
cell %in% basin	3	0.00	0.00	0.39	0.758
area %in% (basin/cell)	11	0.05	0.00	17.58	0.000
segment %in% (basin/cell/area)	30	0.08	0.00	11.14	0.000
Residuals	404	0.10	0.00		



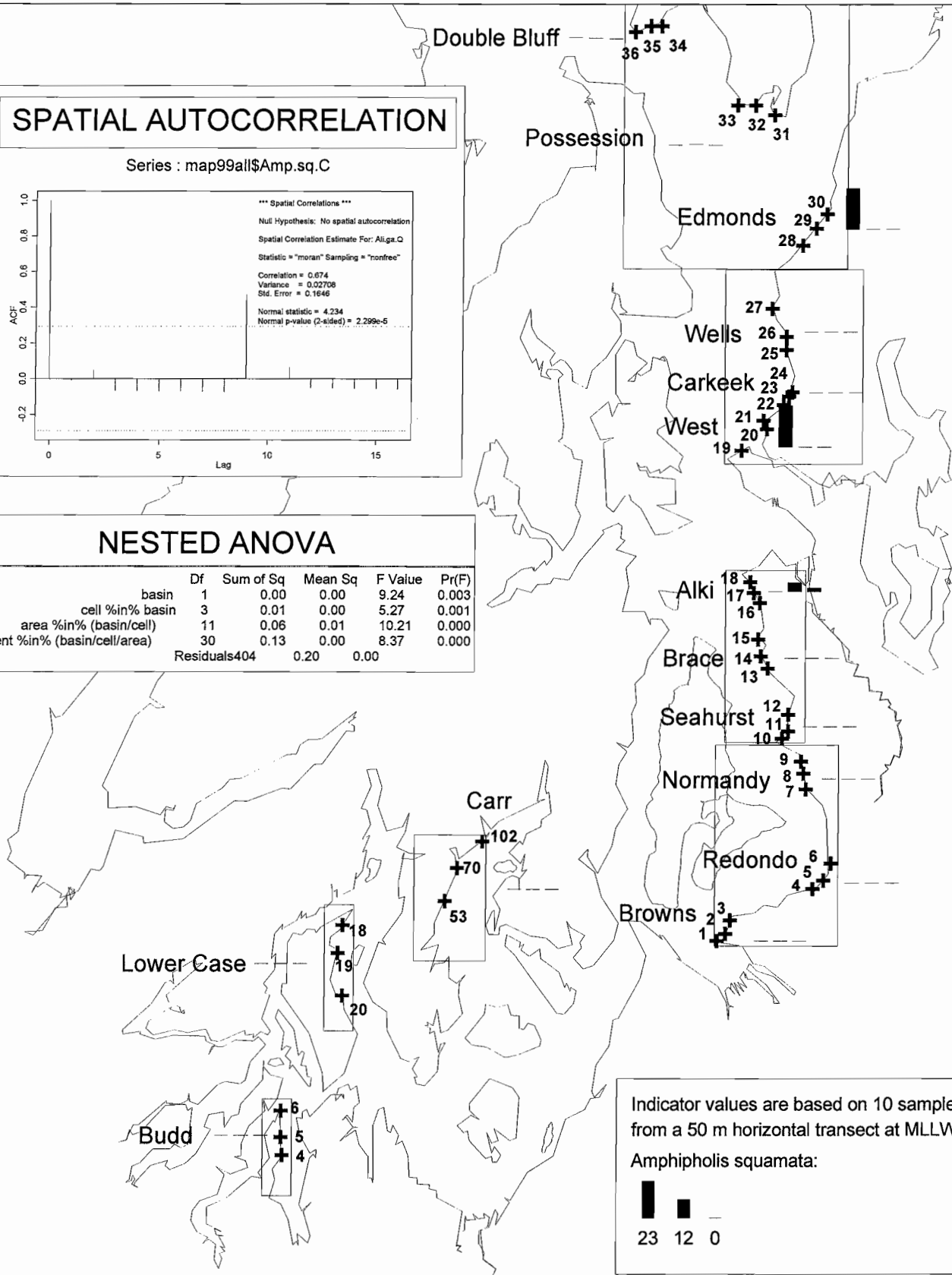
Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Alia gausapata*:  
  
 18 9 0

# Appendix E3. Spatial distribution of *Amphipholis squamata* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions



### NESTED ANOVA

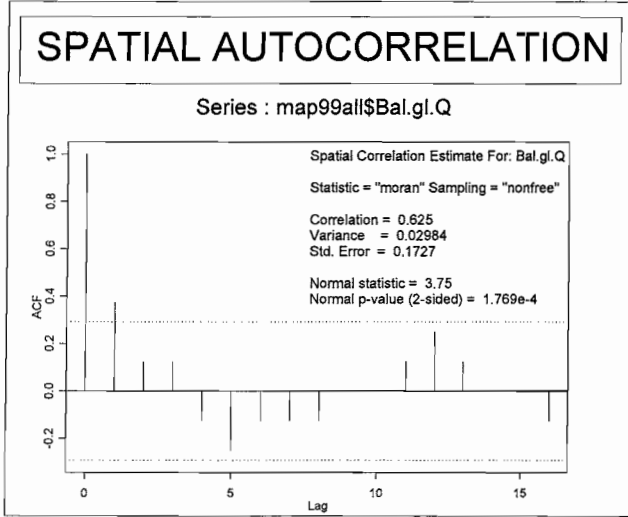
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	9.24	0.003
cell %in% basin	3	0.01	0.00	5.27	0.001
area %in% (basin/cell)	11	0.06	0.01	10.21	0.000
segment %in% (basin/cell/area)	30	0.13	0.00	8.37	0.000
Residuals	404	0.20	0.00		



Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW *Amphipholis squamata*:

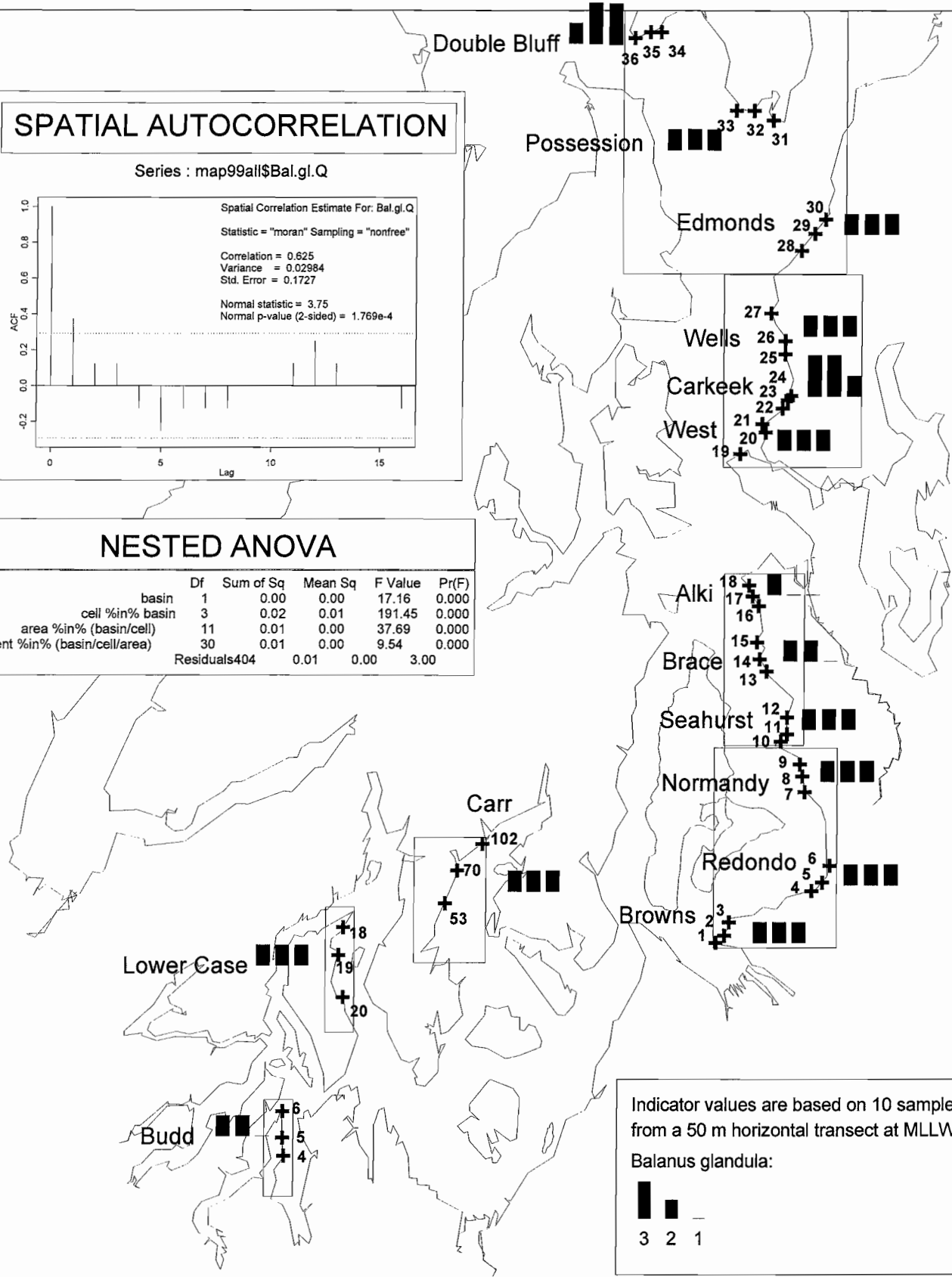
23 12 0

# Appendix E4. Spatial distribution of *Balanus glandula* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions



### NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	17.16	0.000
cell %in% basin	3	0.02	0.01	191.45	0.000
area %in% (basin/cell)	11	0.01	0.00	37.69	0.000
segment %in% (basin/cell/area)	30	0.01	0.00	9.54	0.000
Residuals	404	0.01	0.00	3.00	



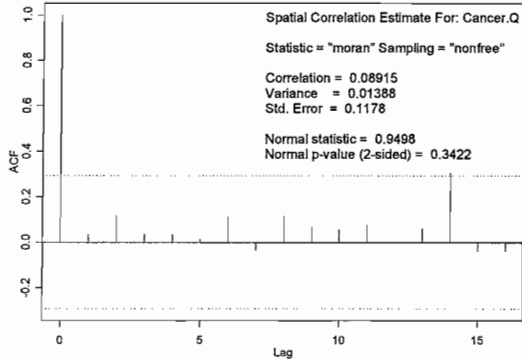
Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
*Balanus glandula*:

3 2 1

# Appendix E5. Spatial distribution of *Cancer productus* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

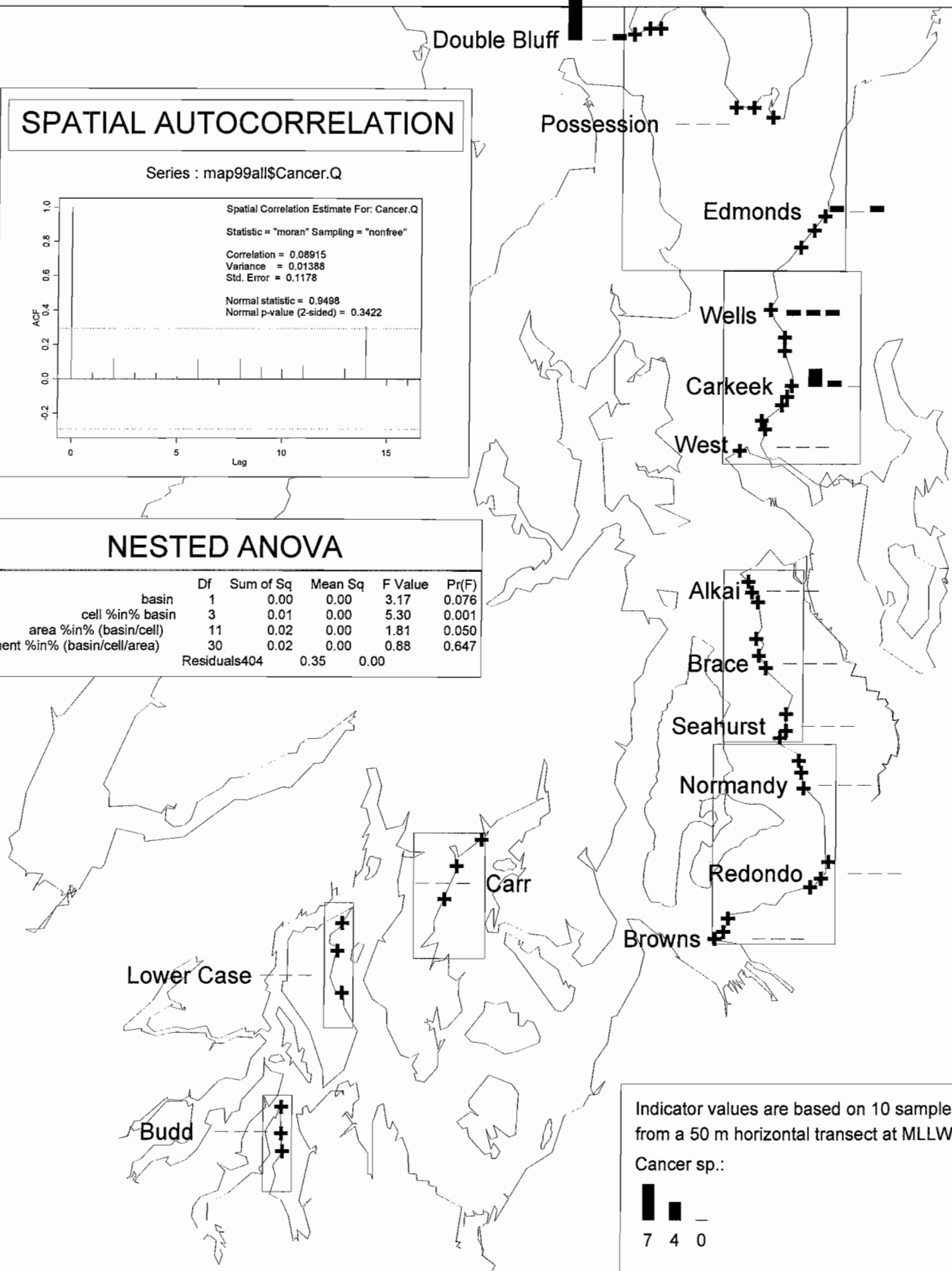
## SPATIAL AUTOCORRELATION

Series : map99all\$Cancer.Q



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	3.17	0.076
cell %in% basin	3	0.01	0.00	5.30	0.001
area %in% (basin/cell)	11	0.02	0.00	1.81	0.050
segment %in% (basin/cell/area)	30	0.02	0.00	0.88	0.647
Residuals	404	0.35	0.00		



Indicator values are based on 10 samples  
from a 50 m horizontal transect at MLLW

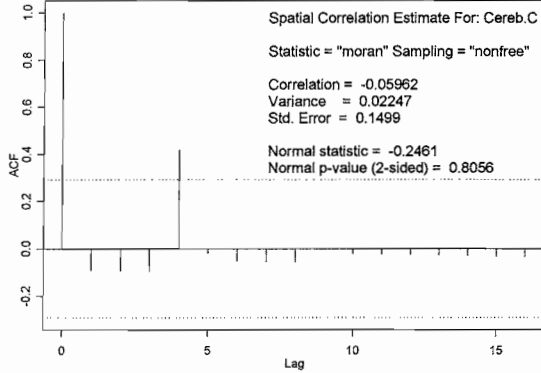
Cancer sp.:



# Appendix E6. Spatial distribution of *Cerebratulus* sp. Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

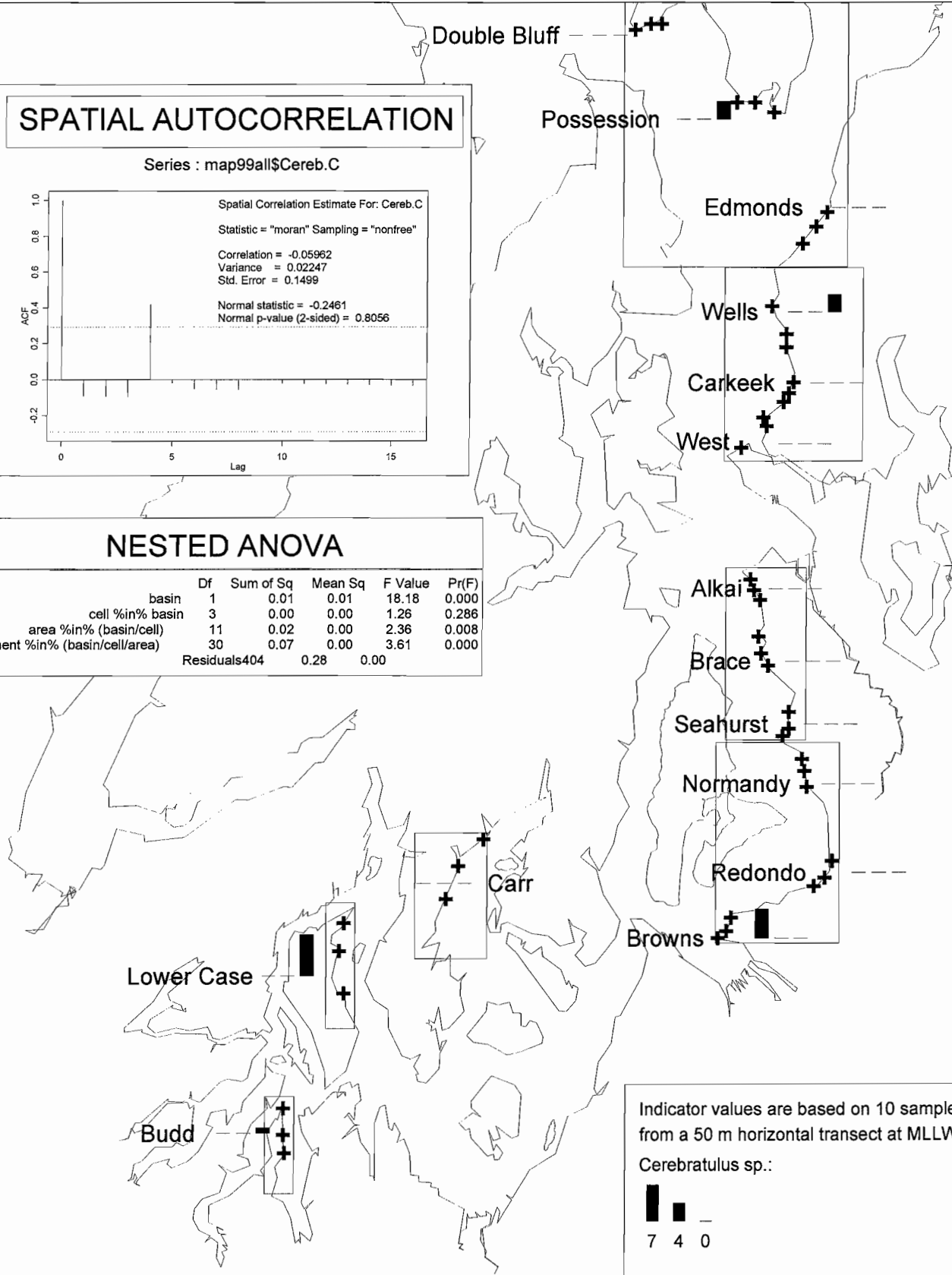
## SPATIAL AUTOCORRELATION

Series : map99all\$Cereb.C



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	18.18	0.000
cell %in% basin	3	0.00	0.00	1.26	0.286
area %in% (basin/cell)	11	0.02	0.00	2.36	0.008
segment %in% (basin/cell/area)	30	0.07	0.00	3.61	0.000
Residuals	404	0.28	0.00		



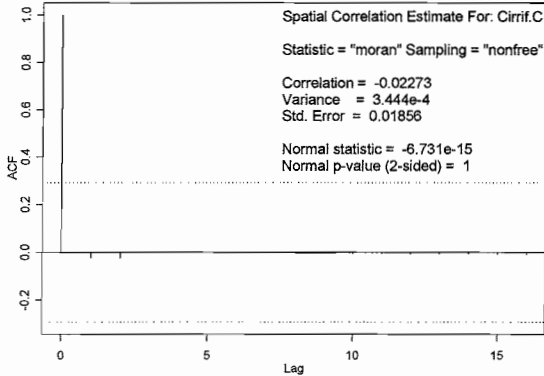
Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
*Cerebratulus* sp.:



# Appendix E7. Spatial distribution of *Cirriformia* sp. Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

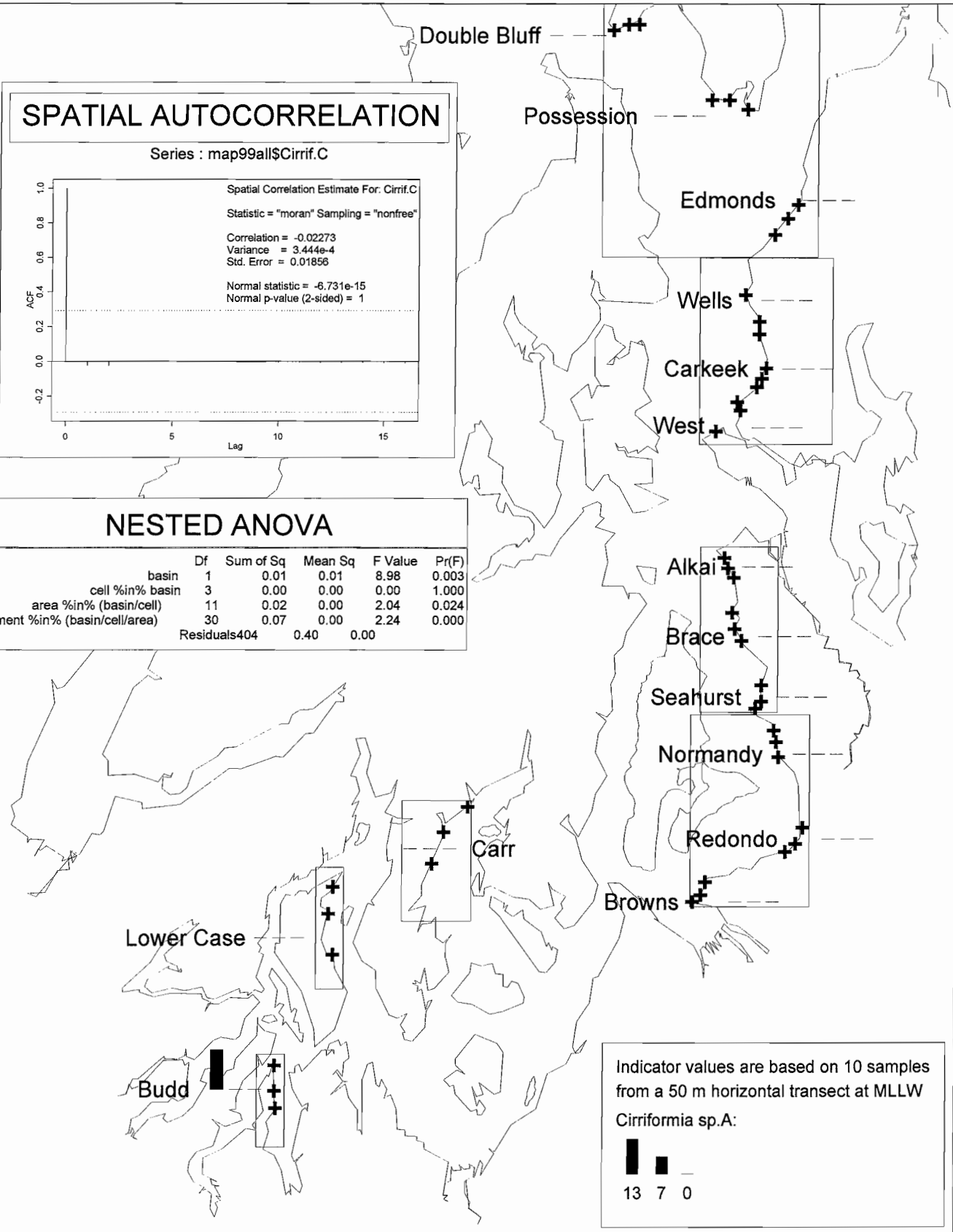
## SPATIAL AUTOCORRELATION

Series : map99all\$Cirrif.C



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	8.98	0.003
cell %in% basin	3	0.00	0.00	0.00	1.000
area %in% (basin/cell)	11	0.02	0.00	2.04	0.024
segment %in% (basin/cell/area)	30	0.07	0.00	2.24	0.000
Residuals	404	0.40	0.00		



Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
*Cirriformia* sp.A:

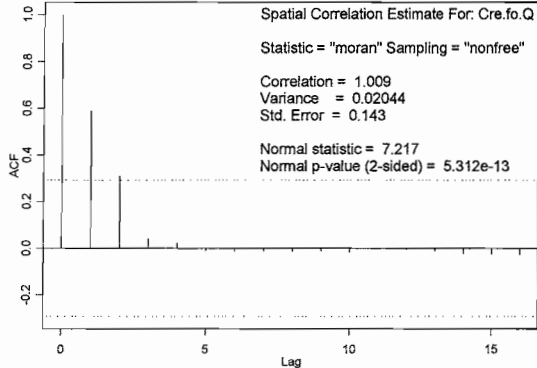
13 7 0



# Appendix E8. Spatial distribution of *Crepidula fornicata* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

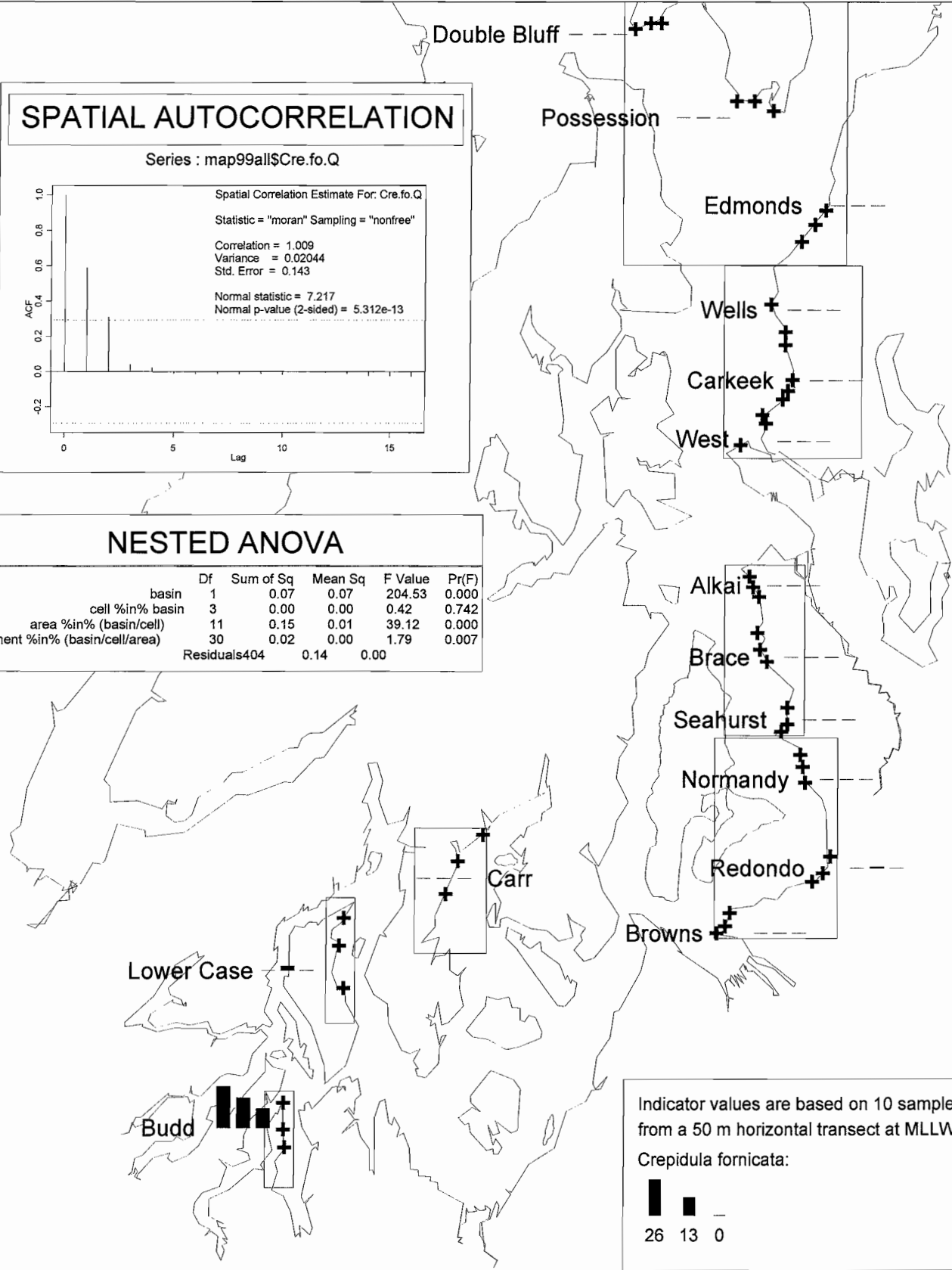
## SPATIAL AUTOCORRELATION

Series : map99all\$Cre.fo.Q



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.07	0.07	204.53	0.000
cell %in% basin	3	0.00	0.00	0.42	0.742
area %in% (basin/cell)	11	0.15	0.01	39.12	0.000
segment %in% (basin/cell/area)	30	0.02	0.00	1.79	0.007
Residuals	404		0.14	0.00	

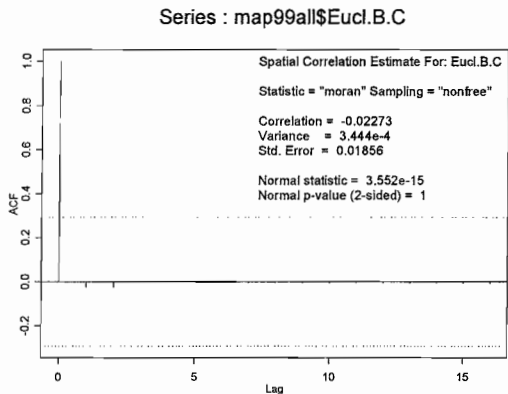


Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
*Crepidula fornicata*:



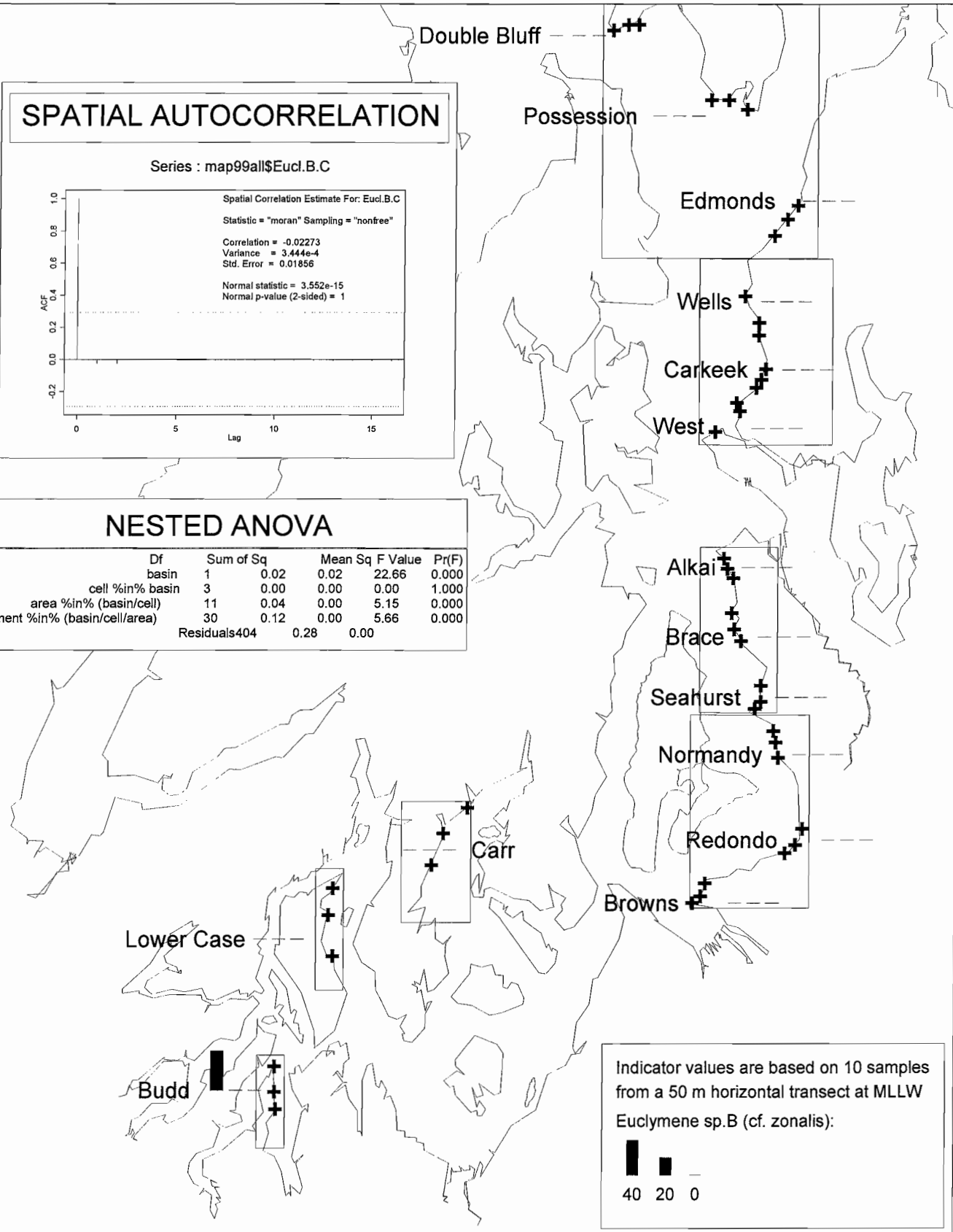
# Appendix E9. Spatial distribution of *Euclymene* sp.B Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.02	0.02	22.66	0.000
cell %in% basin	3	0.00	0.00	0.00	1.000
area %in% (basin/cell)	11	0.04	0.00	5.15	0.000
segment %in% (basin/cell/area)	30	0.12	0.00	5.66	0.000
Residuals	404	0.28	0.00		

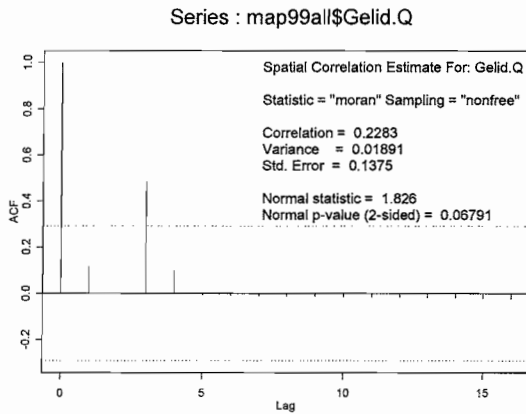


Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
*Euclymene* sp.B (cf. *zonalis*):

40
  20
  0

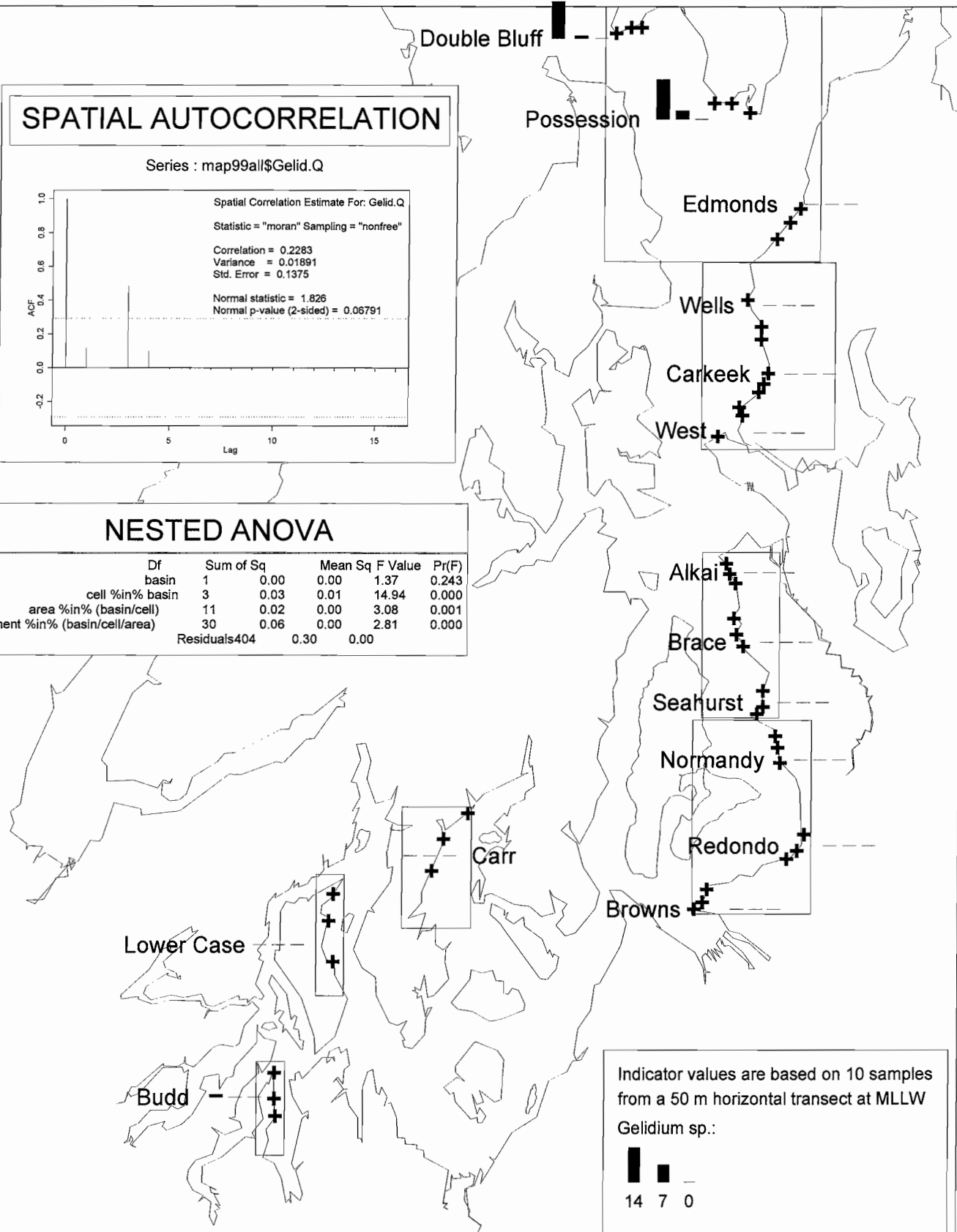
# Appendix E10. Spatial distribution of *Gelidium* sp Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(>F)
basin	1	0.00	0.00	1.37	0.243
cell %in% basin	3	0.03	0.01	14.94	0.000
area %in% (basin/cell)	11	0.02	0.00	3.08	0.001
segment %in% (basin/cell/area)	30	0.06	0.00	2.81	0.000
Residuals	404	0.30	0.00		



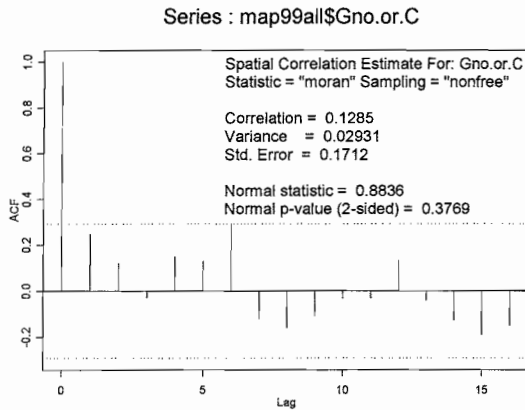
Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW

*Gelidium* sp.:

█ █ -  
14 7 0

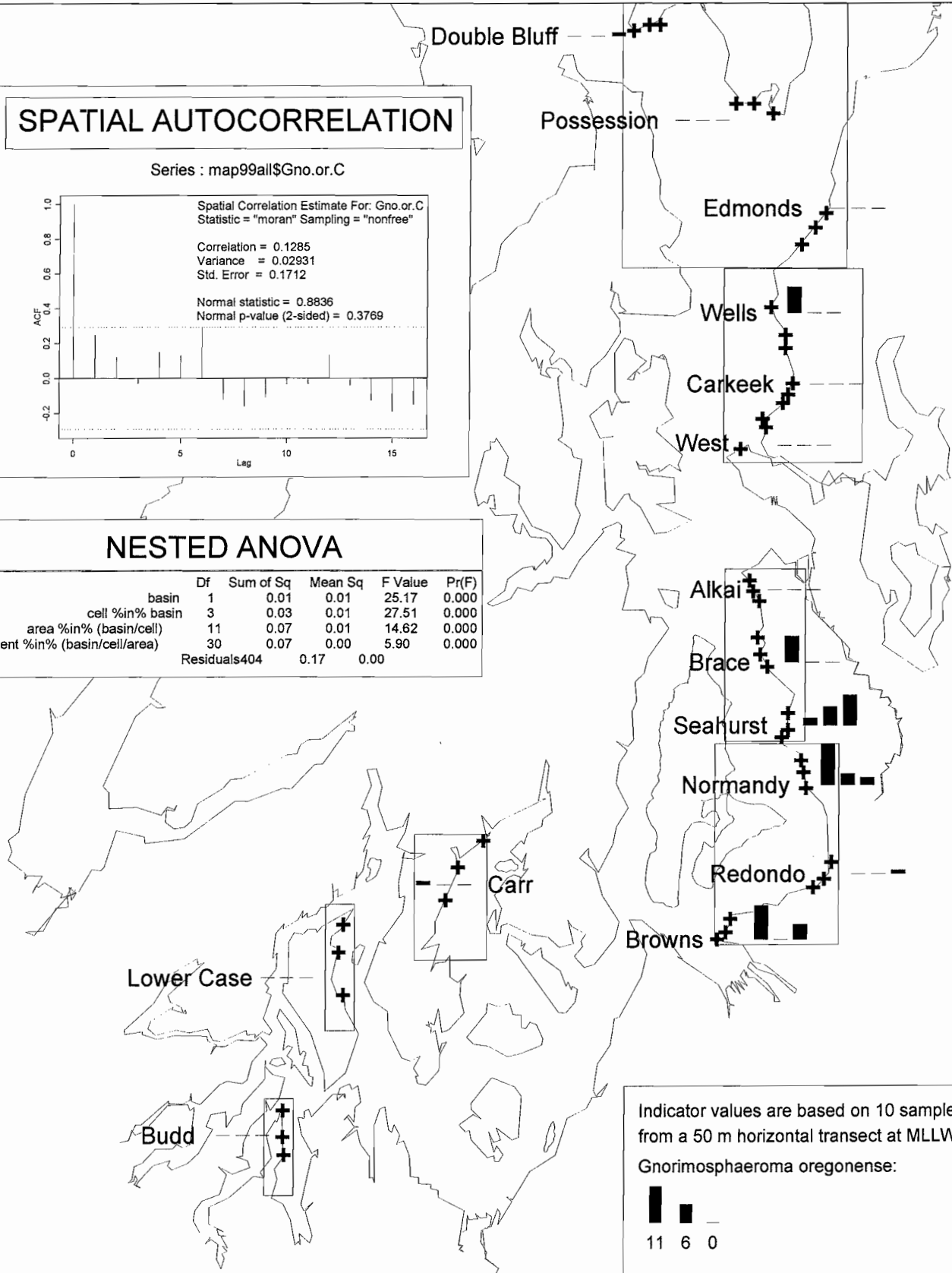
# Appendix E11. Spatial distribution of *Gnorimosphaeroma oregonense* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

## SPATIAL AUTOCORRELATION



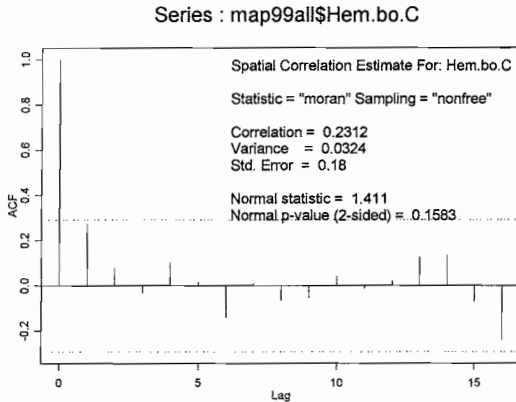
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	25.17	0.000
cell %in% basin	3	0.03	0.01	27.51	0.000
area %in% (basin/cell)	11	0.07	0.01	14.62	0.000
segment %in% (basin/cell/area)	30	0.07	0.00	5.90	0.000
Residuals	404		0.17	0.00	



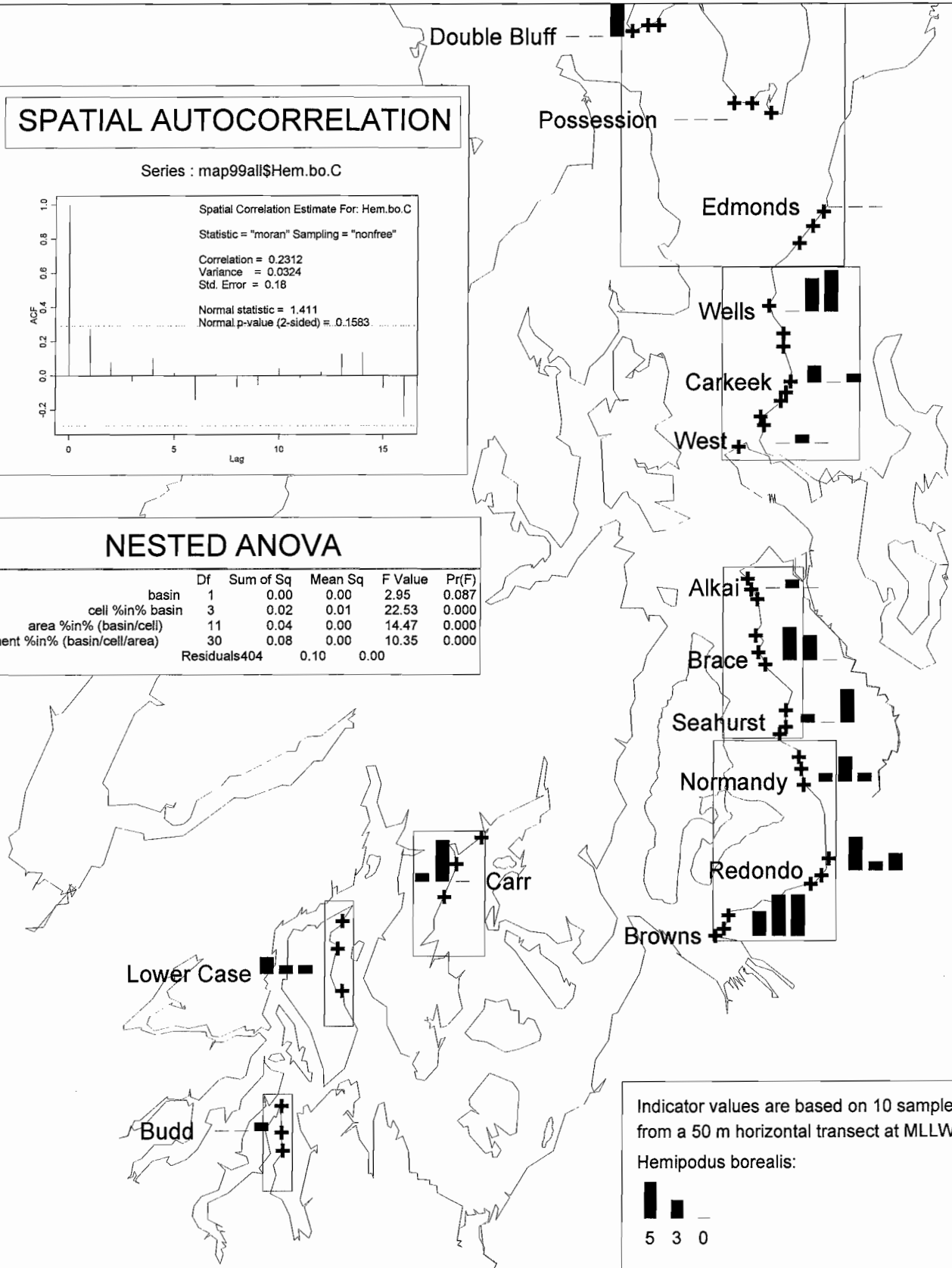
# Appendix E12. Spatial distribution of *Hemipodus borealis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Attributes

## SPATIAL AUTOCORRELATION

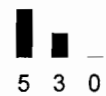


## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	2.95	0.087
cell %in% basin	3	0.02	0.01	22.53	0.000
area %in% (basin/cell)	11	0.04	0.00	14.47	0.000
segment %in% (basin/cell/area)	30	0.08	0.00	10.35	0.000
Residuals	404	0.10	0.00		

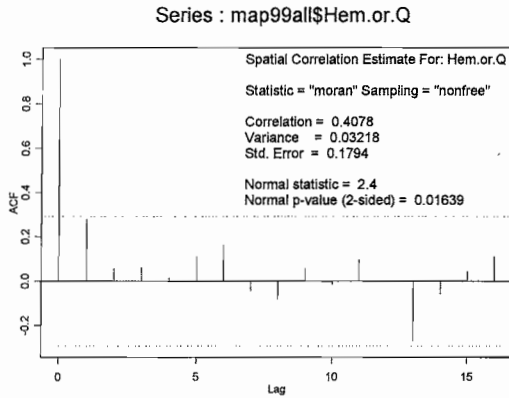


Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
*Hemipodus borealis*:



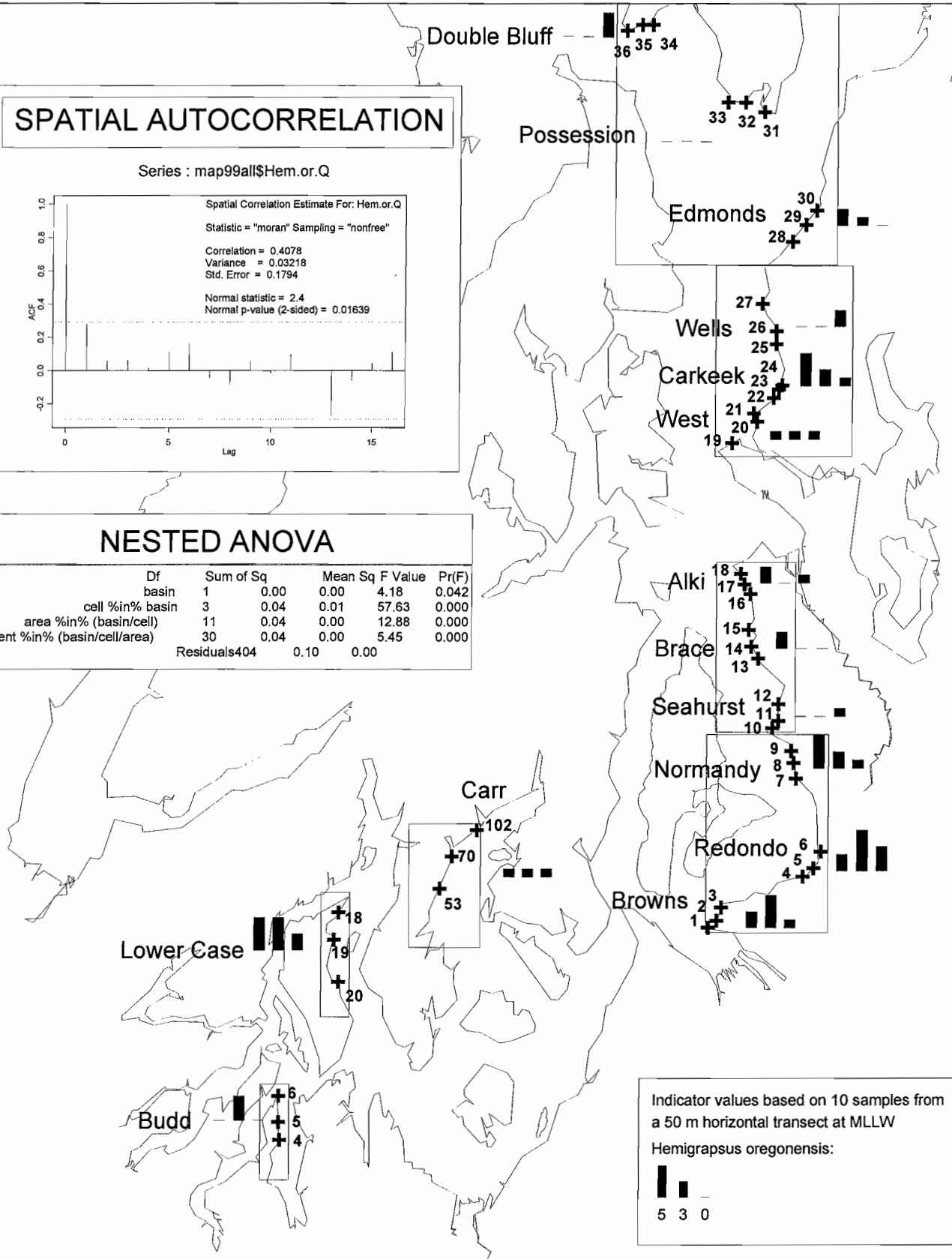
# Appendix E13. Spatial distribution of *Hemigrapsus oregonensis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	4.18	0.042
cell %in% basin	3	0.04	0.01	57.63	0.000
area %in% (basin/cell)	11	0.04	0.00	12.88	0.000
segment %in% (basin/cell/area)	30	0.04	0.00	5.45	0.000
Residuals	404	0.10	0.00		



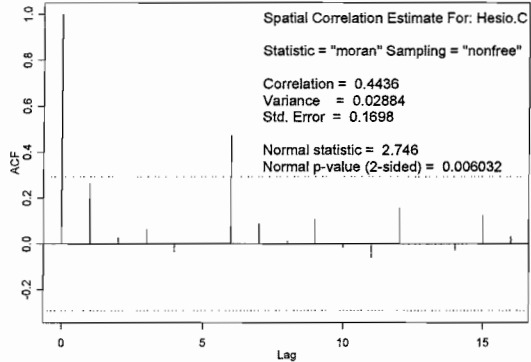
Indicator values based on 10 samples from  
a 50 m horizontal transect at MLLW  
*Hemigrapsus oregonensis*:



# Appendix E14. Spatial distribution of Hesionids (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

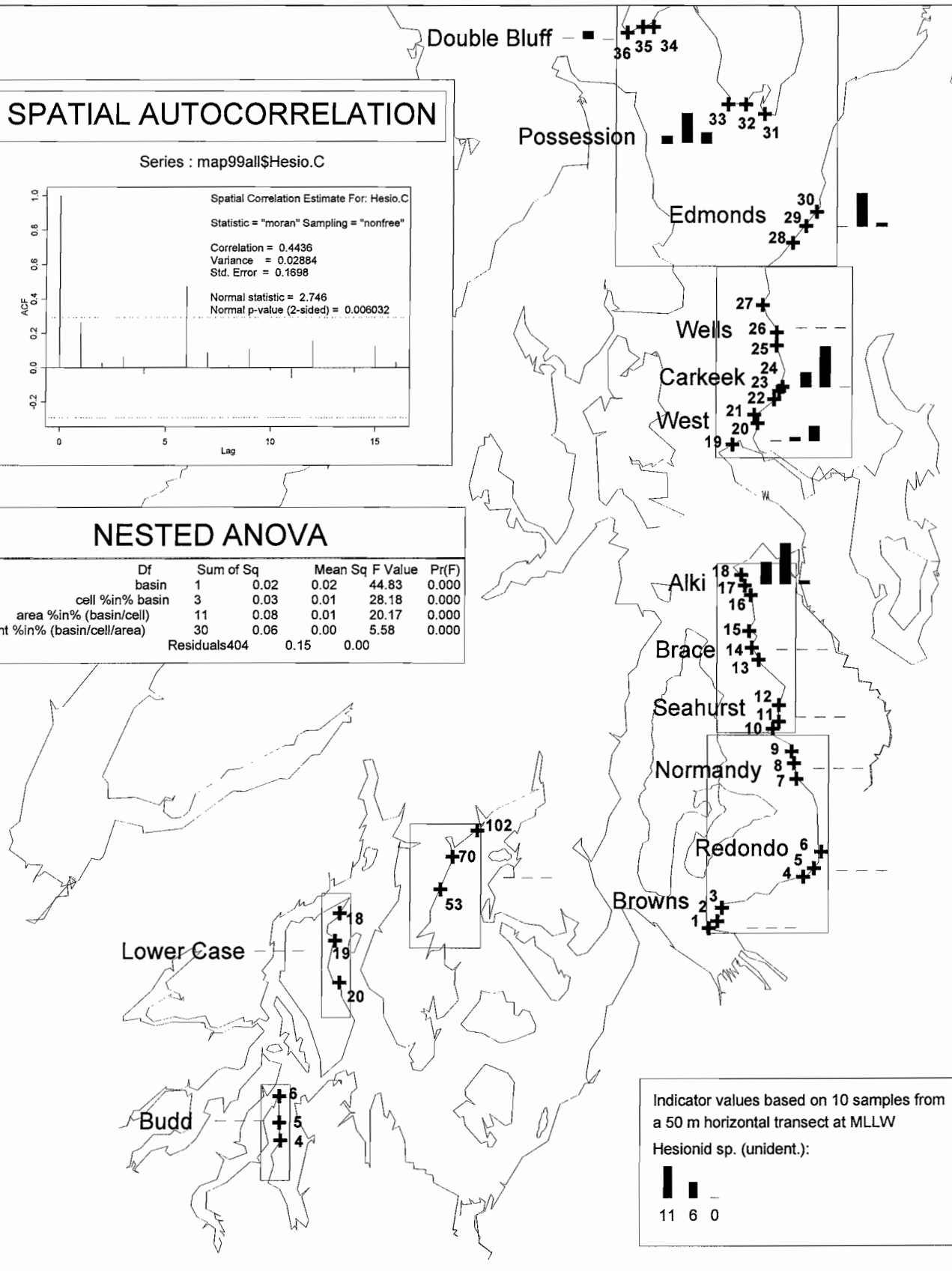
## SPATIAL AUTOCORRELATION

Series : map99all\$Hesio.C



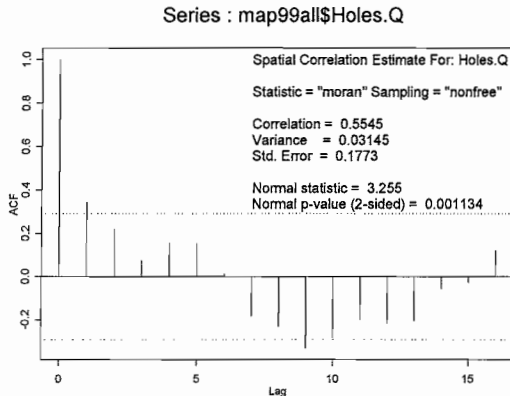
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.02	0.02	44.83	0.000
cell %in% basin	3	0.03	0.01	28.18	0.000
area %in% (basin/cell)	11	0.08	0.01	20.17	0.000
segment %in% (basin/cell/area)	30	0.06	0.00	5.58	0.000
Residuals	404	0.15	0.00		



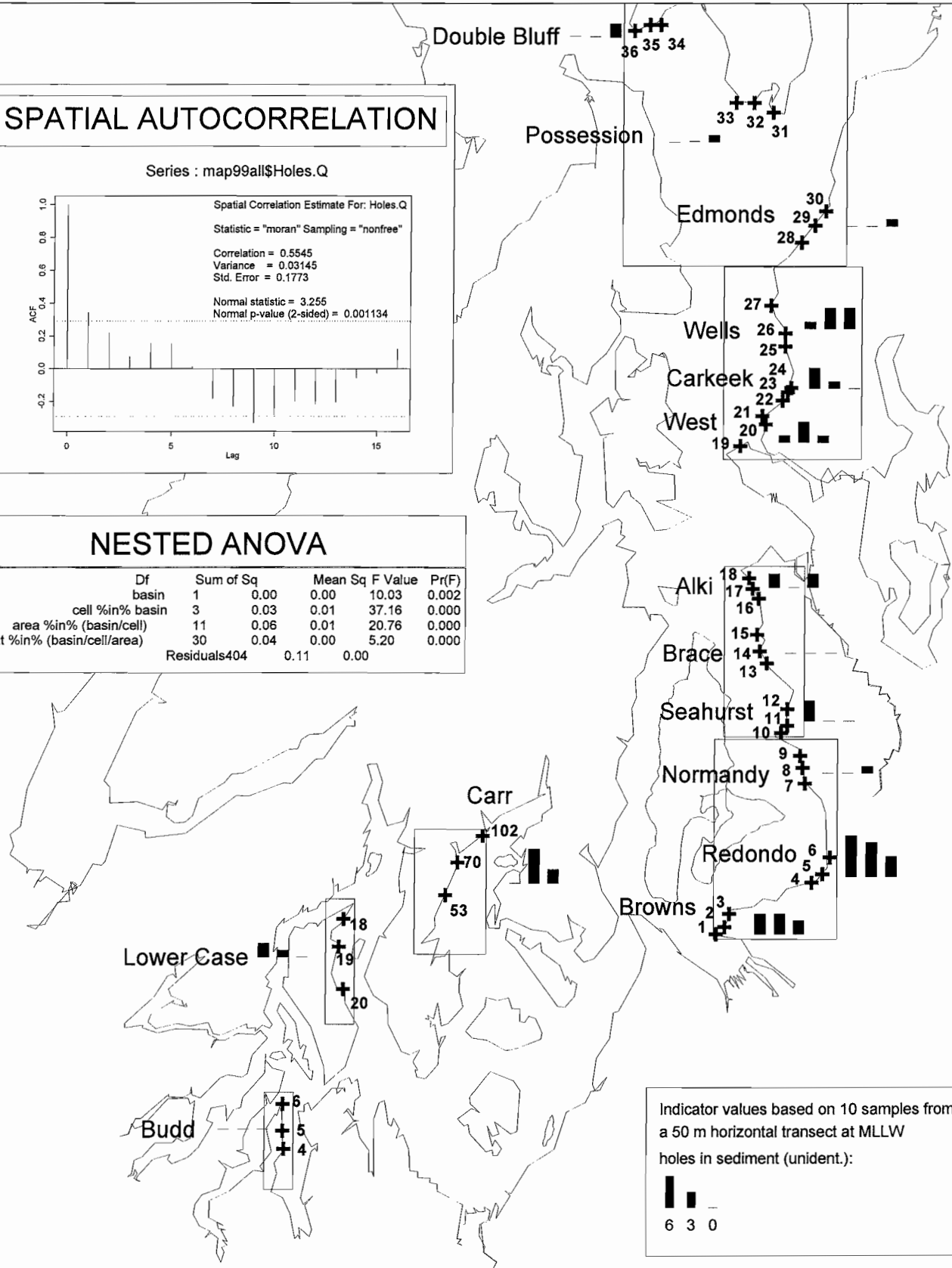
# Appendix E15. Spatial distribution of clam siphons/holes Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	10.03	0.002
cell %in% basin	3	0.03	0.01	37.16	0.000
area %in% (basin/cell)	11	0.06	0.01	20.76	0.000
segment %in% (basin/cell/area)	30	0.04	0.00	5.20	0.000
Residuals	404	0.11	0.00		



Indicator values based on 10 samples from a 50 m horizontal transect at MLLW holes in sediment (unident.):

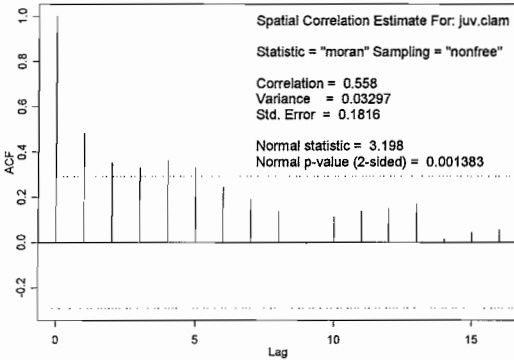
6 3 0



# Appendix E16. Spatial distribution of juvenile clams (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

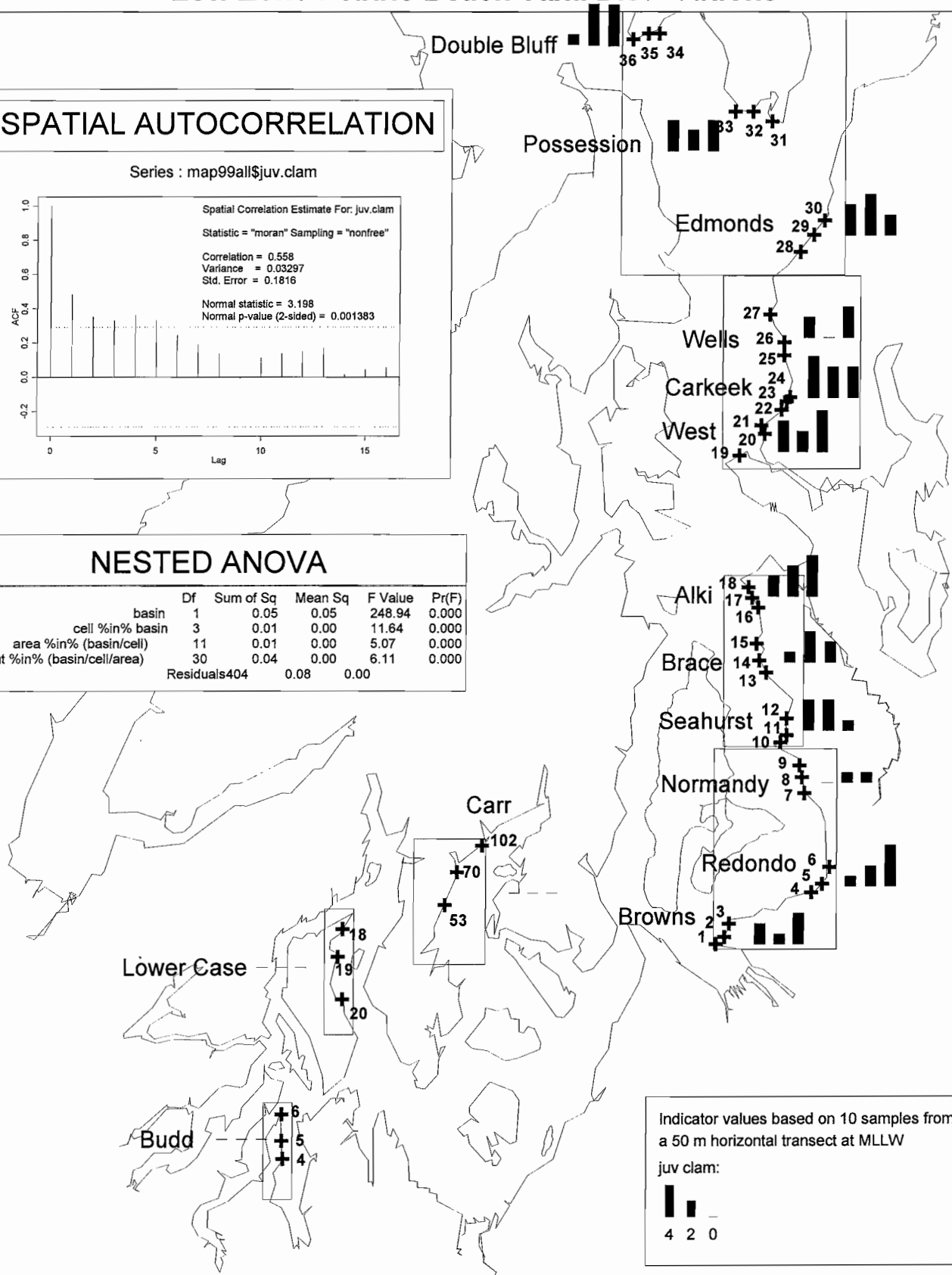
## SPATIAL AUTOCORRELATION

Series : map99all\$juv.clam



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.05	0.05	248.94	0.000
cell %in% basin	3	0.01	0.00	11.64	0.000
area %in% (basin/cell)	11	0.01	0.00	5.07	0.000
segment %in% (basin/cell/area)	30	0.04	0.00	6.11	0.000
Residuals	404	0.08	0.00		



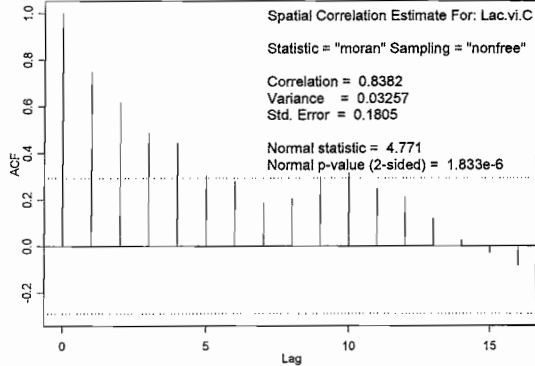
Indicator values based on 10 samples from  
a 50 m horizontal transect at MLLW  
juv clam:



# Appendix E17. Spatial distribution of *Lacuna vincta* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

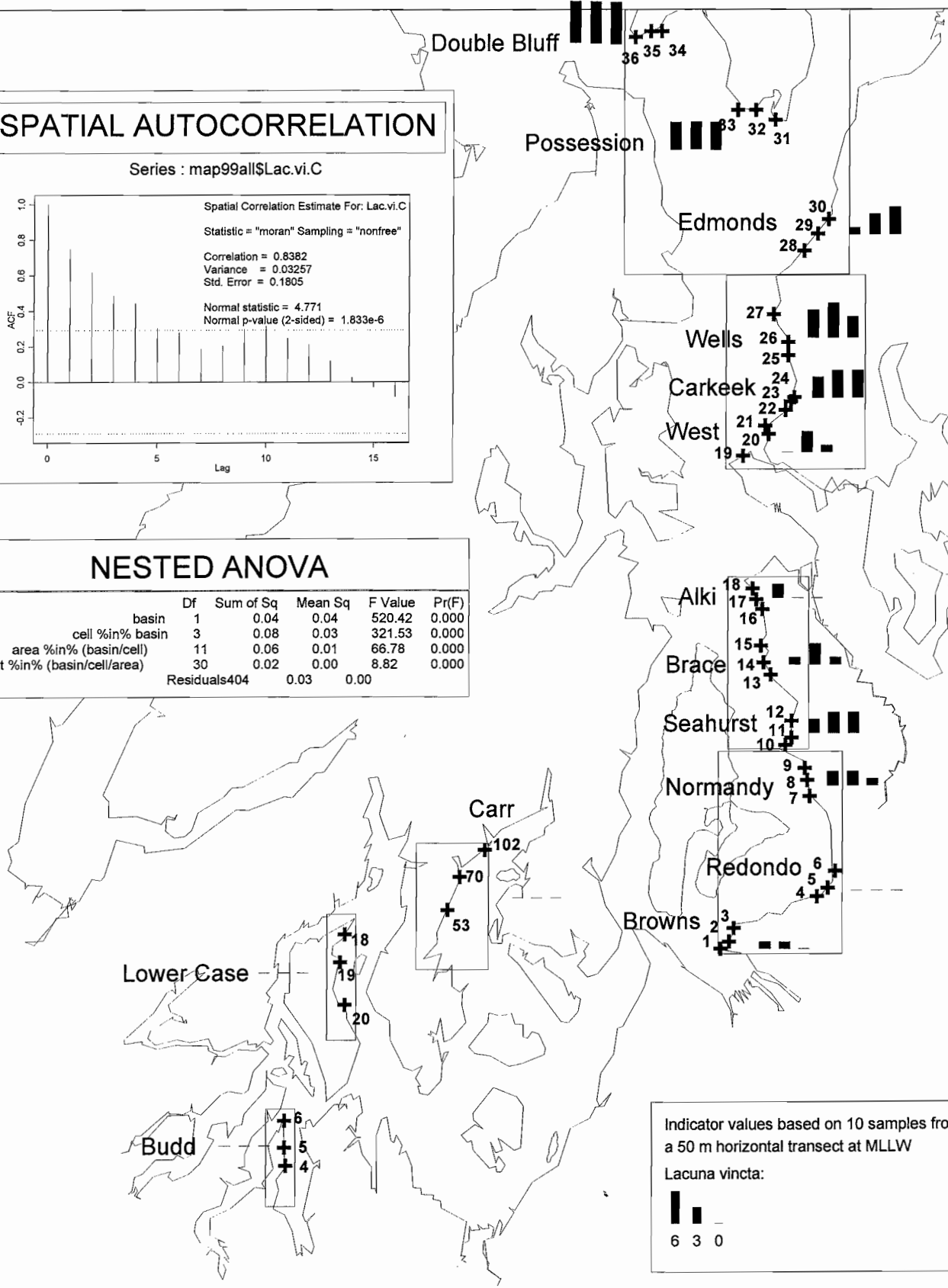
## SPATIAL AUTOCORRELATION

Series : map99all\$Lac.vi.C



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.04	0.04	520.42	0.000
cell %in% basin	3	0.08	0.03	321.53	0.000
area %in% (basin/cell)	11	0.06	0.01	66.78	0.000
segment %in% (basin/cell/area)	30	0.02	0.00	8.82	0.000
Residuals	404	0.03	0.00		



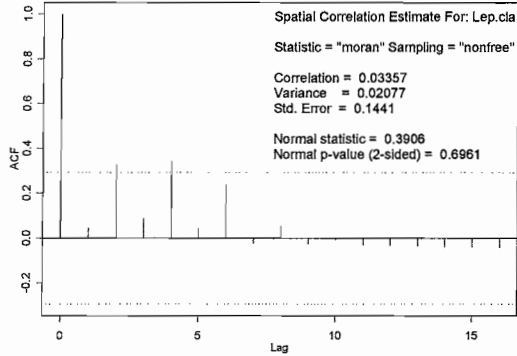
Indicator values based on 10 samples from  
a 50 m horizontal transect at MLLW  
*Lacuna vincta*:



# Appendix E18. Spatial distribution of *Leptosynapta clark* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

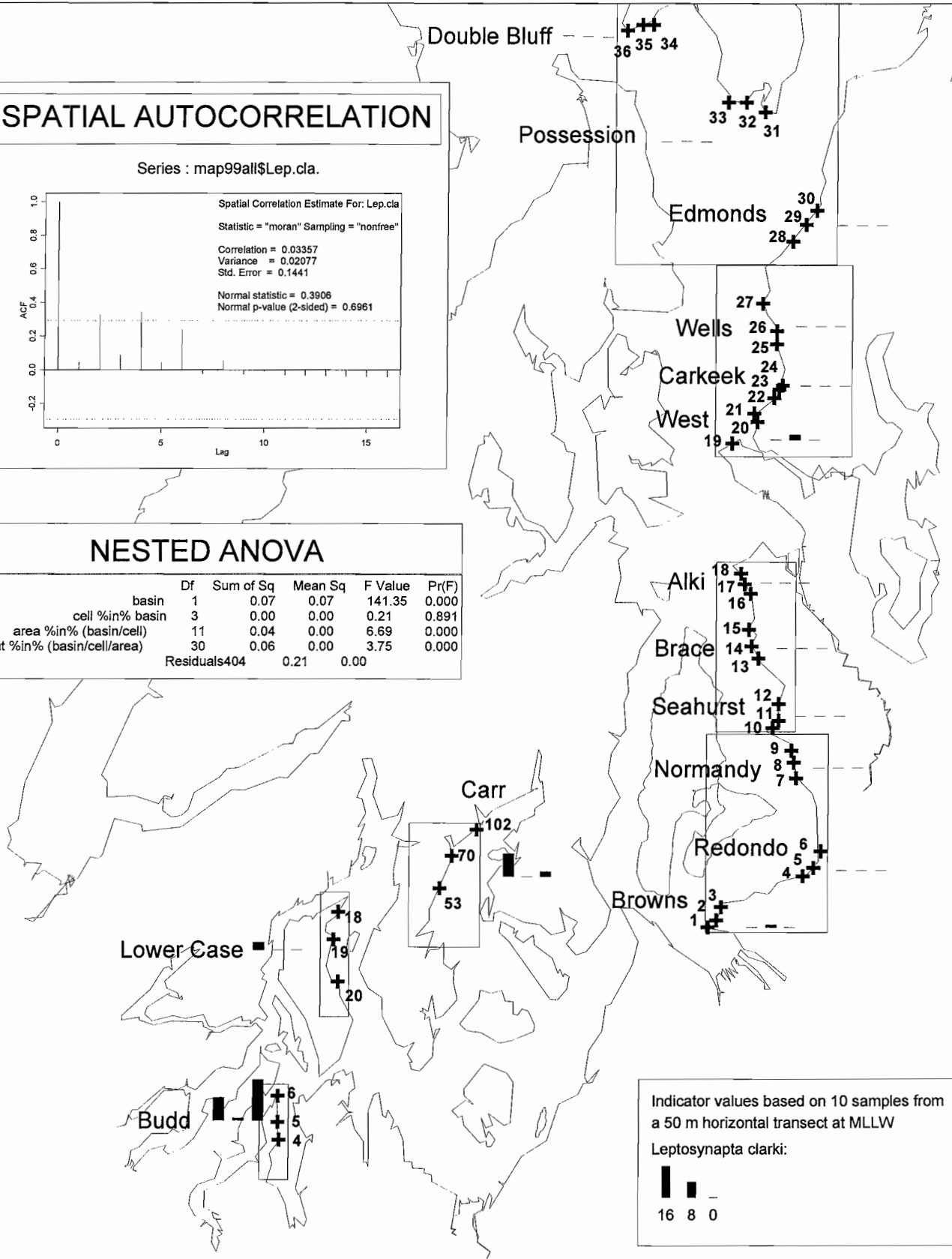
## SPATIAL AUTOCORRELATION

Series : map99all\$Lep.cla.



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(>F)
basin	1	0.07	0.07	141.35	0.000
cell %in% basin	3	0.00	0.00	0.21	0.891
area %in% (basin/cell)	11	0.04	0.00	6.69	0.000
segment %in% (basin/cell/area)	30	0.06	0.00	3.75	0.000
Residuals	404	0.21	0.00		



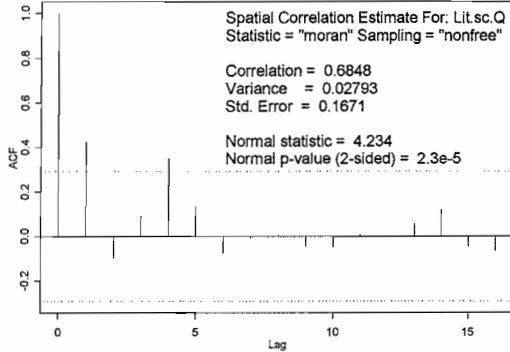
Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Leptosynapta clarki*:

16 8 0

# Appendix E19. Spatial distribution of *Littorina scutulata* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

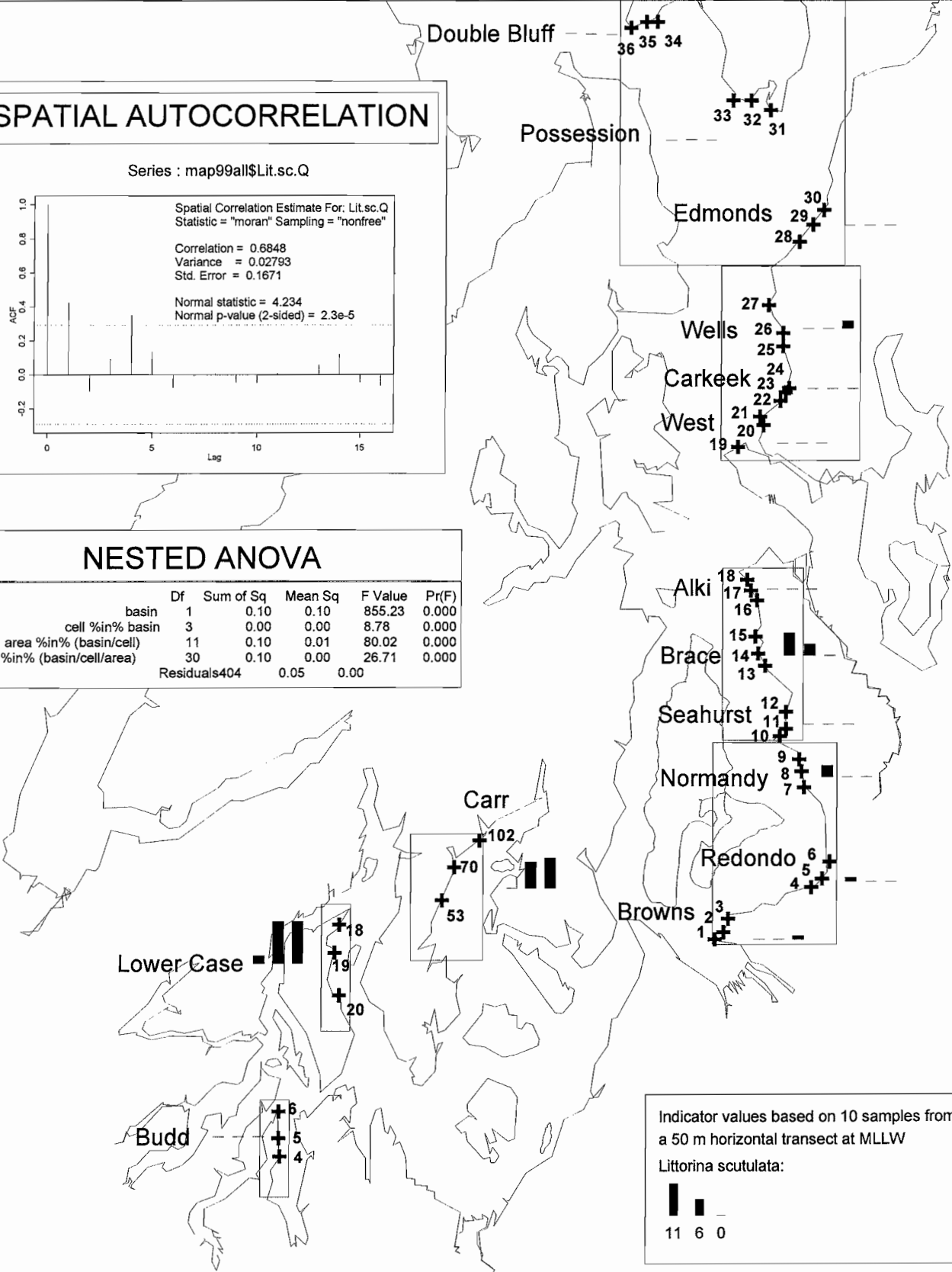
## SPATIAL AUTOCORRELATION


Series : map99all\$Lit.sc.Q



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.10	0.10	855.23	0.000
cell %in% basin	3	0.00	0.00	8.78	0.000
area %in% (basin/cell)	11	0.10	0.01	80.02	0.000
segment %in% (basin/cell/area)	30	0.10	0.00	26.71	0.000
Residuals	404	0.05	0.00		

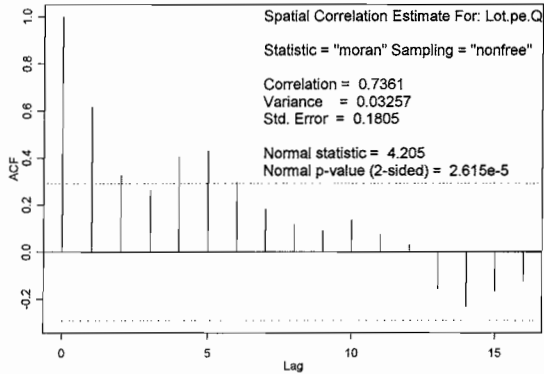


Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Littorina scutulata*:  
  
 11 6 0

# Appendix E20. Spatial distribution of *Lottia pelta* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

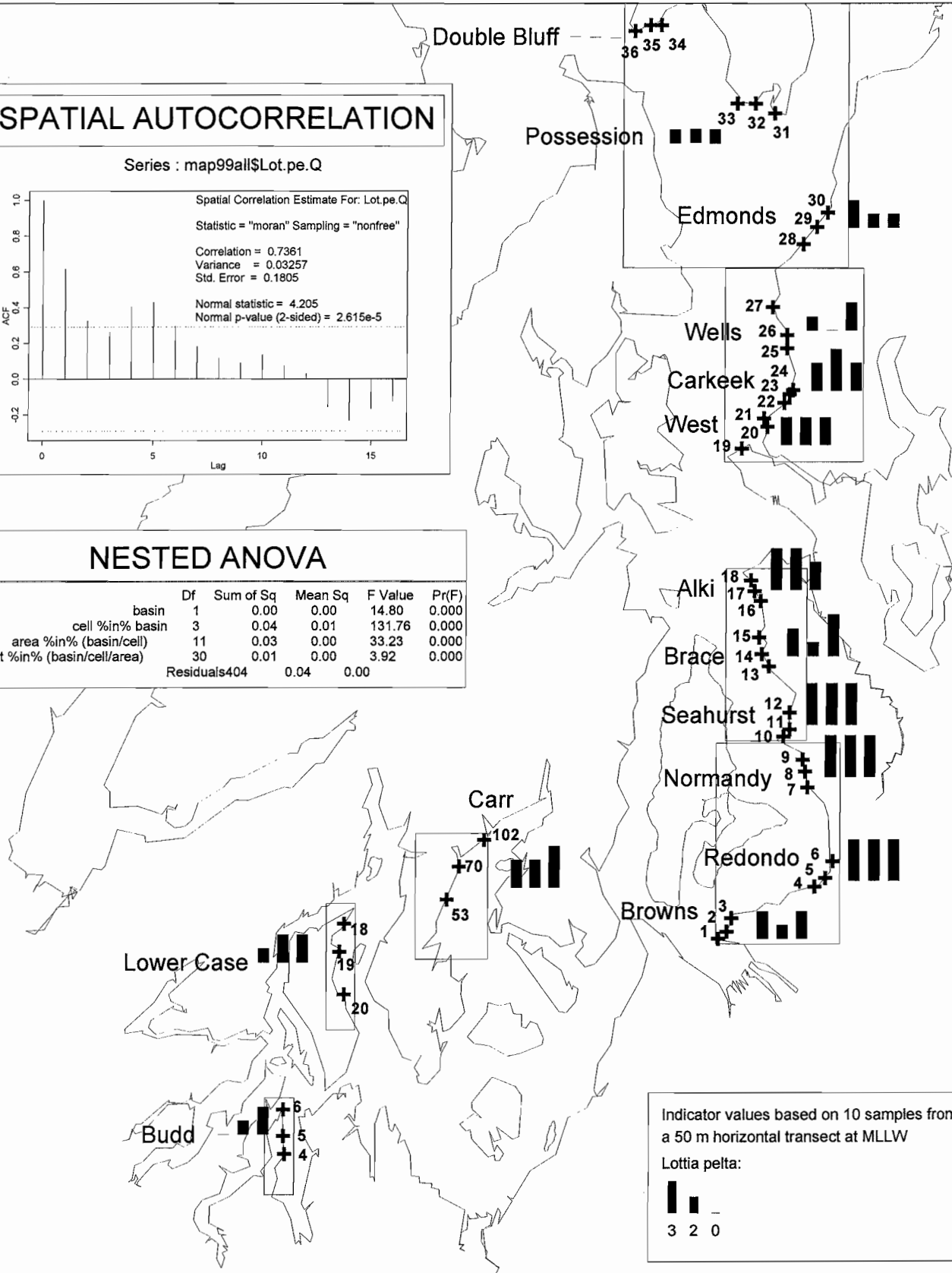
## SPATIAL AUTOCORRELATION

Series : map99all\$Lot.pe.Q



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	14.80	0.000
cell %in% basin	3	0.04	0.01	131.76	0.000
area %in% (basin/cell)	11	0.03	0.00	33.23	0.000
segment %in% (basin/cell/area)	30	0.01	0.00	3.92	0.000
Residuals	404	0.04	0.00		



Indicator values based on 10 samples from  
a 50 m horizontal transect at MLLW

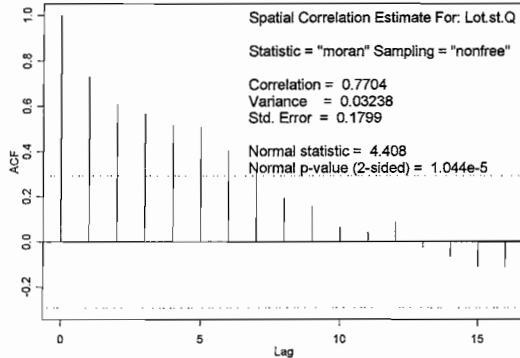
*Lottia pelta*:



# Appendix E21. Spatial distribution of *Lottia strigatella* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

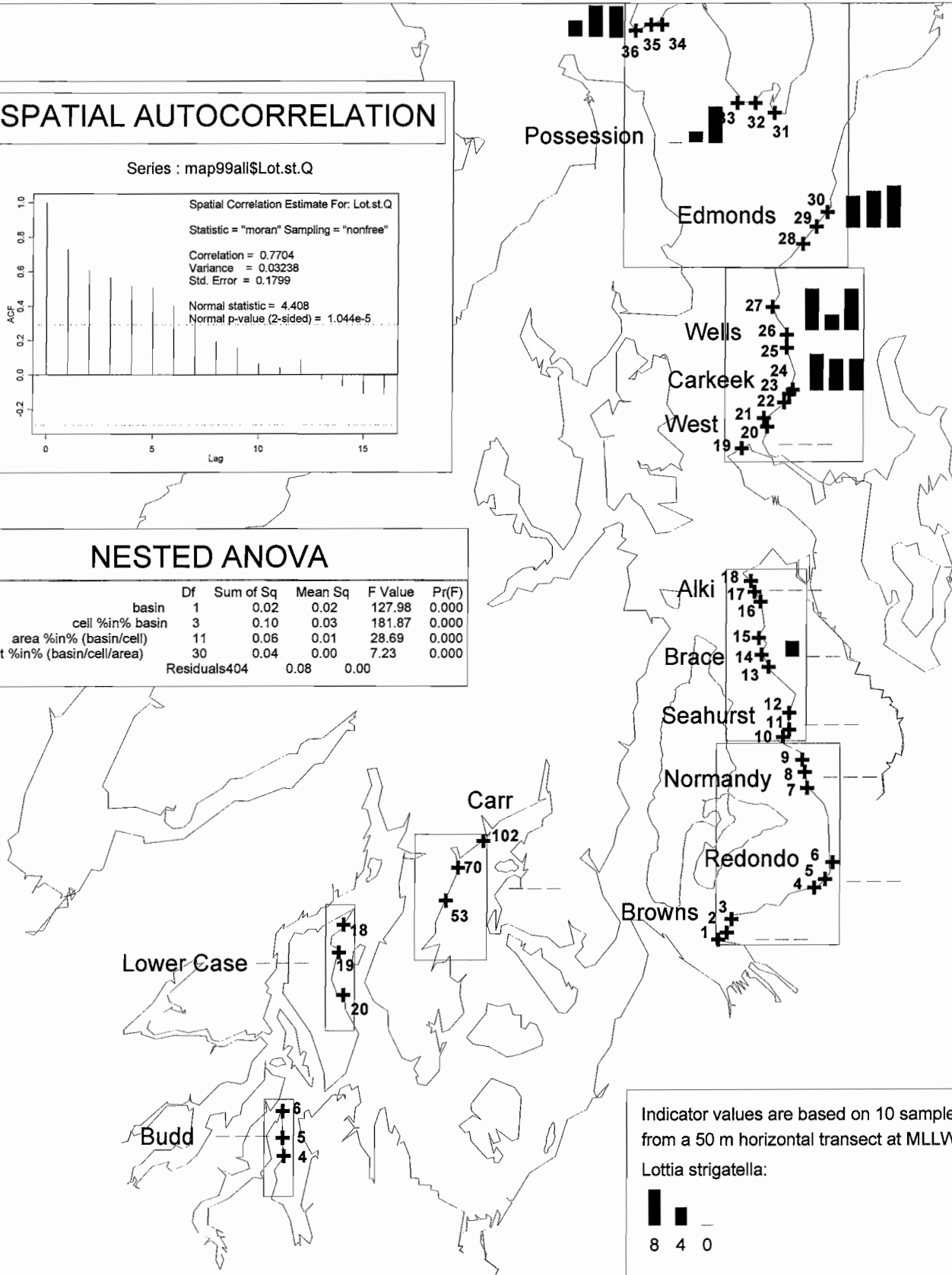
## SPATIAL AUTOCORRELATION

Series : map99all\$Lot.st.Q



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.02	0.02	127.98	0.000
cell %in% basin	3	0.10	0.03	181.87	0.000
area %in% (basin/cell)	11	0.06	0.01	28.69	0.000
segment %in% (basin/cell/area)	30	0.04	0.00	7.23	0.000
Residuals	404	0.08	0.00		

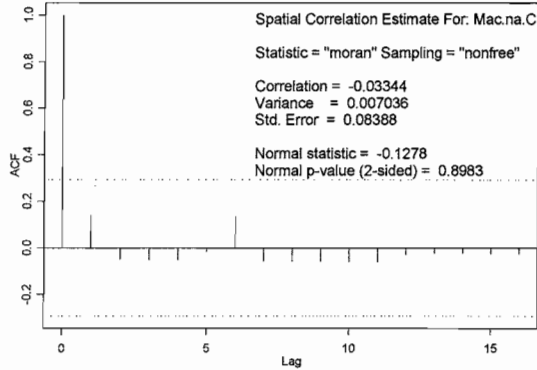


Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
*Lottia strigatella*:  
8 4 0

# Appendix E22. Spatial distribution of *Macoma nasuta* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

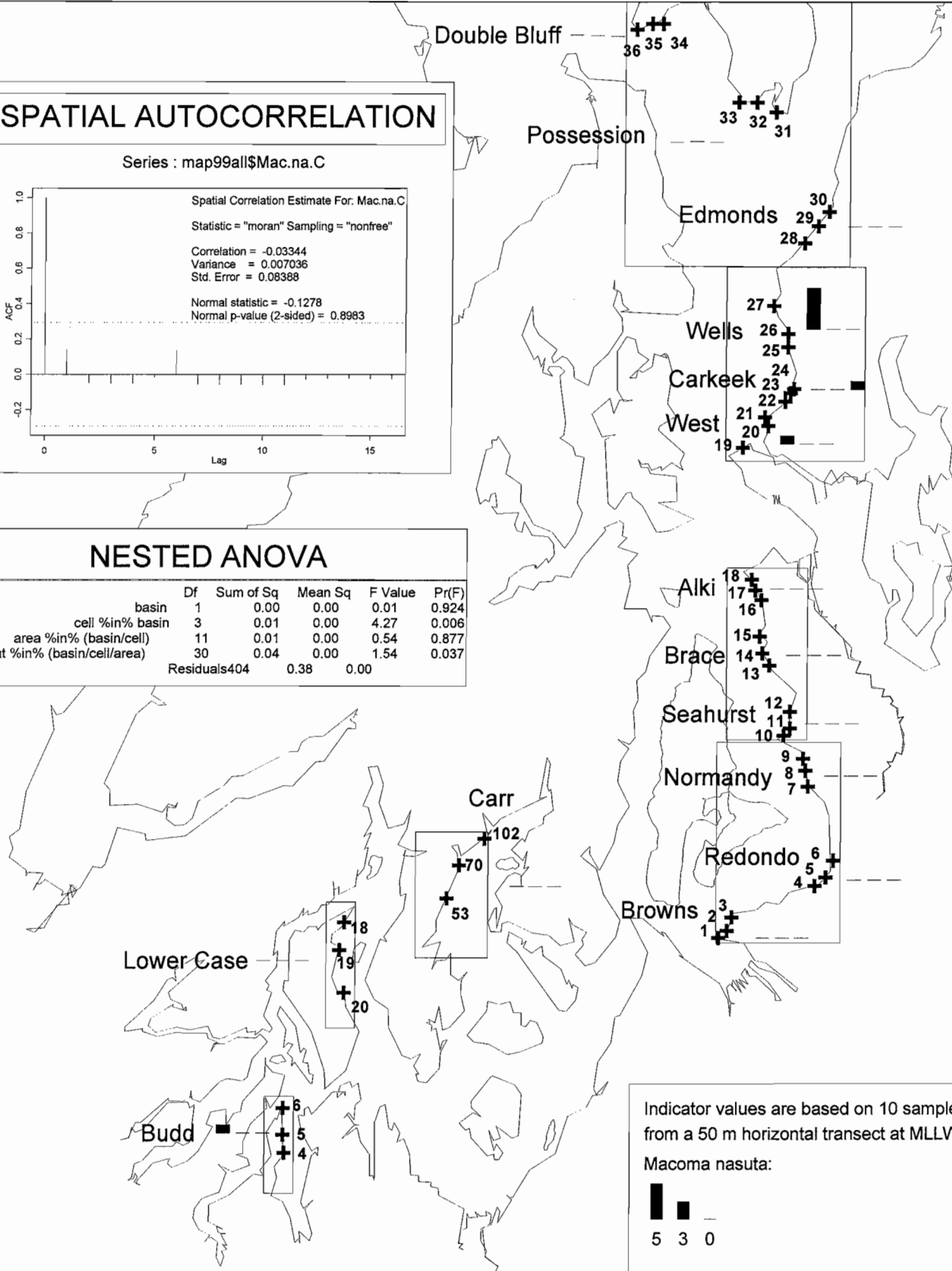
## SPATIAL AUTOCORRELATION

Series : map99all\$Mac.na.C



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	0.01	0.924
cell %in% basin	3	0.01	0.00	4.27	0.006
area %in% (basin/cell)	11	0.01	0.00	0.54	0.877
segment %in% (basin/cell/area)	30	0.04	0.00	1.54	0.037
Residuals	404	0.38	0.00		



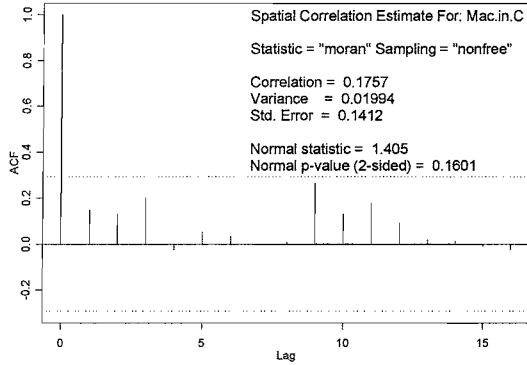
Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW *Macoma nasuta*:



# Appendix E23. Spatial distribution of *Macoma inquinata* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

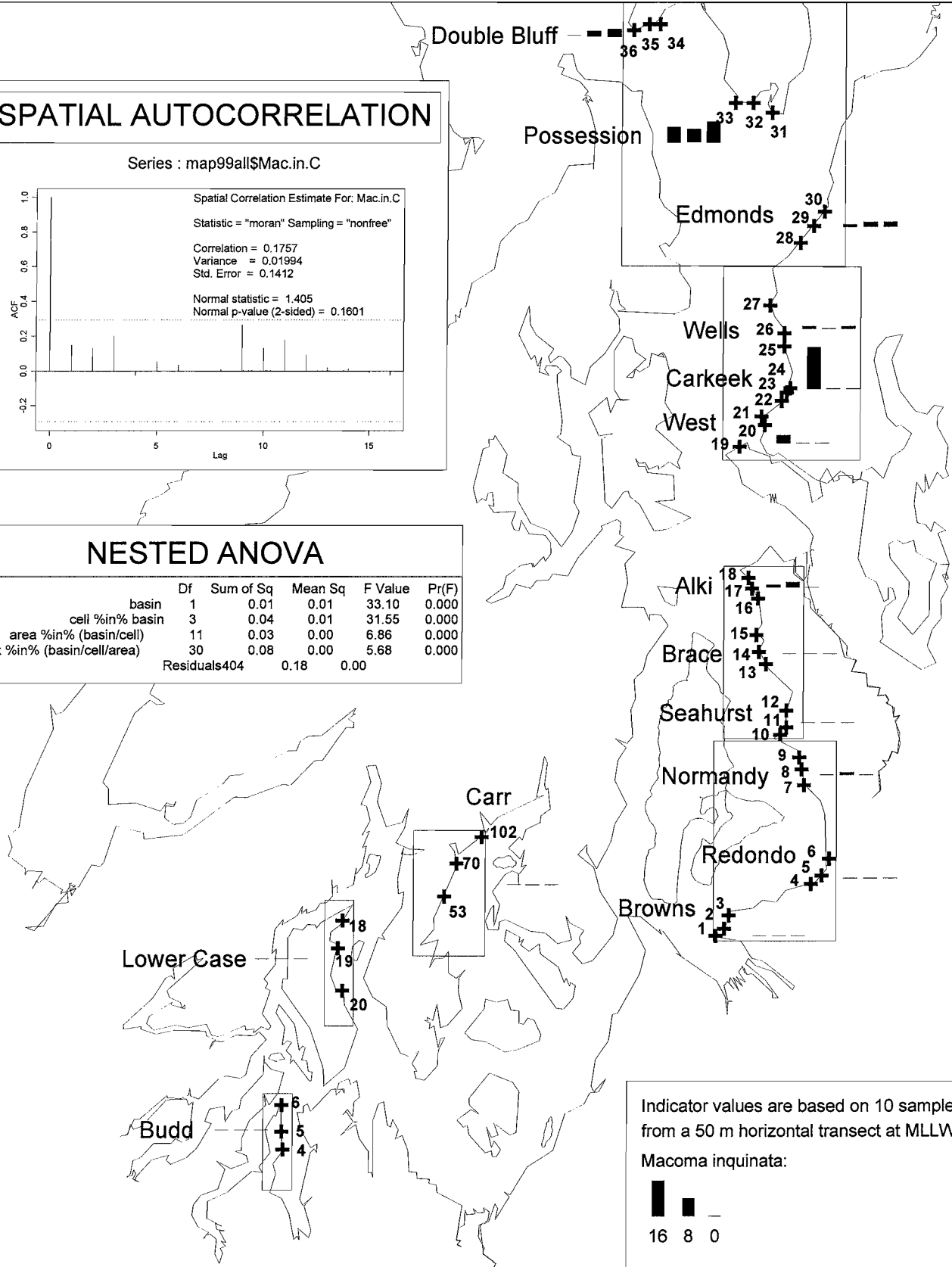
## SPATIAL AUTOCORRELATION

Series : map99all\$Mac.in.C



## NESTED ANOVA

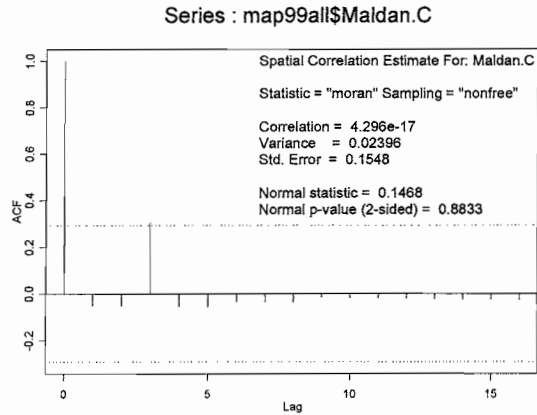
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	33.10	0.000
cell %in% basin	3	0.04	0.01	31.55	0.000
area %in% (basin/cell)	11	0.03	0.00	6.86	0.000
segment %in% (basin/cell/area)	30	0.08	0.00	5.68	0.000
Residuals	404	0.18	0.00		





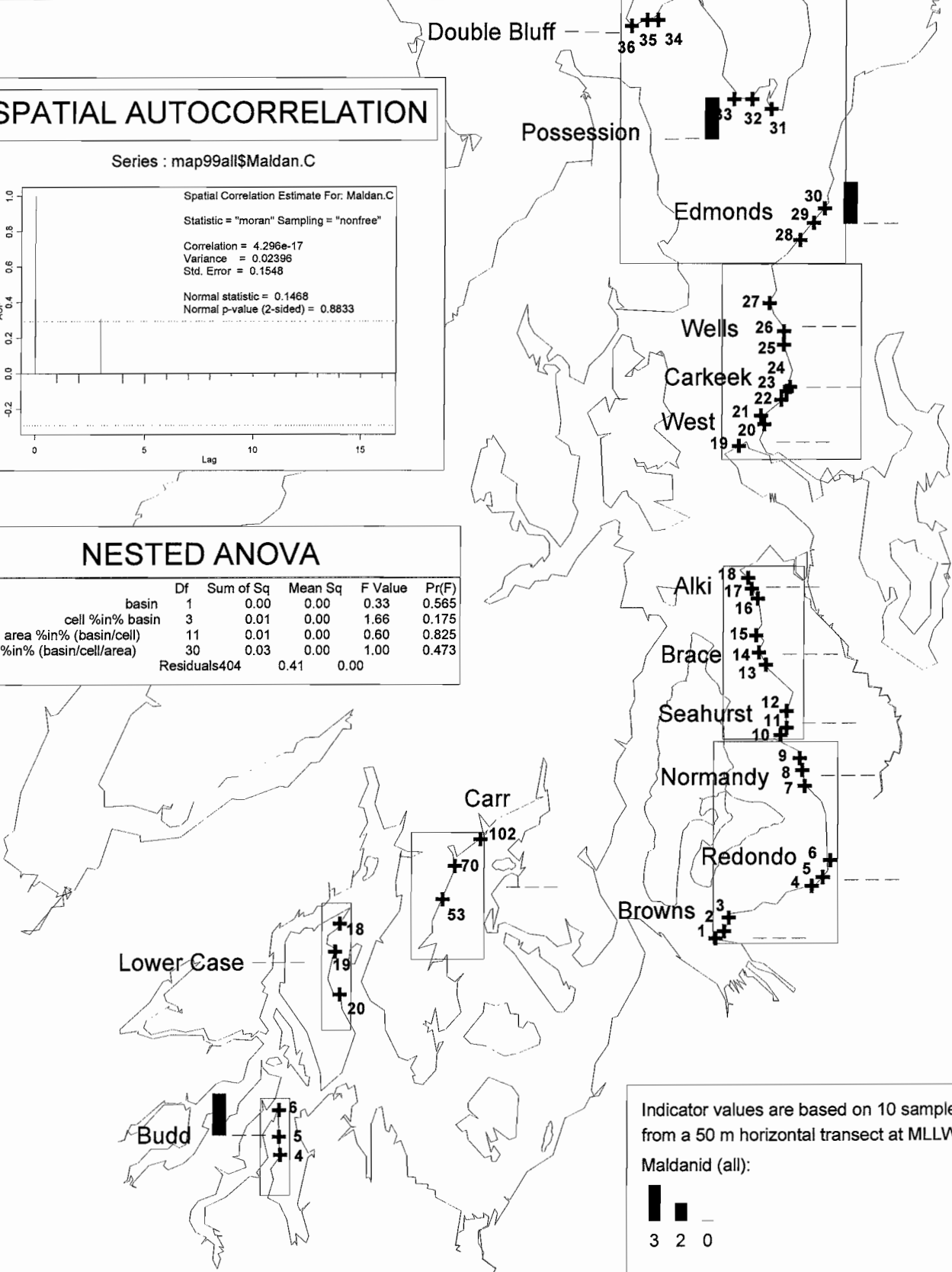
# Appendix E24. Spatial distribution of Maldanids (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	0.33	0.565
cell %in% basin	3	0.01	0.00	1.66	0.175
area %in% (basin/cell)	11	0.01	0.00	0.60	0.825
segment %in% (basin/cell/area)	30	0.03	0.00	1.00	0.473
Residuals	404	0.41	0.00		



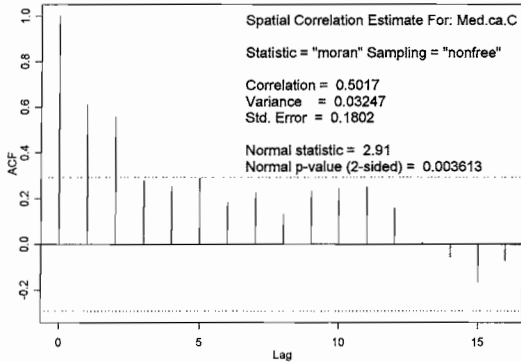
Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW Maldanid (all):

3 2 0

# Appendix E25. Spatial distribution of *Mediomastus californiensis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

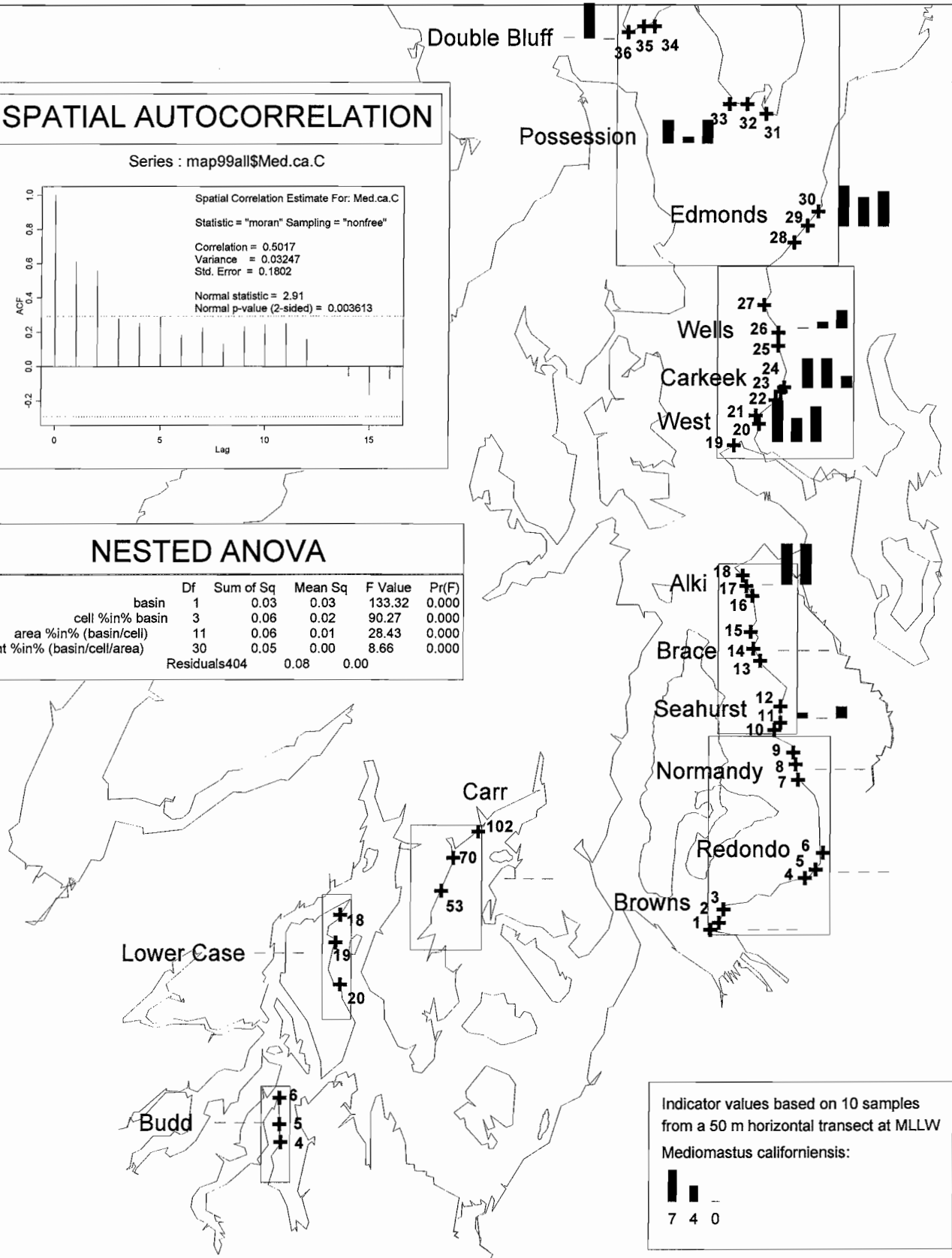
## SPATIAL AUTOCORRELATION

Series : map99all\$Med.ca.C



## NESTED ANOVA

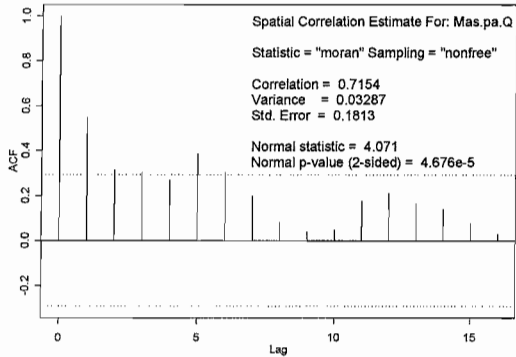
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.03	0.03	133.32	0.000
cell %in% basin	3	0.06	0.02	90.27	0.000
area %in% (basin/cell)	11	0.06	0.01	28.43	0.000
segment %in% (basin/cell/area)	30	0.05	0.00	8.66	0.000
Residuals	404	0.08	0.00		



# Appendix E26. Spatial distribution of *Mastocarpus papillatus* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

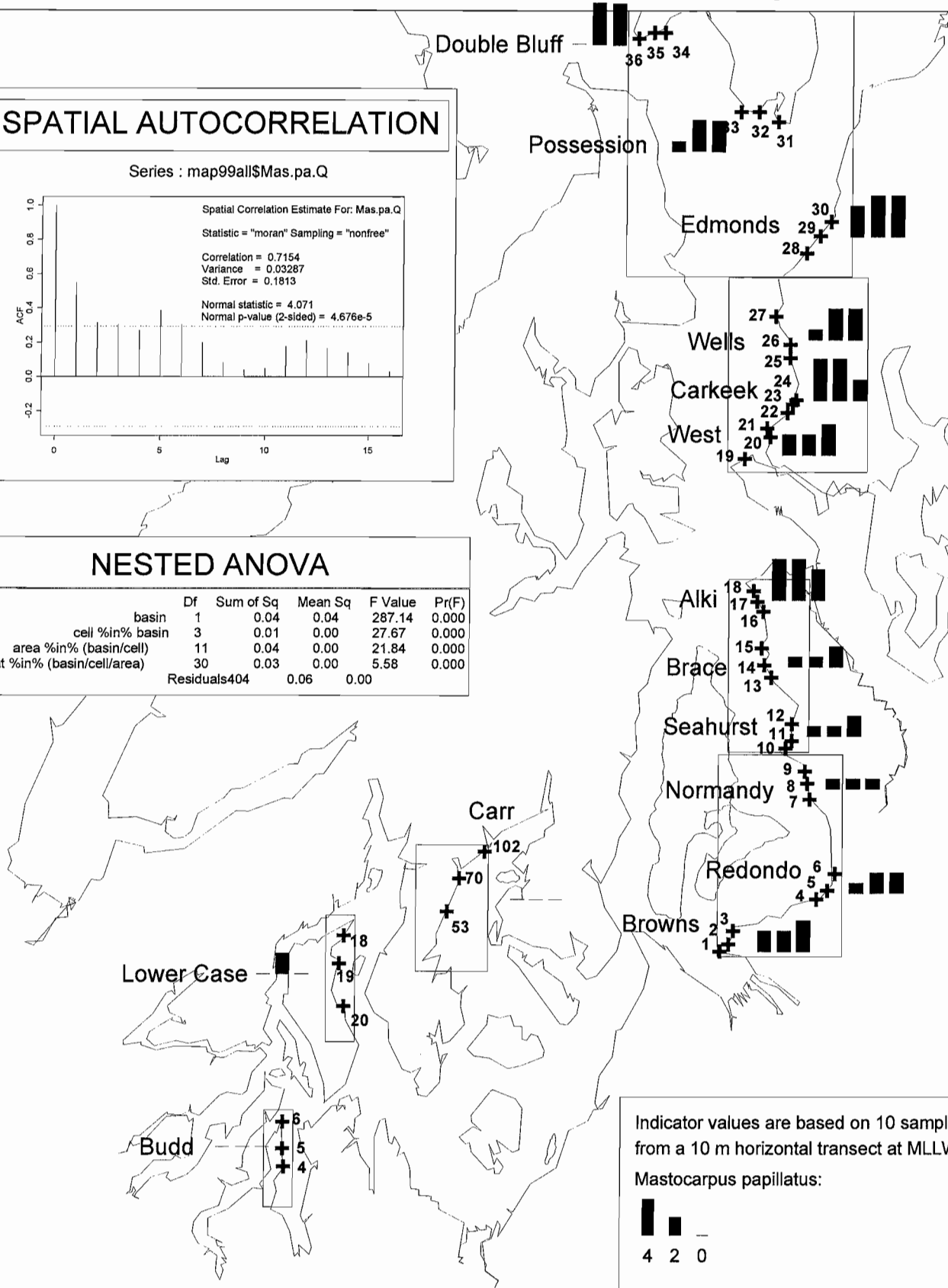
## SPATIAL AUTOCORRELATION

Series : map99all\$Mas.pa.Q



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.04	0.04	287.14	0.000
cell %in% basin	3	0.01	0.00	27.67	0.000
area %in% (basin/cell)	11	0.04	0.00	21.84	0.000
segment %in% (basin/cell/area)	30	0.03	0.00	5.58	0.000
Residuals	404	0.06	0.00		



Indicator values are based on 10 samples from a 10 m horizontal transect at MLLW

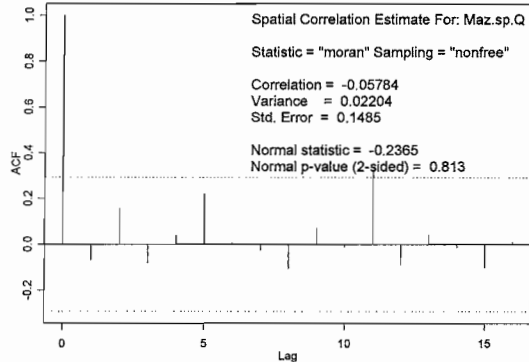
*Mastocarpus papillatus*:

4 2 0

# Appendix E27. Spatial distribution of *Mazzaella splendens* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

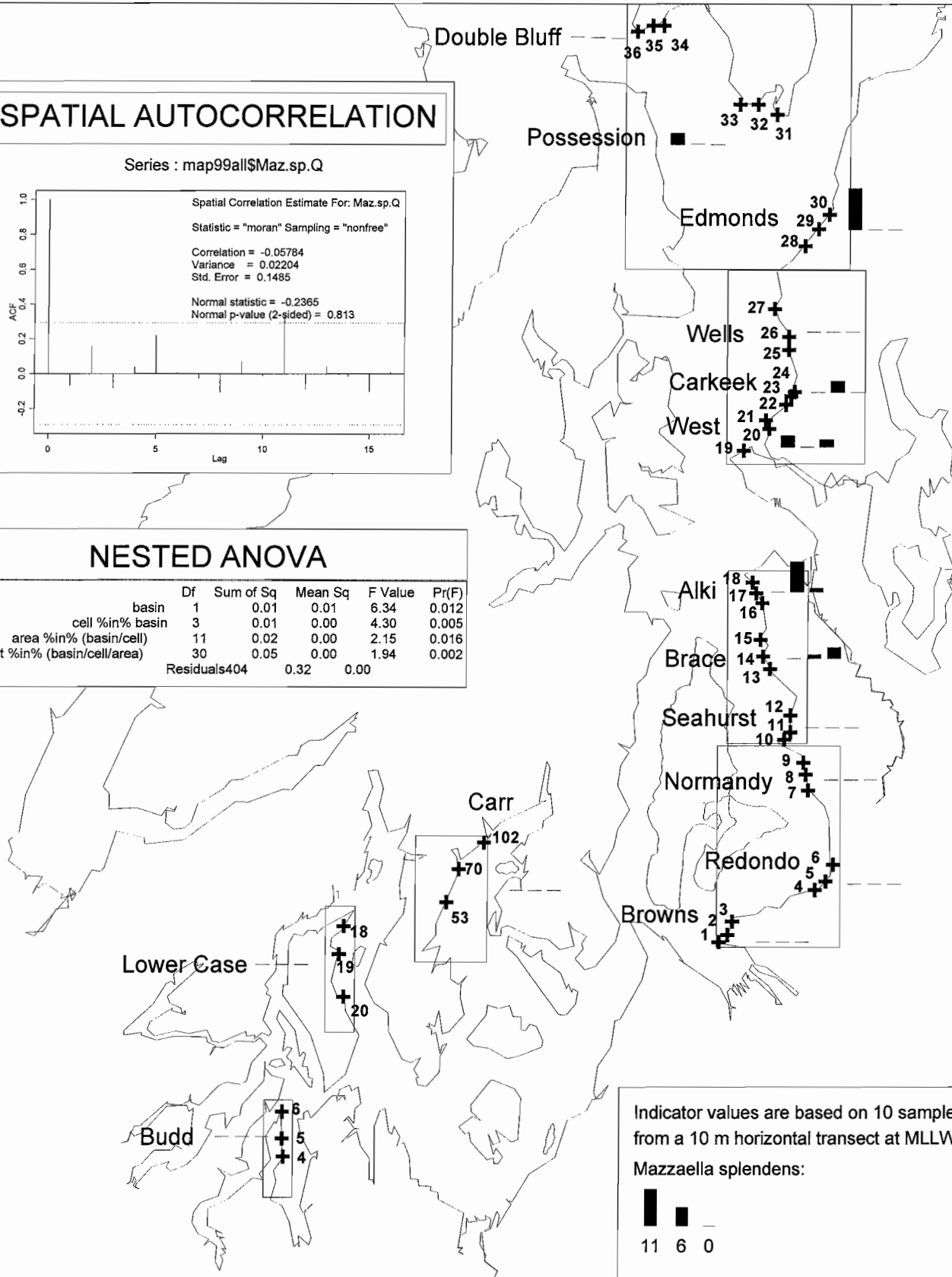
## SPATIAL AUTOCORRELATION

Series : map99all\$Maz.sp.Q



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	6.34	0.012
cell %in% basin	3	0.01	0.00	4.30	0.005
area %in% (basin/cell)	11	0.02	0.00	2.15	0.016
segment %in% (basin/cell/area)	30	0.05	0.00	1.94	0.002
Residuals	404	0.32	0.00		

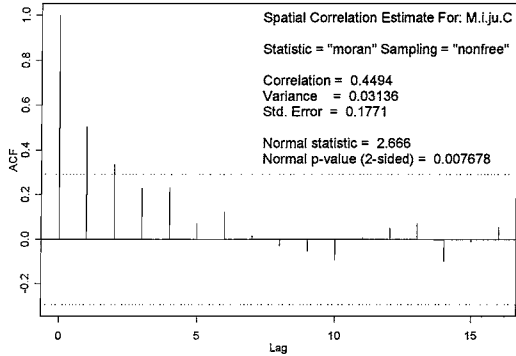


Indicator values are based on 10 samples from a 10 m horizontal transect at MLLW  
*Mazzaella splendens*:  
11 6 0

# Appendix E28. Spatial distribution of *Macoma inquinata* (juv) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

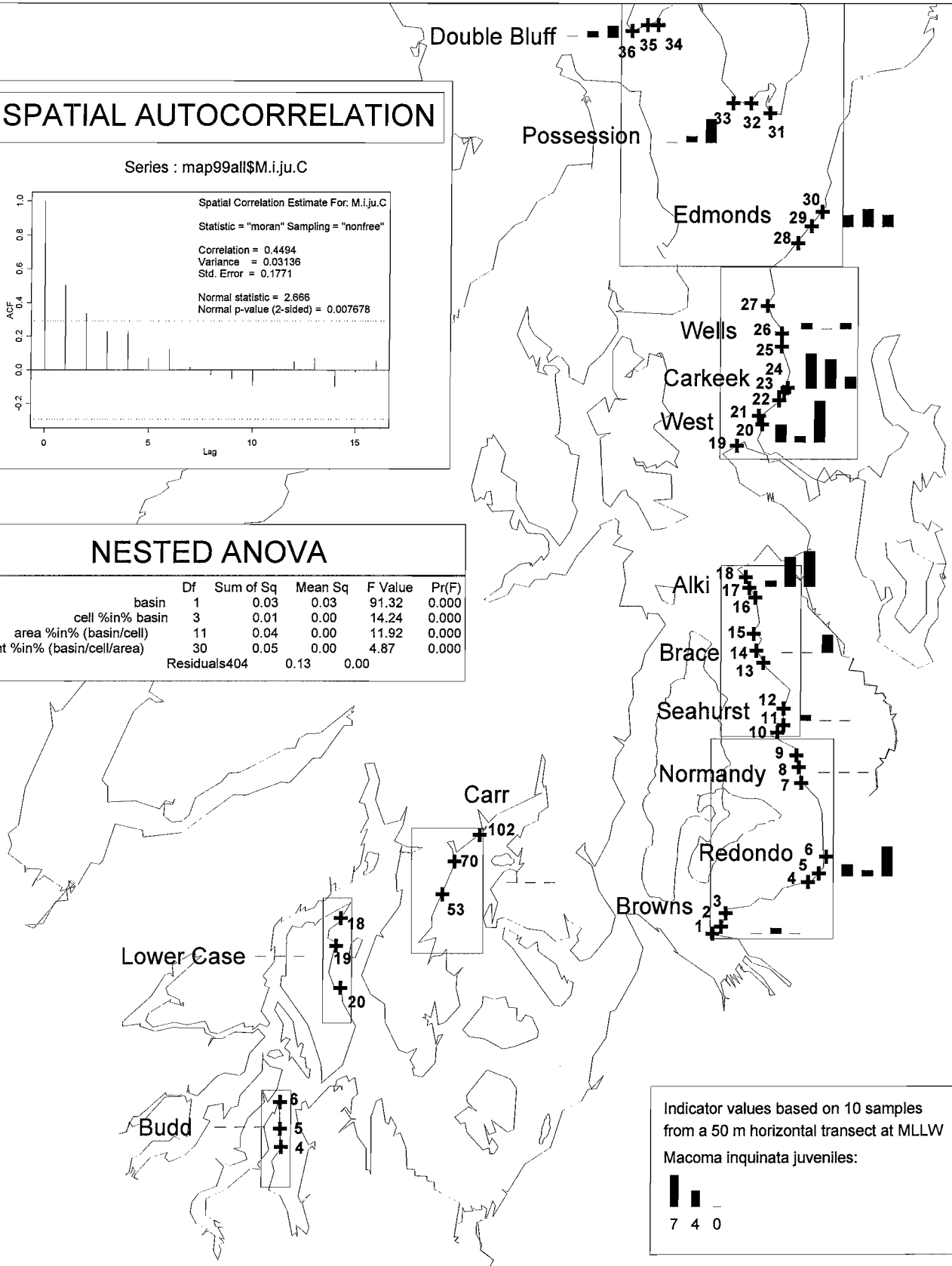
## SPATIAL AUTOCORRELATION

Series : map99all\$M.i.ju.C



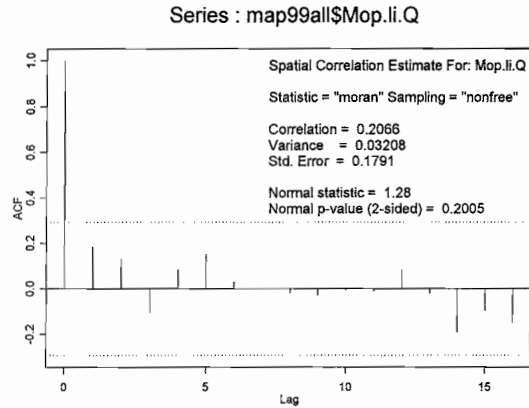
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.03	0.03	91.32	0.000
cell %in% basin	3	0.01	0.00	14.24	0.000
area %in% (basin/cell)	11	0.04	0.00	11.92	0.000
segment %in% (basin/cell/area)	30	0.05	0.00	4.87	0.000
Residuals	404	0.13	0.00		



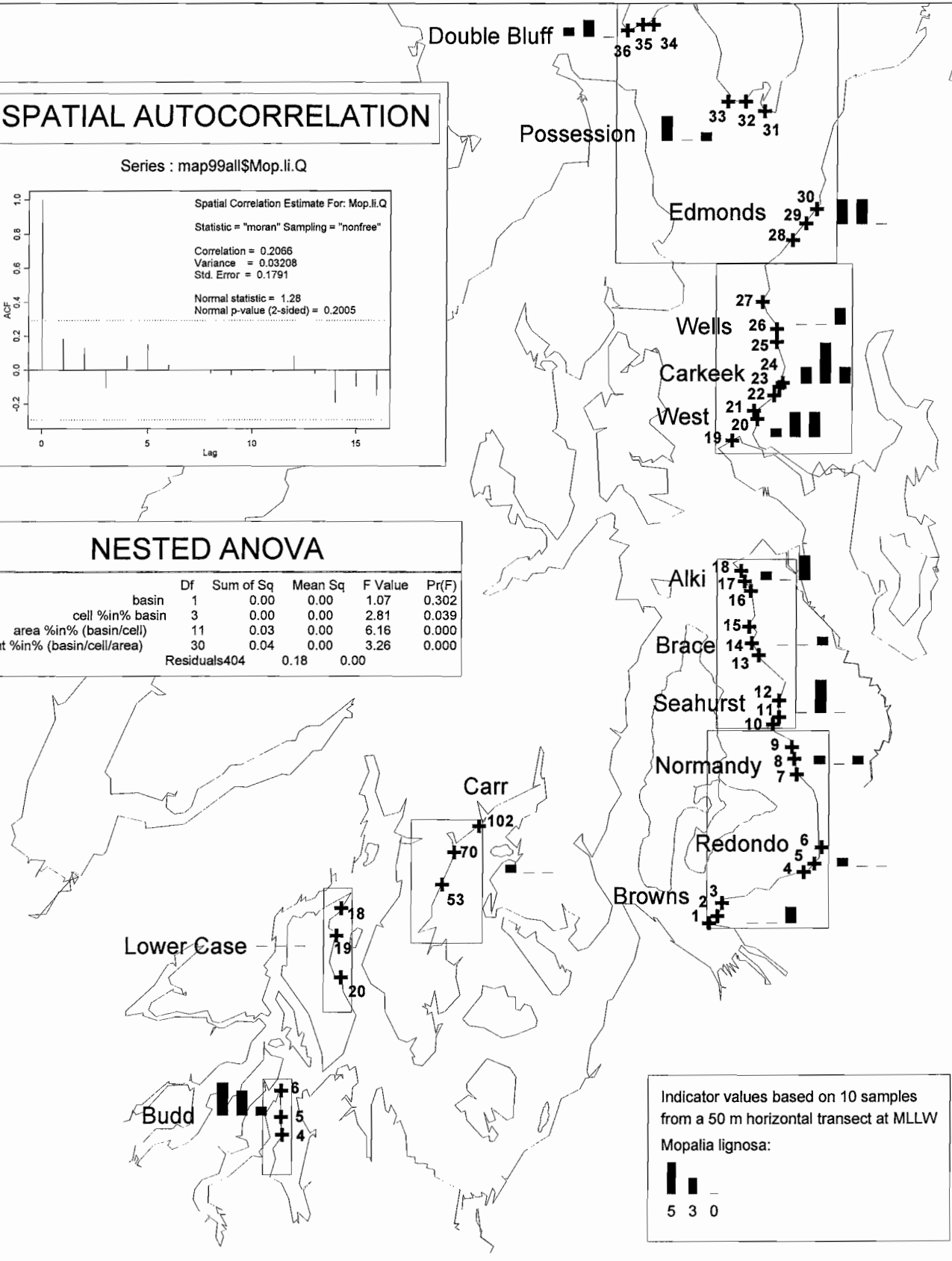
# Appendix E29. Spatial distribution of *Mopalia lignosa* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	1.07	0.302
cell %in% basin	3	0.00	0.00	2.81	0.039
area %in% (basin/cell)	11	0.03	0.00	6.16	0.000
segment %in% (basin/cell/area)	30	0.04	0.00	3.26	0.000
Residuals	404	0.18	0.00		



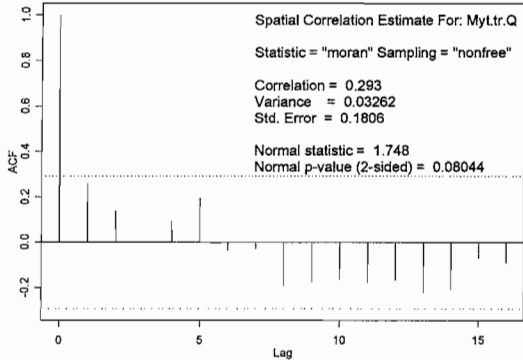
Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Mopalia lignosa*:

5 3 0

# Appendix E30. Spatial distribution of *Mytilus trossulus* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

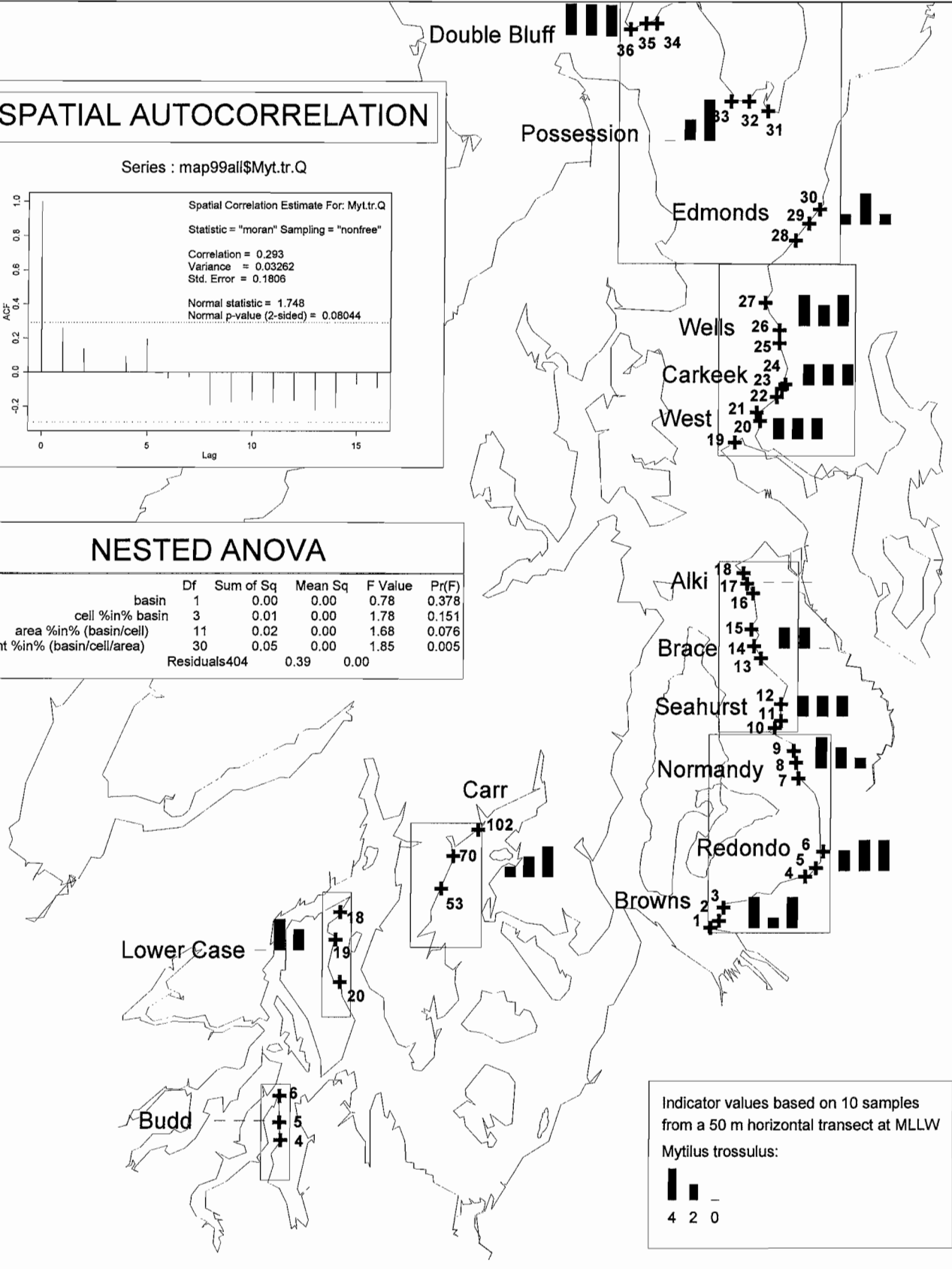
## SPATIAL AUTOCORRELATION

Series : map99all\$Myt.tr.Q



## NESTED ANOVA

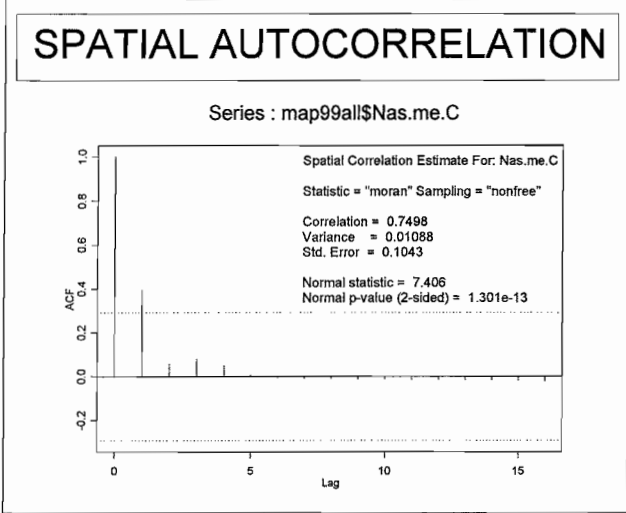
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	0.78	0.378
cell %in% basin	3	0.01	0.00	1.78	0.151
area %in% (basin/cell)	11	0.02	0.00	1.68	0.076
segment %in% (basin/cell/area)	30	0.05	0.00	1.85	0.005
Residuals	404	0.39	0.00		



Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Mytilus trossulus*:

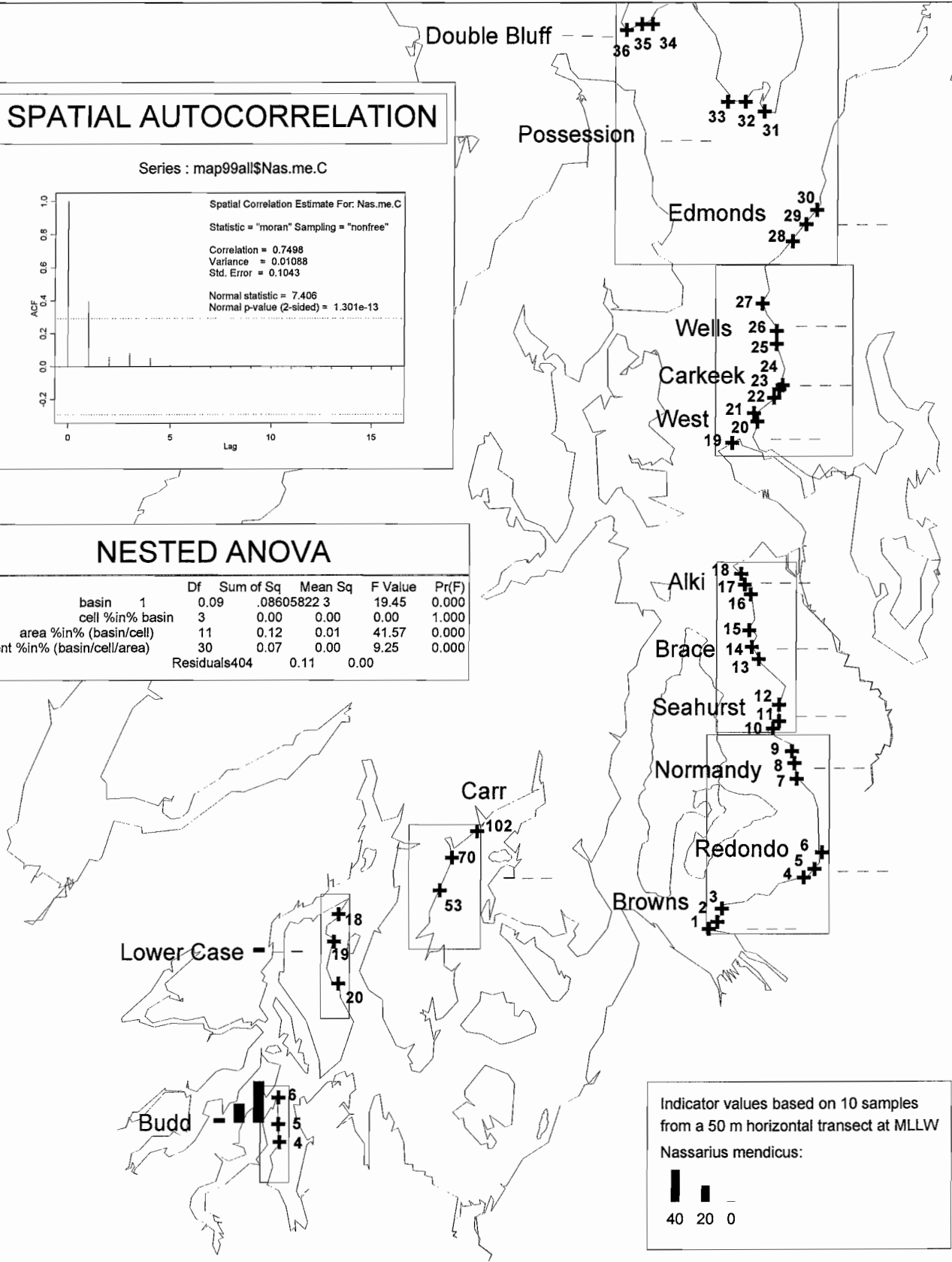
4 2 0

# Appendix E31. Spatial distribution of *Nassarius mendicus* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions



### NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)	
basin	1	0.09	.08605822	3	19.45	0.000
cell %in% basin	3	0.00	0.00	0.00	1.000	
area %in% (basin/cell)	11	0.12	0.01	41.57	0.000	
segment %in% (basin/cell/area)	30	0.07	0.00	9.25	0.000	
Residuals	404	0.11	0.00			



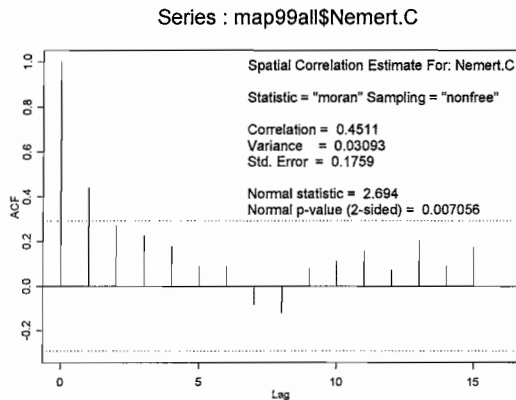
Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Nassarius mendicus*:

40 20 0



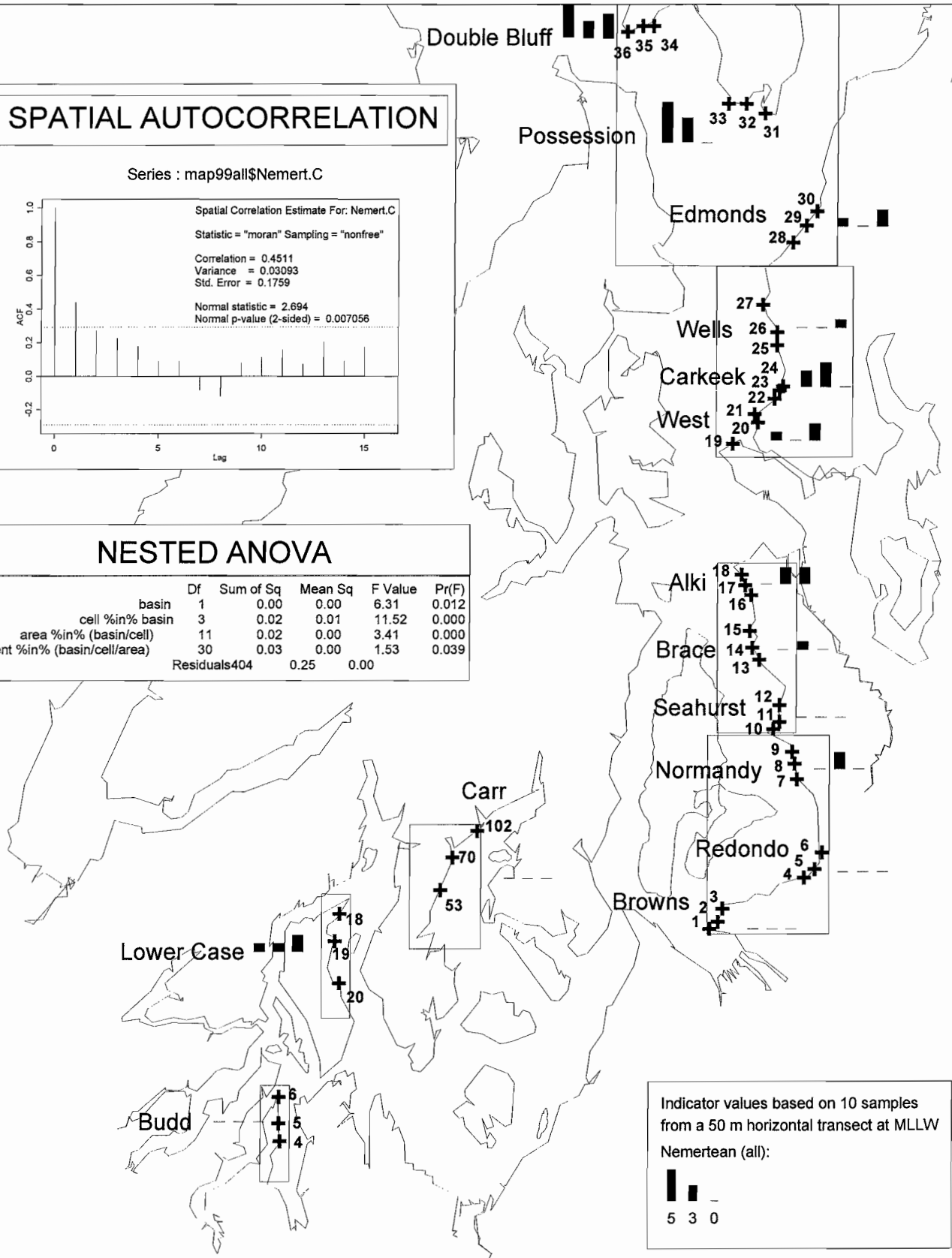
# Appendix E32. Spatial distribution of Nemertean (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



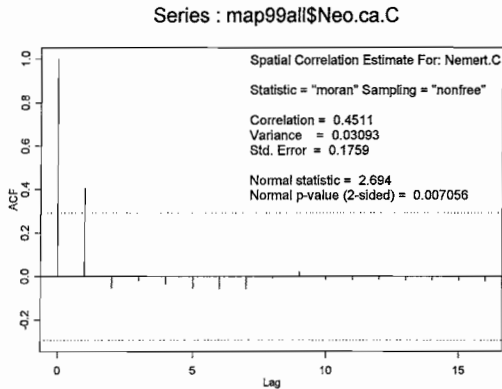
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	6.31	0.012
cell %in% basin	3	0.02	0.01	11.52	0.000
area %in% (basin/cell)	11	0.02	0.00	3.41	0.000
segment %in% (basin/cell/area)	30	0.03	0.00	1.53	0.039
Residuals	404	0.25	0.00		



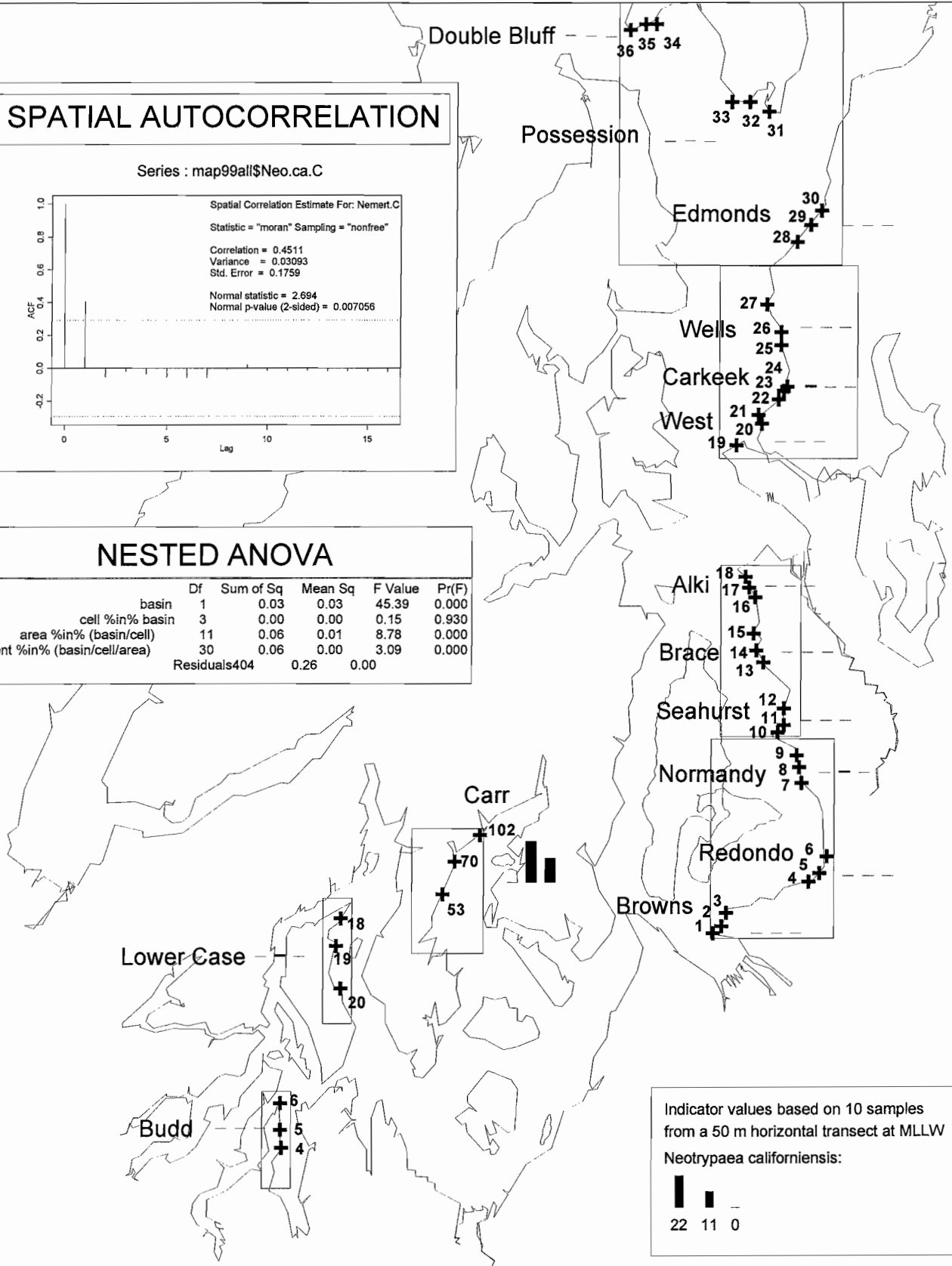
# Appendix E33. Spatial distribution of *Neotrypaea californiensis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION

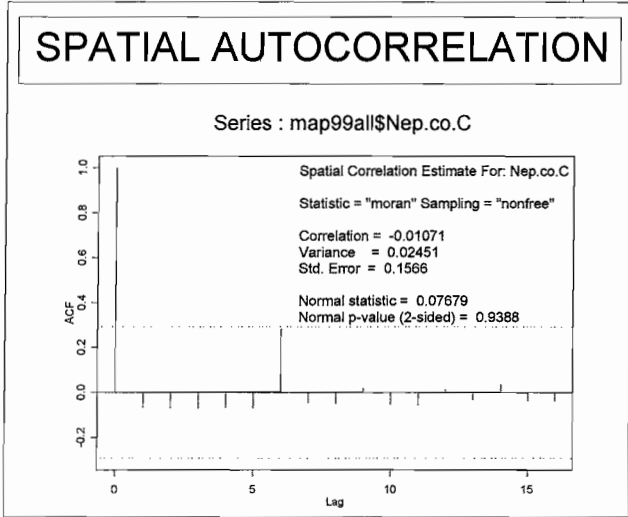


## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.03	0.03	45.39	0.000
cell %in% basin	3	0.00	0.00	0.15	0.930
area %in% (basin/cell)	11	0.06	0.01	8.78	0.000
segment %in% (basin/cell/area)	30	0.06	0.00	3.09	0.000
Residuals	404	0.26	0.00		

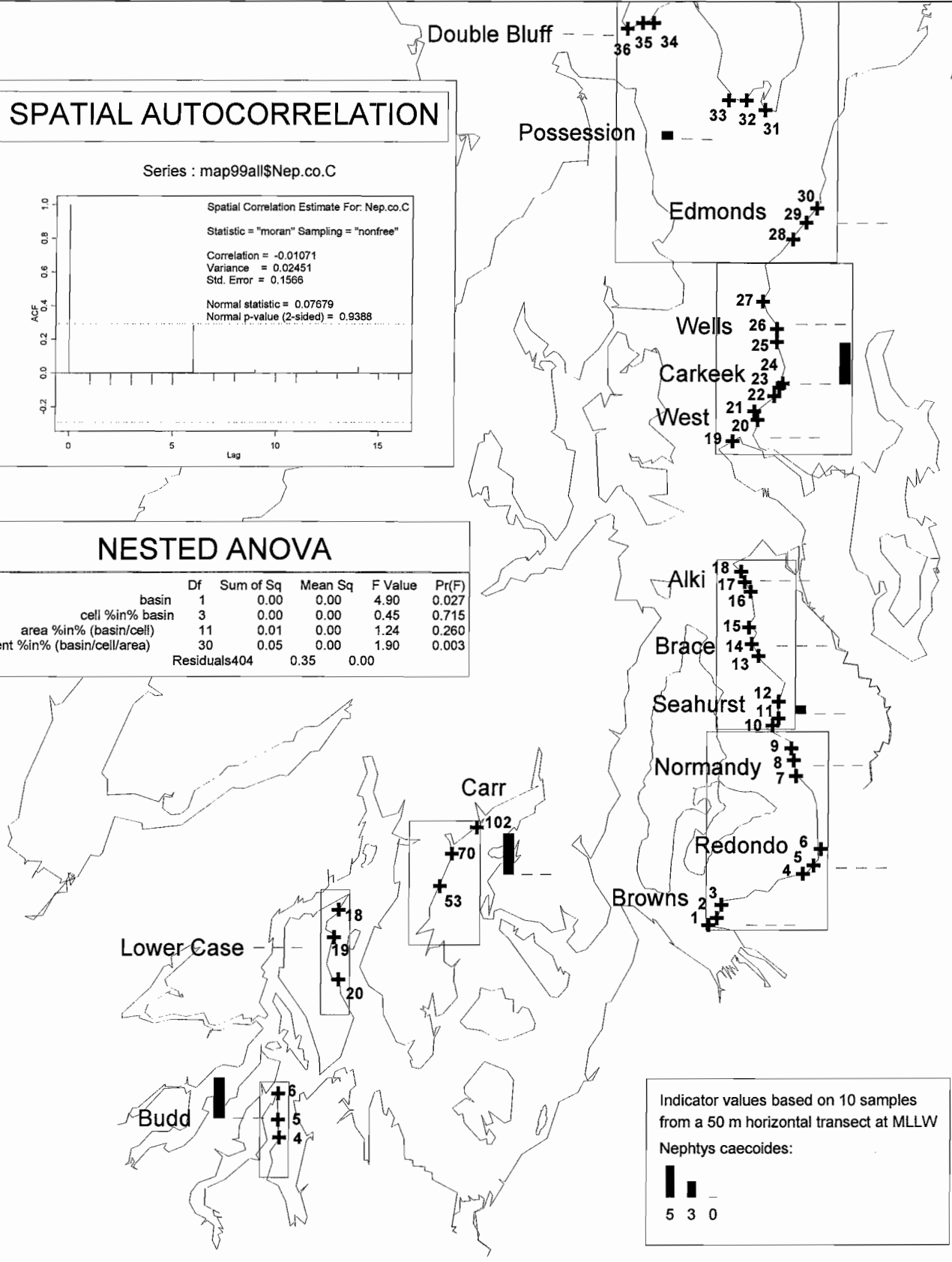


# Appendix E34. Spatial distribution of *Nephtys caecoides* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions



### NESTED ANOVA

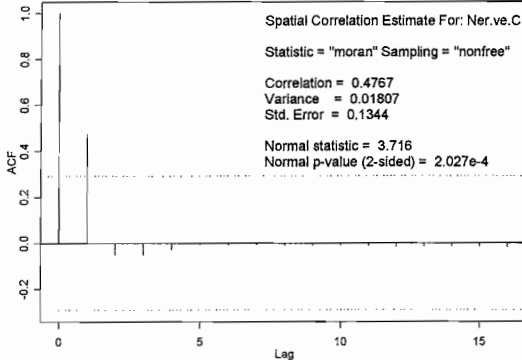
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	4.90	0.027
cell %in% basin	3	0.00	0.00	0.45	0.715
area %in% (basin/cell)	11	0.01	0.00	1.24	0.260
segment %in% (basin/cell/area)	30	0.05	0.00	1.90	0.003
Residuals	404	0.35	0.00		



# Appendix E35. Spatial distribution of *Nereis vexillosa* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

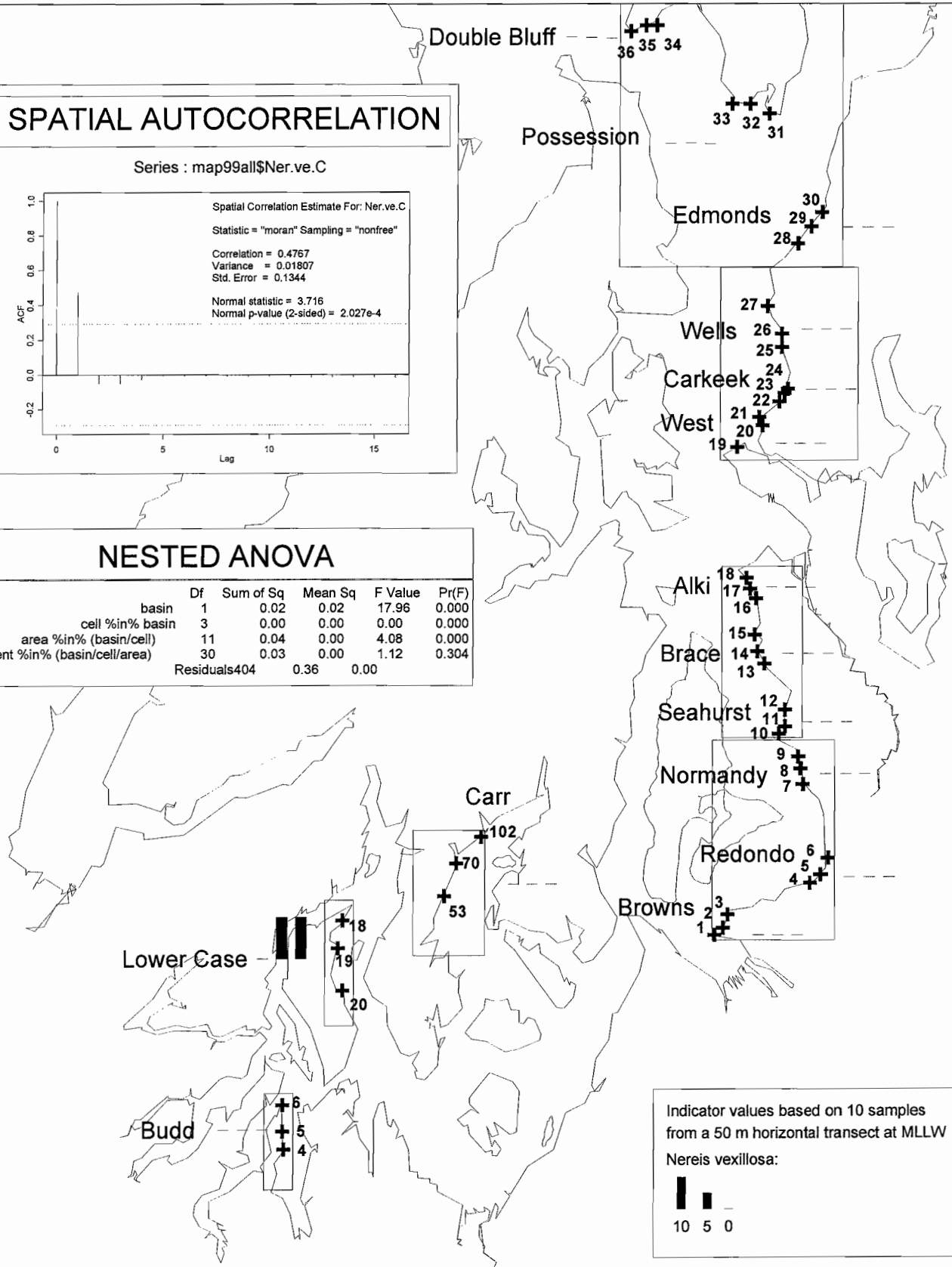
## SPATIAL AUTOCORRELATION

Series : map99all\$Ner.ve.C



## NESTED ANOVA

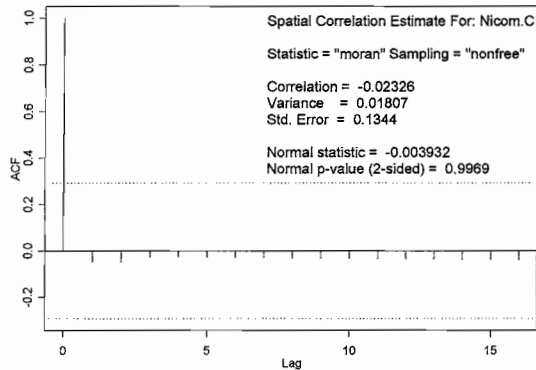
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.02	0.02	17.96	0.000
cell %in% basin	3	0.00	0.00	0.00	0.000
area %in% (basin/cell)	11	0.04	0.00	4.08	0.000
segment %in% (basin/cell/area)	30	0.03	0.00	1.12	0.304
Residuals	404	0.36	0.00		



# Appendix E36. Spatial distribution of *Nicomache personata* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

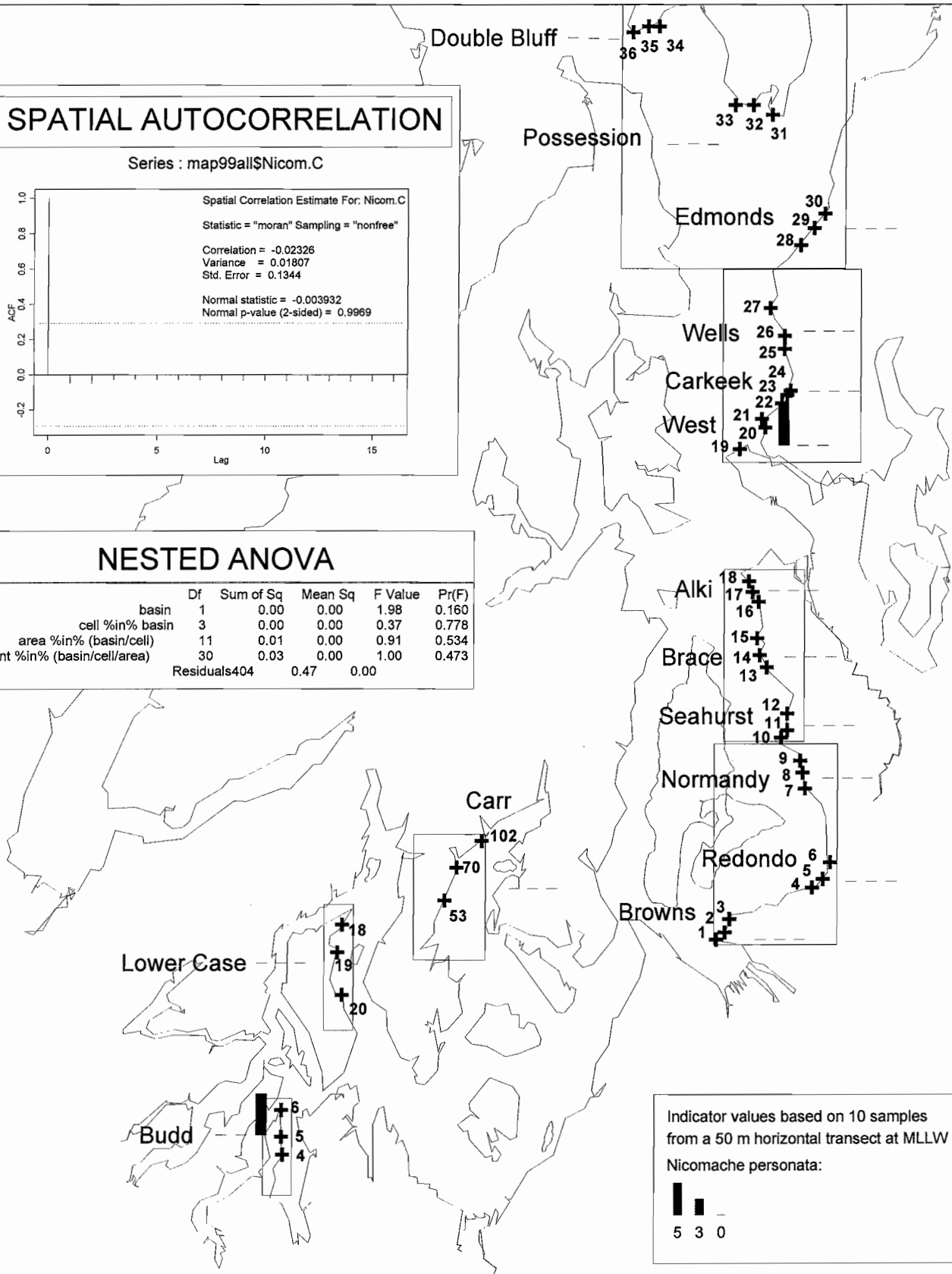
## SPATIAL AUTOCORRELATION

Series : map99all\$Nicom.C



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	1.98	0.160
cell %in% basin	3	0.00	0.00	0.37	0.778
area %in% (basin/cell)	11	0.01	0.00	0.91	0.534
segment %in% (basin/cell/area)	30	0.03	0.00	1.00	0.473
Residuals	404	0.47	0.00		

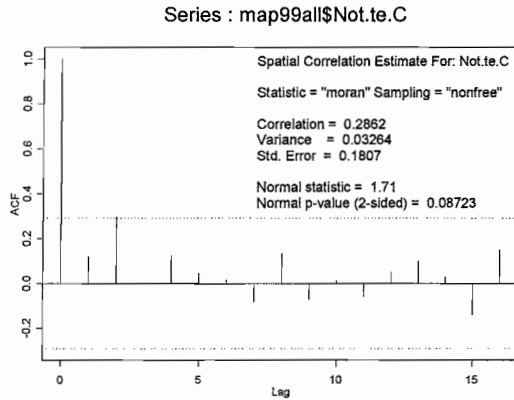


Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Nicomache personata*:



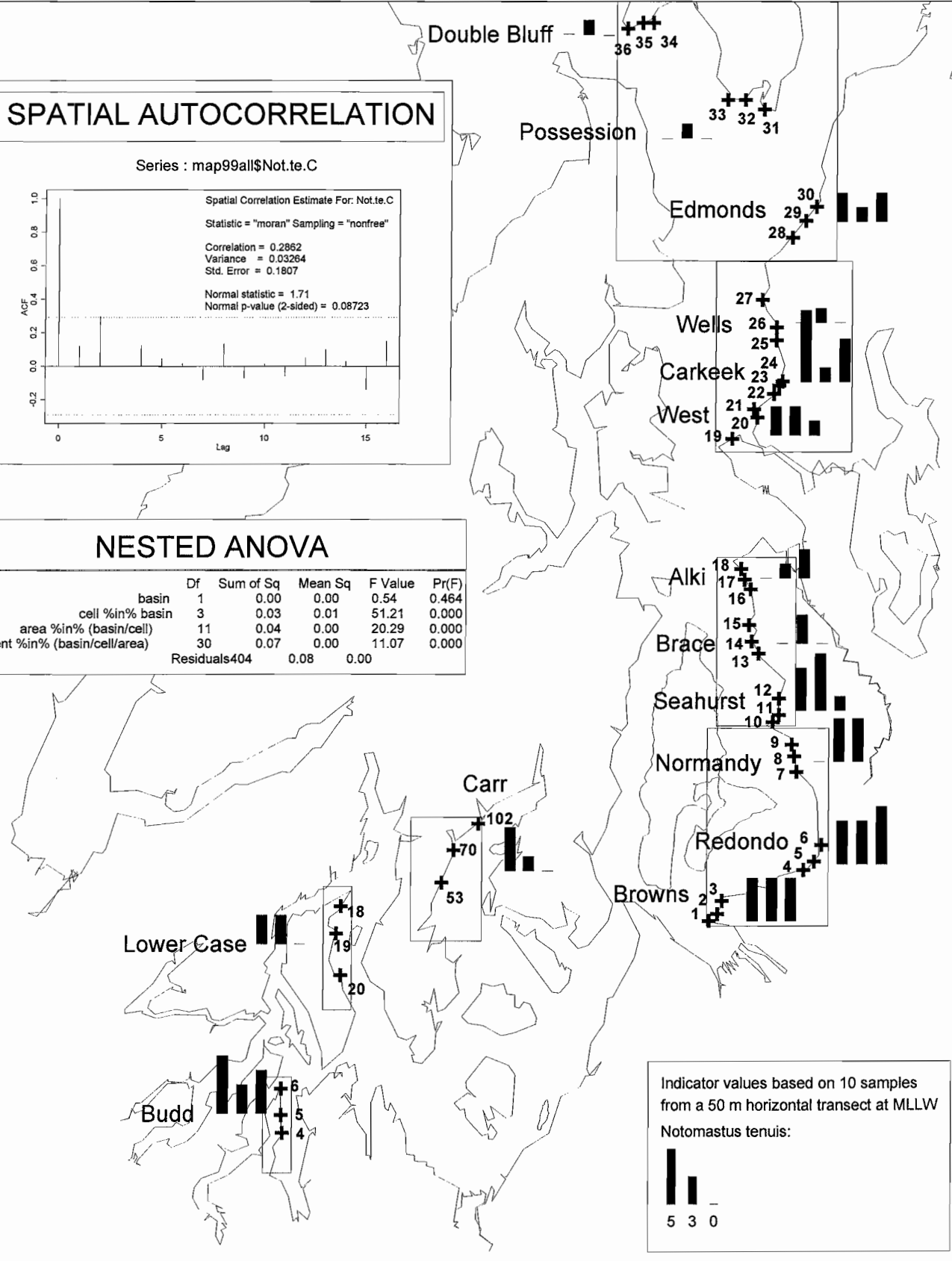
# Appendix E37. Spatial distribution of *Notomastus tenuis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	0.54	0.464
cell %in% basin	3	0.03	0.01	51.21	0.000
area %in% (basin/cell)	11	0.04	0.00	20.29	0.000
segment %in% (basin/cell/area)	30	0.07	0.00	11.07	0.000
Residuals	404	0.08	0.00		

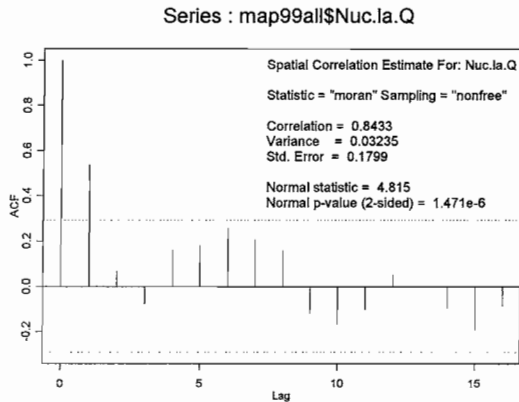


Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Notomastus tenuis*:

5 3 0

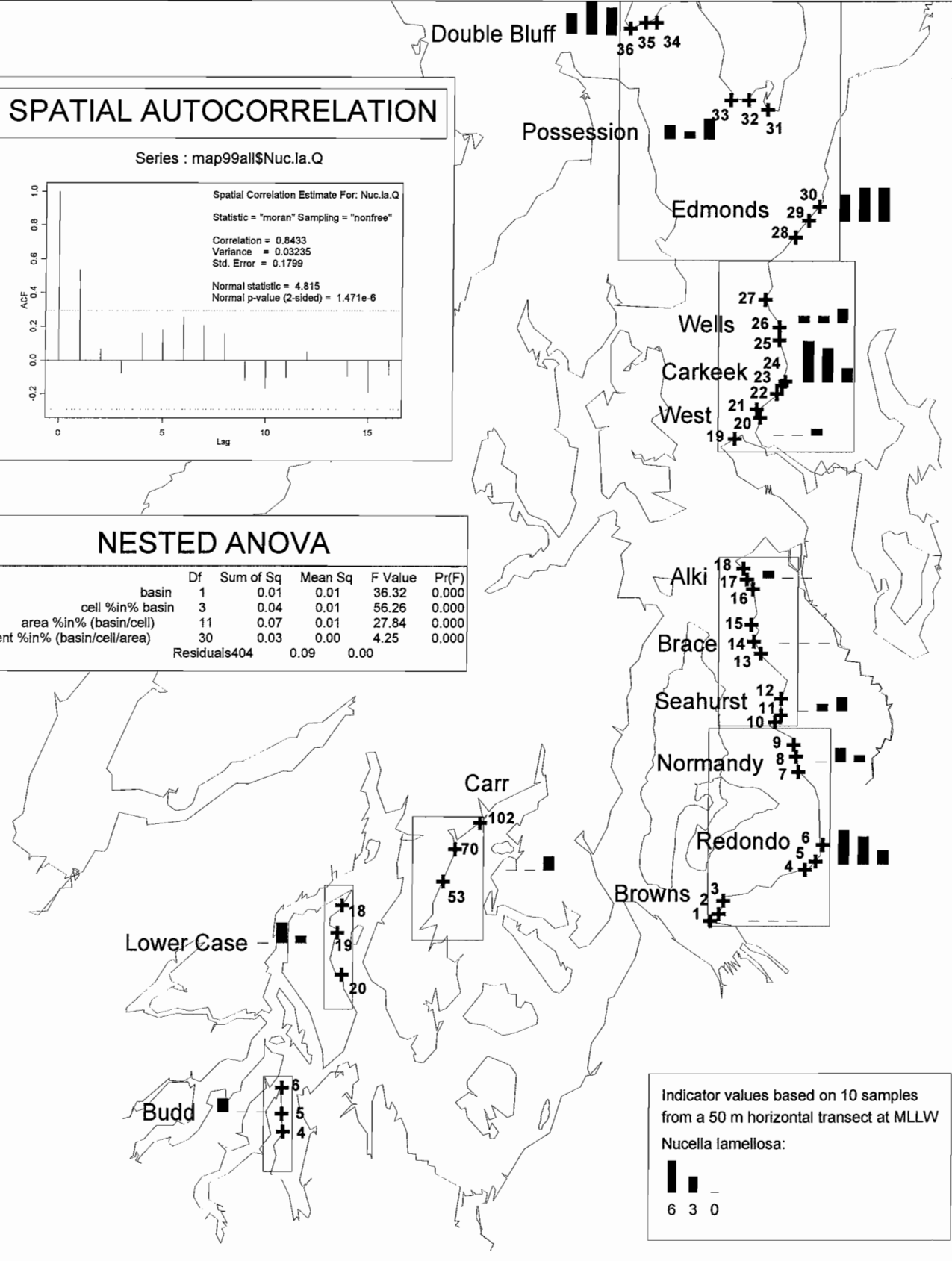
# Appendix E38. Spatial distribution of *Nucella lamellosa* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	36.32	0.000
cell %in% basin	3	0.04	0.01	56.26	0.000
area %in% (basin/cell)	11	0.07	0.01	27.84	0.000
segment %in% (basin/cell/area)	30	0.03	0.00	4.25	0.000
Residuals	404	0.09	0.00		

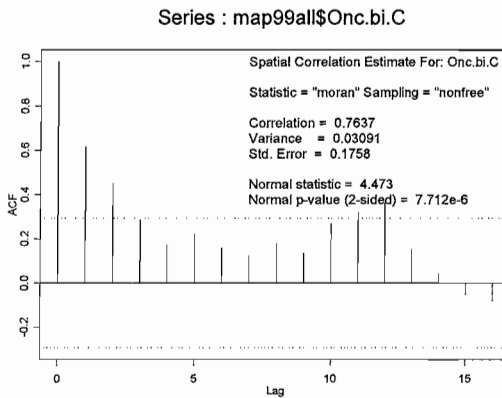


Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Nucella lamellosa*:

6 3 0

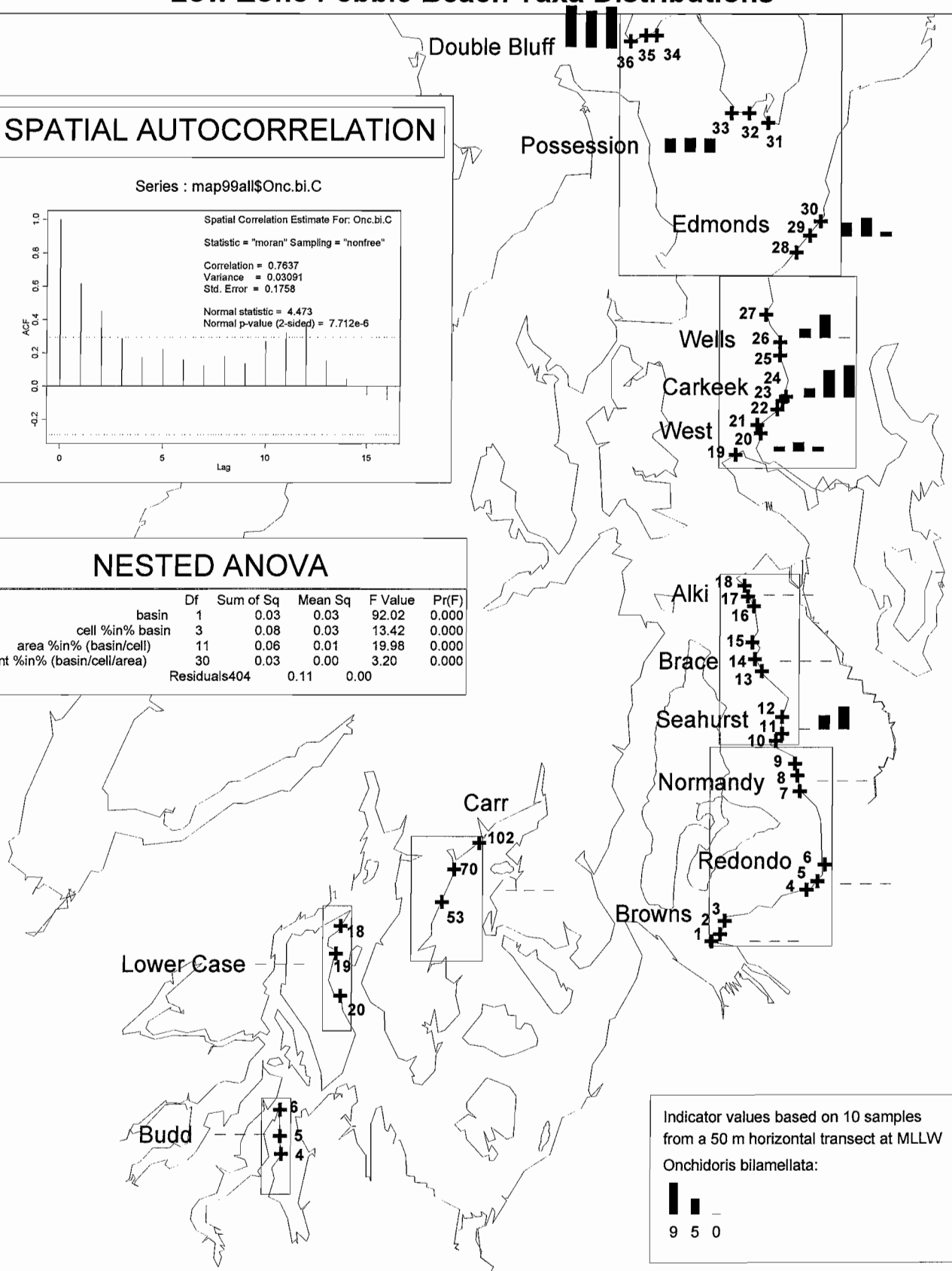
# Appendix E39. Spatial distribution of *Onchidoris bilamellata* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.03	0.03	92.02	0.000
cell %in% basin	3	0.08	0.03	13.42	0.000
area %in% (basin/cell)	11	0.06	0.01	19.98	0.000
segment %in% (basin/cell/area)	30	0.03	0.00	3.20	0.000
Residuals	404	0.11	0.00		



Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Onchidoris bilamellata*:

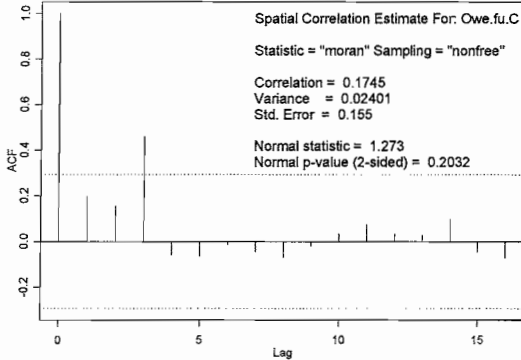




# Appendix E40. Spatial distribution of *Owenia fusiformis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

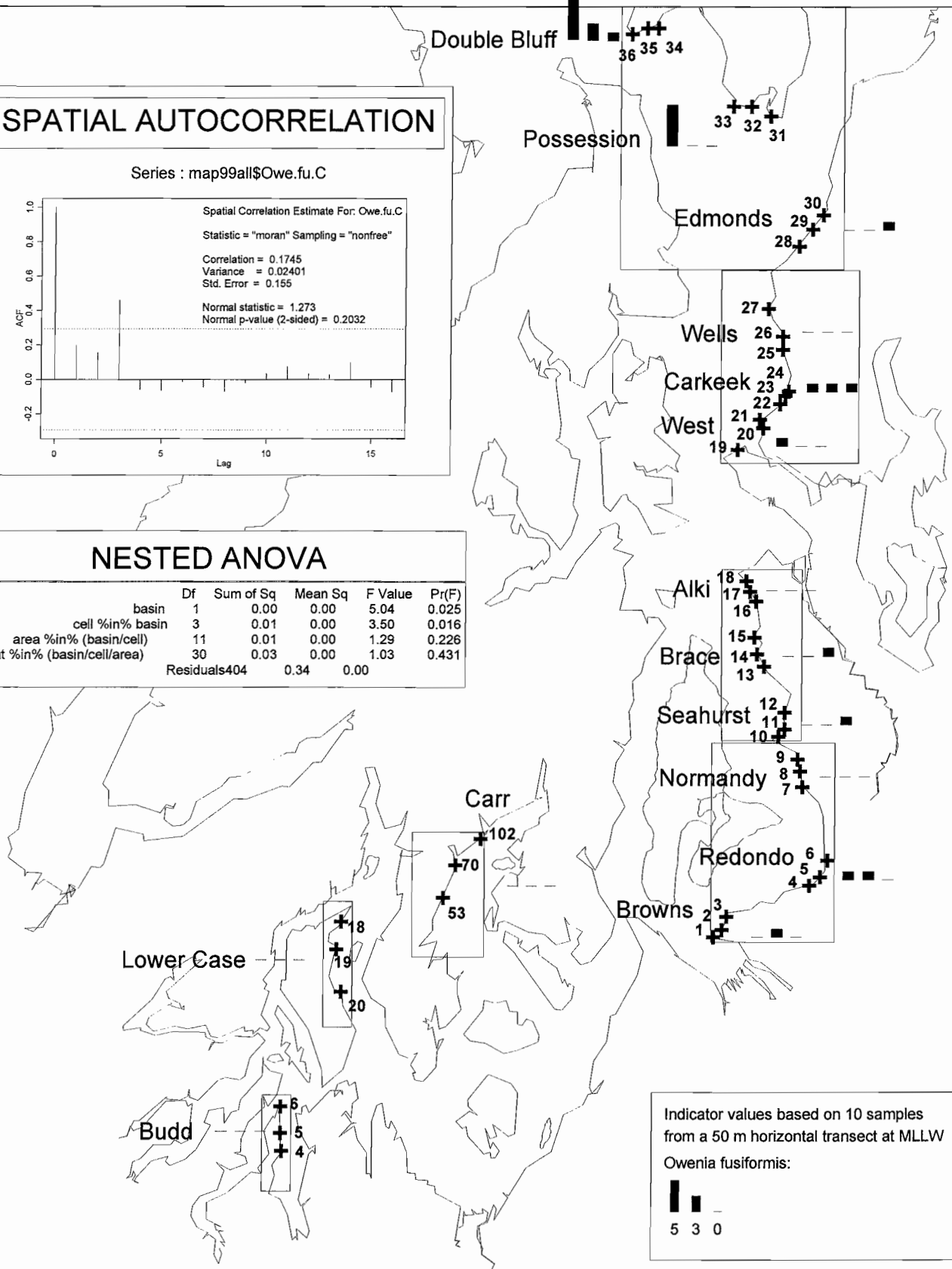
## SPATIAL AUTOCORRELATION

Series : map99all\$Owe.fu.C



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	5.04	0.025
cell %in% basin	3	0.01	0.00	3.50	0.016
area %in% (basin/cell)	11	0.01	0.00	1.29	0.226
segment %in% (basin/cell/area)	30	0.03	0.00	1.03	0.431
Residuals	404		0.34	0.00	

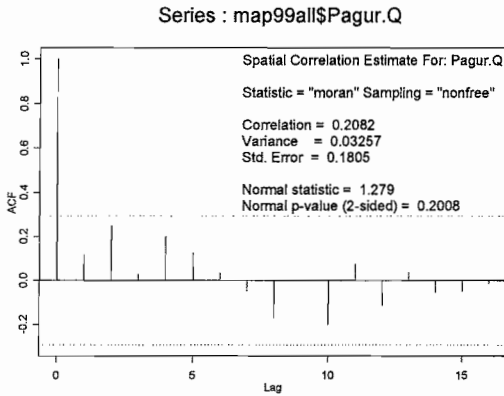


Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Owenia fusiformis*:

5 3 0

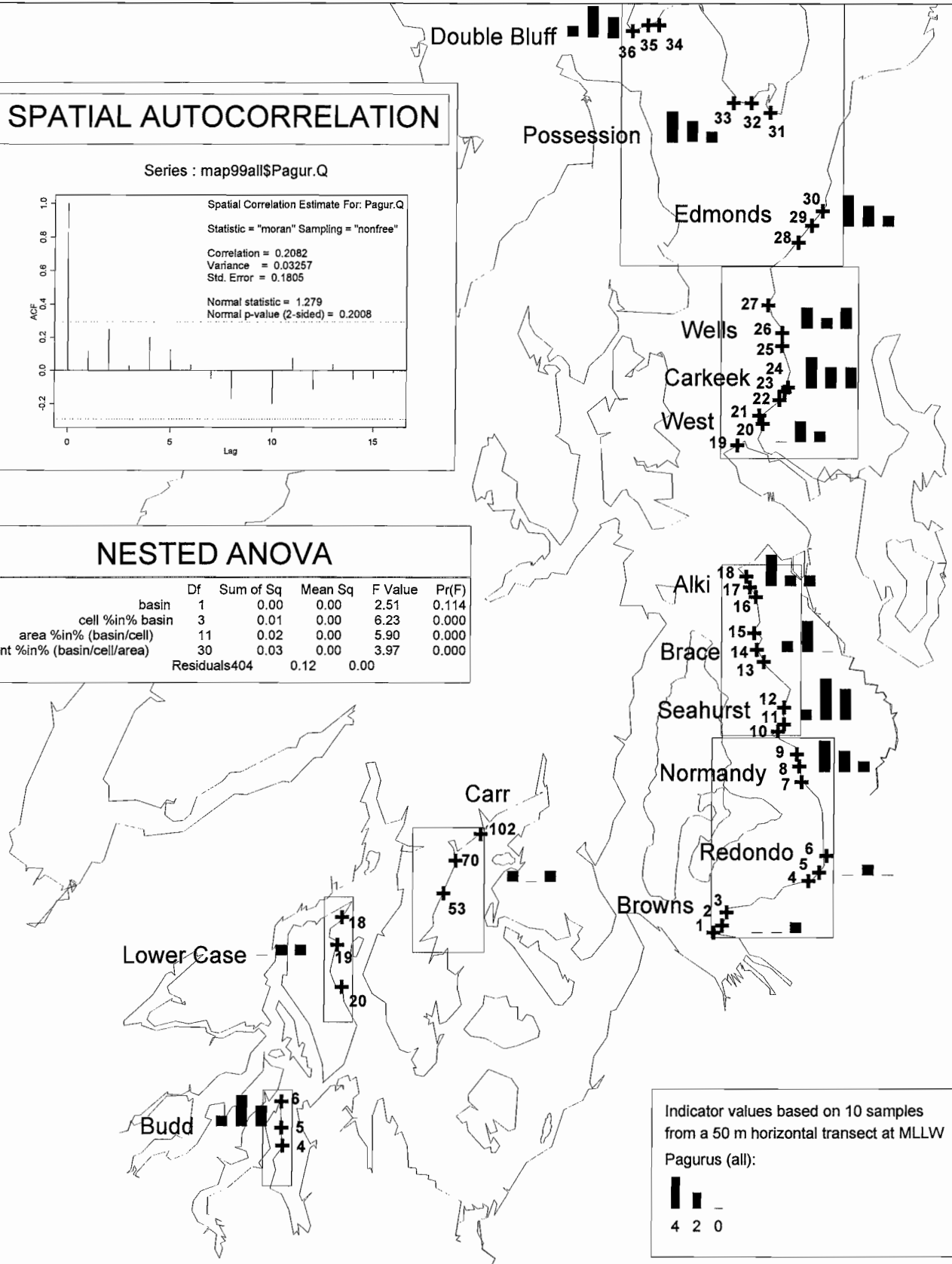
# Appendix E41. Spatial distribution of Pagurus (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



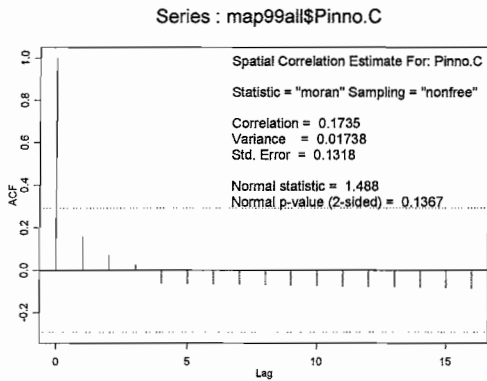
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	2.51	0.114
cell %in% basin	3	0.01	0.00	6.23	0.000
area %in% (basin/cell)	11	0.02	0.00	5.90	0.000
segment %in% (basin/cell/area)	30	0.03	0.00	3.97	0.000
Residuals	404		0.12	0.00	



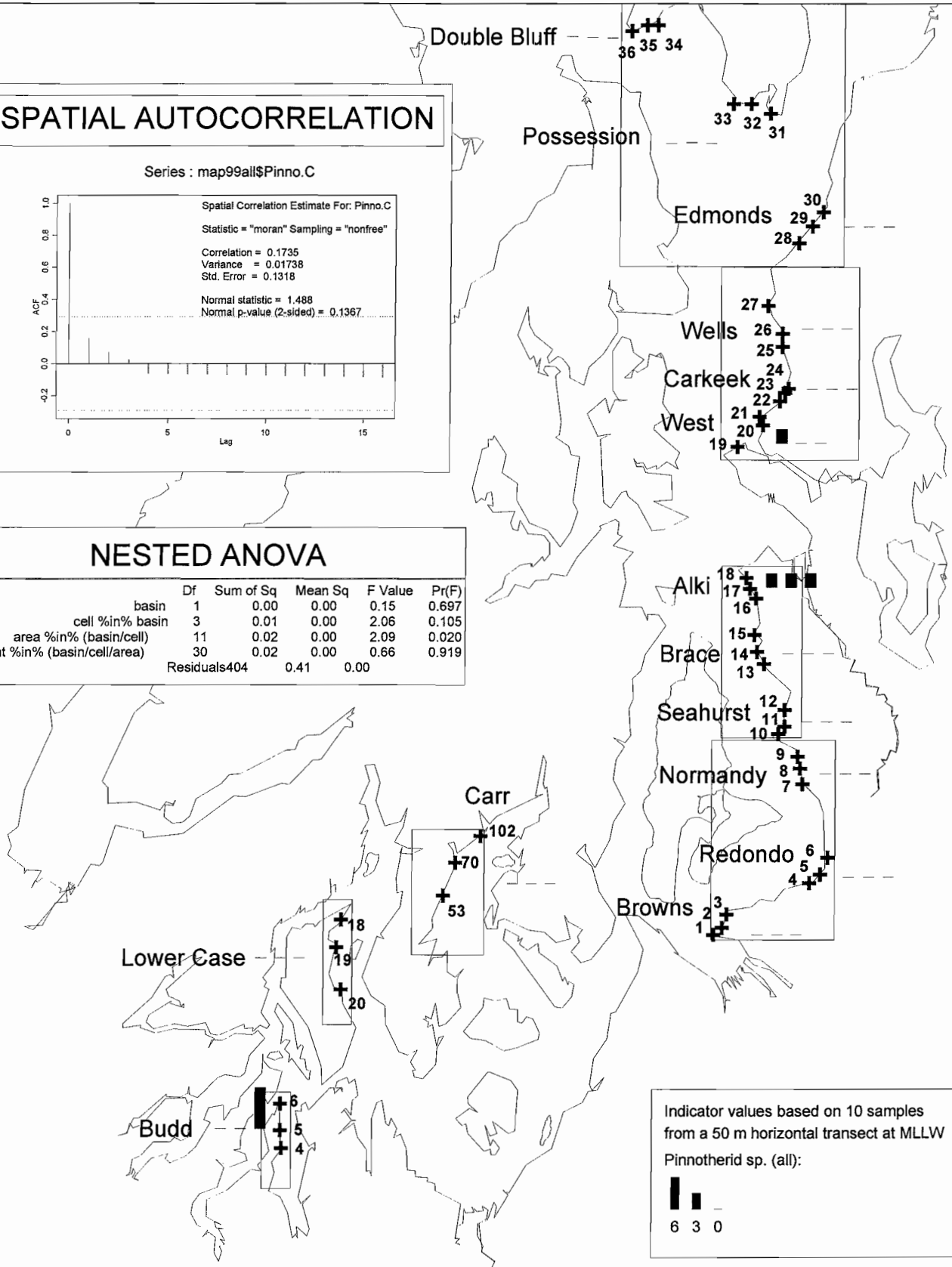
# Appendix E42. Spatial distribution of Pinnotherids (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



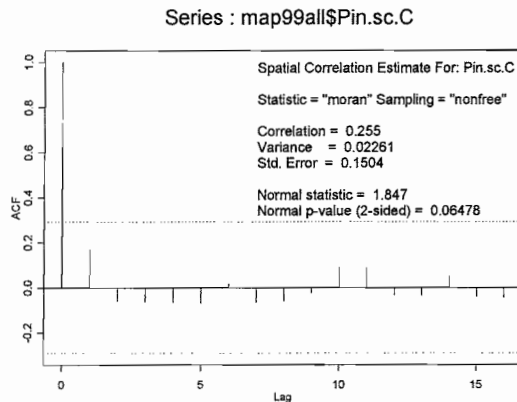
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	0.15	0.697
cell %in% basin	3	0.01	0.00	2.06	0.105
area %in% (basin/cell)	11	0.02	0.00	2.09	0.020
segment %in% (basin/cell/area)	30	0.02	0.00	0.66	0.919
Residuals	404		0.41	0.00	



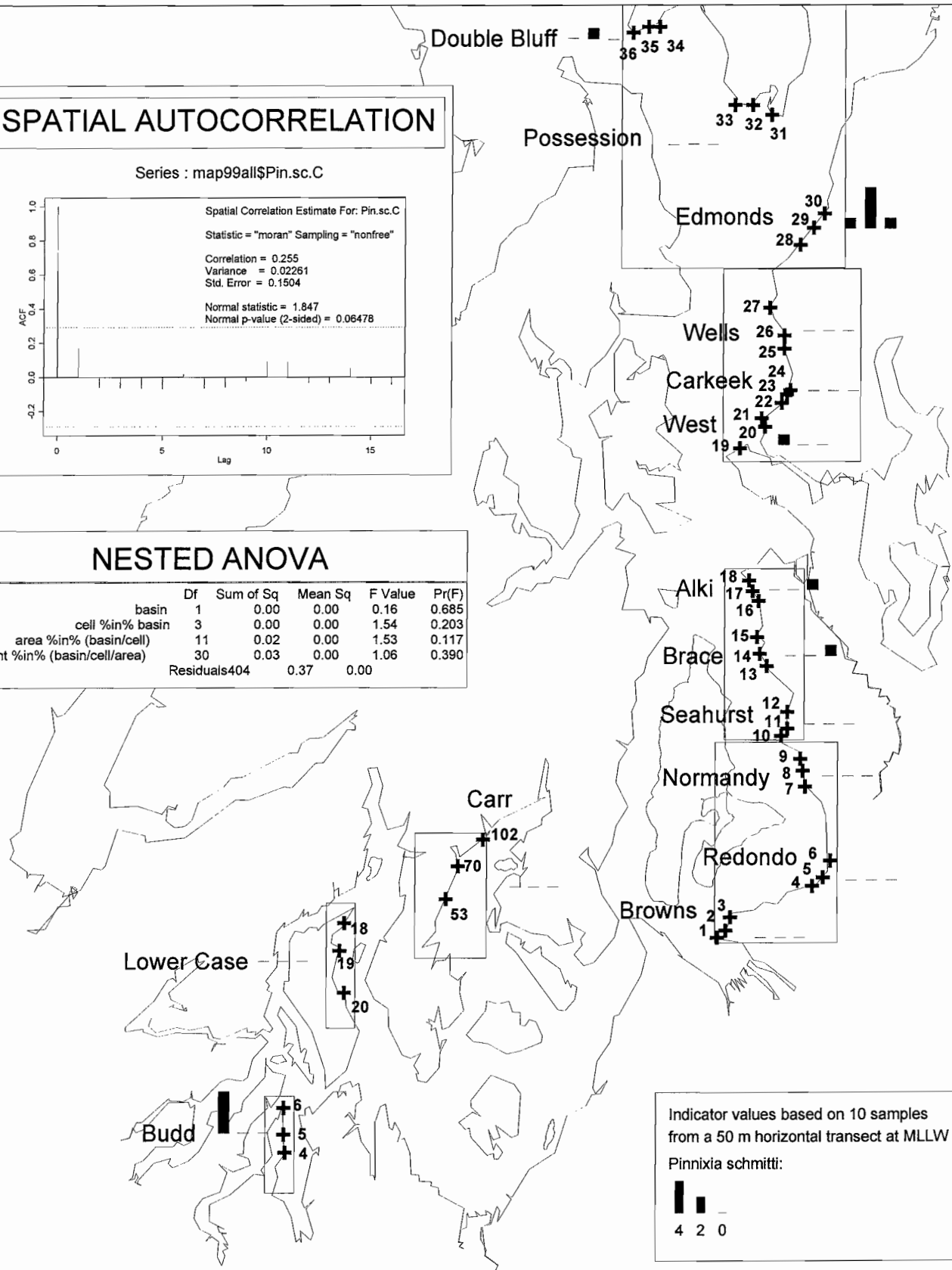
# Appendix E43. Spatial distribution of *Pinnixia schmitti* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	0.16	0.685
cell %in% basin	3	0.00	0.00	1.54	0.203
area %in% (basin/cell)	11	0.02	0.00	1.53	0.117
segment %in% (basin/cell/area)	30	0.03	0.00	1.06	0.390
Residuals	404		0.37	0.00	

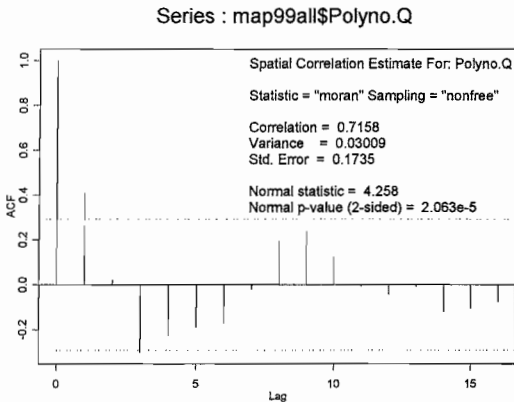


Indicator values based on 10 samples from a 50 m horizontal transect at MLLW *Pinnixia schmitti*:

4 2 0

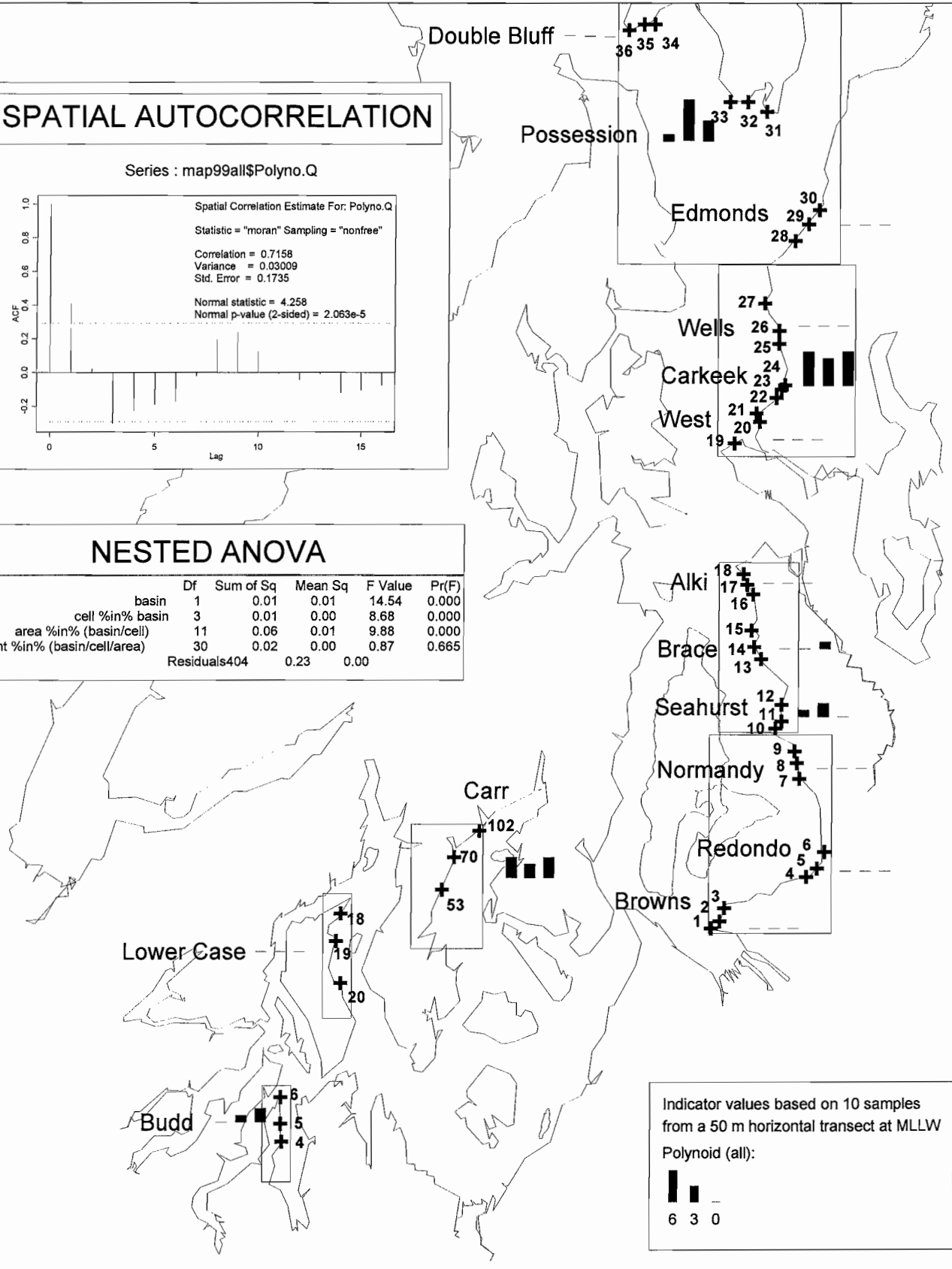
# Appendix E44. Spatial distribution of Polynoids (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(>F)
basin	1	0.01	0.01	14.54	0.000
cell %in% basin	3	0.01	0.00	8.68	0.000
area %in% (basin/cell)	11	0.06	0.01	9.88	0.000
segment %in% (basin/cell/area)	30	0.02	0.00	0.87	0.665
Residuals	404	0.23	0.00		



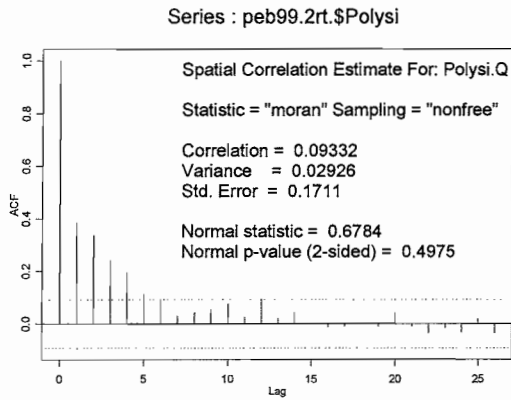
Indicator values based on 10 samples from a 50 m horizontal transect at MLLW

Polynoid (all):

■ 6    ■ 3    - 0

# Appendix E45. Spatial distribution of *Polysiphonia* sp. (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

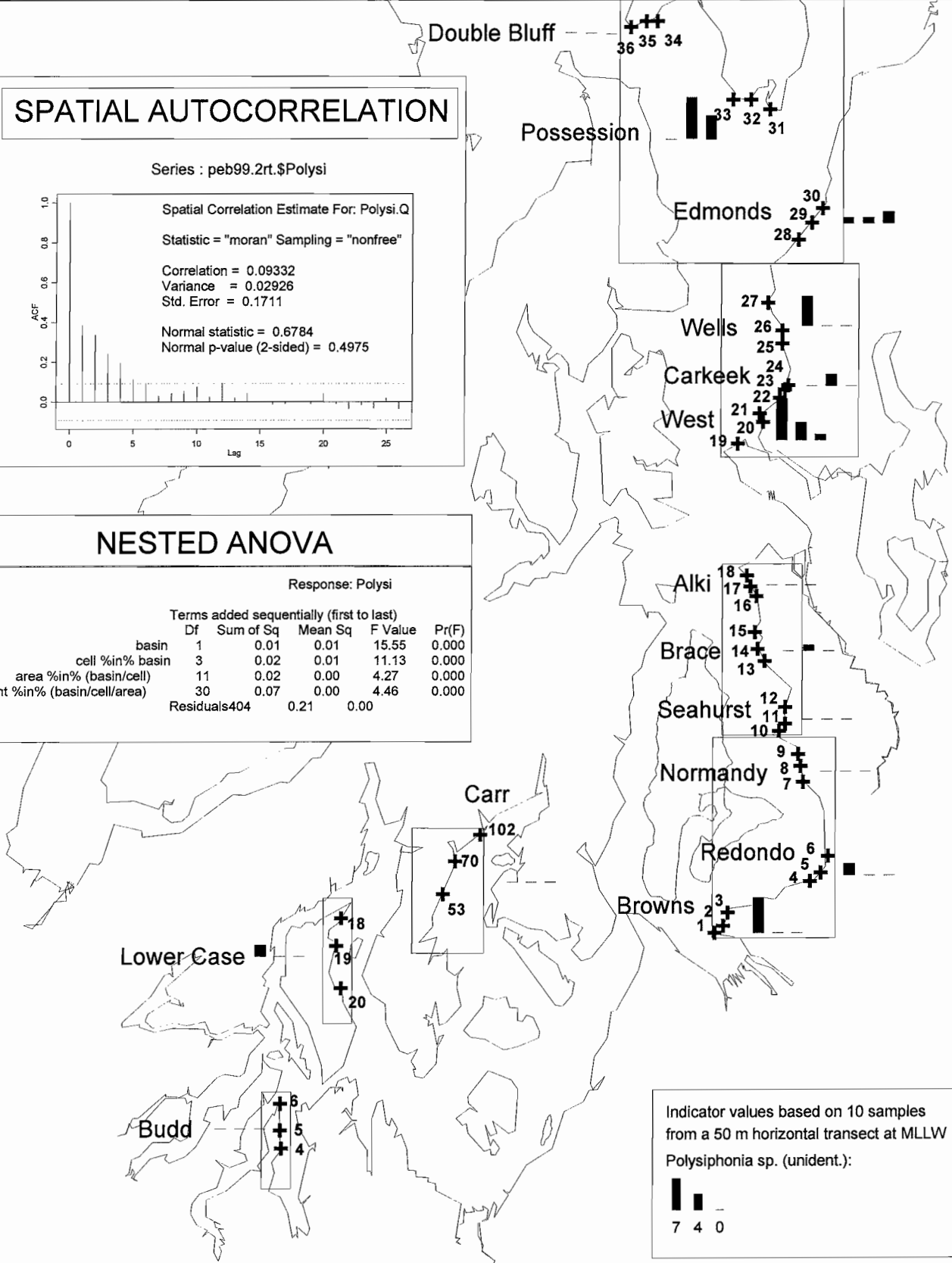
## SPATIAL AUTOCORRELATION



## NESTED ANOVA

Response: Polysi

Terms added sequentially (first to last)					
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	15.55	0.000
cell %in% basin	3	0.02	0.01	11.13	0.000
area %in% (basin/cell)	11	0.02	0.00	4.27	0.000
segment %in% (basin/cell/area)	30	0.07	0.00	4.46	0.000
Residuals	404		0.21	0.00	



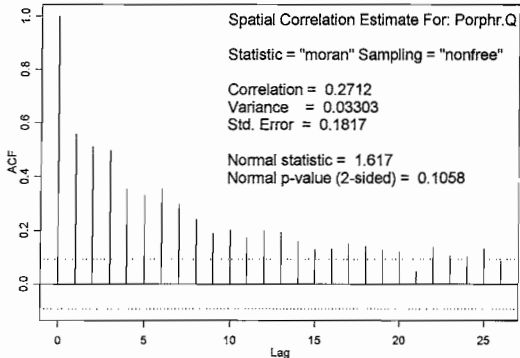
Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Polysiphonia* sp. (unident.):



# Appendix E46. Spatial distribution of *Porphyra* sp. (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION

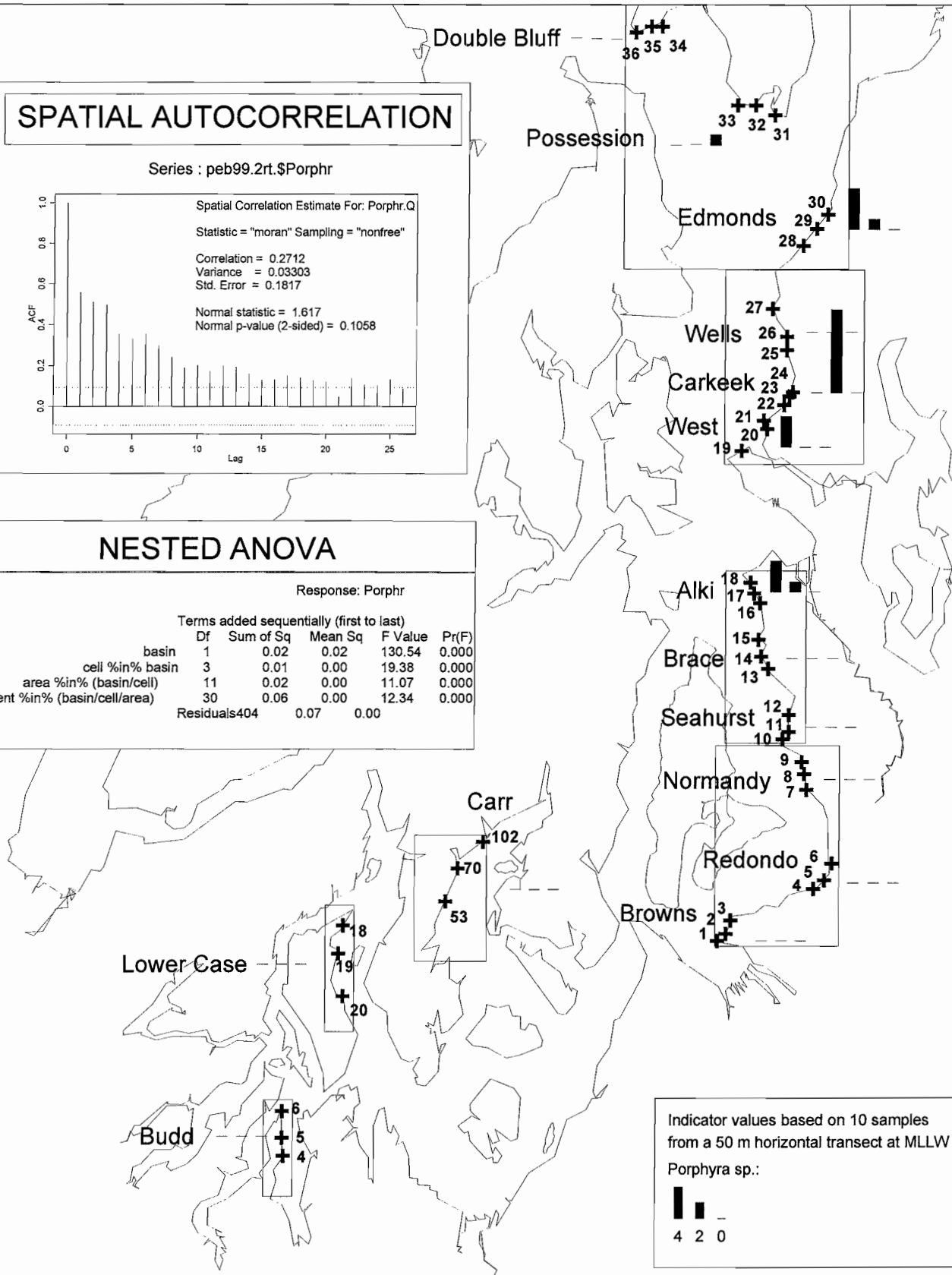
Series : peb99.2rt.\$Porphr



## NESTED ANOVA

Response: Porphr

Terms added sequentially (first to last)					
	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.02	0.02	130.54	0.000
cell %in% basin	3	0.01	0.00	19.38	0.000
area %in% (basin/cell)	11	0.02	0.00	11.07	0.000
segment %in% (basin/cell/area)	30	0.06	0.00	12.34	0.000
Residuals	404	0.07	0.00		

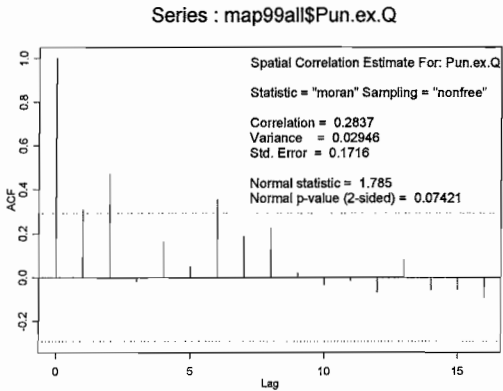


Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Porphyra* sp.:

4 2 0

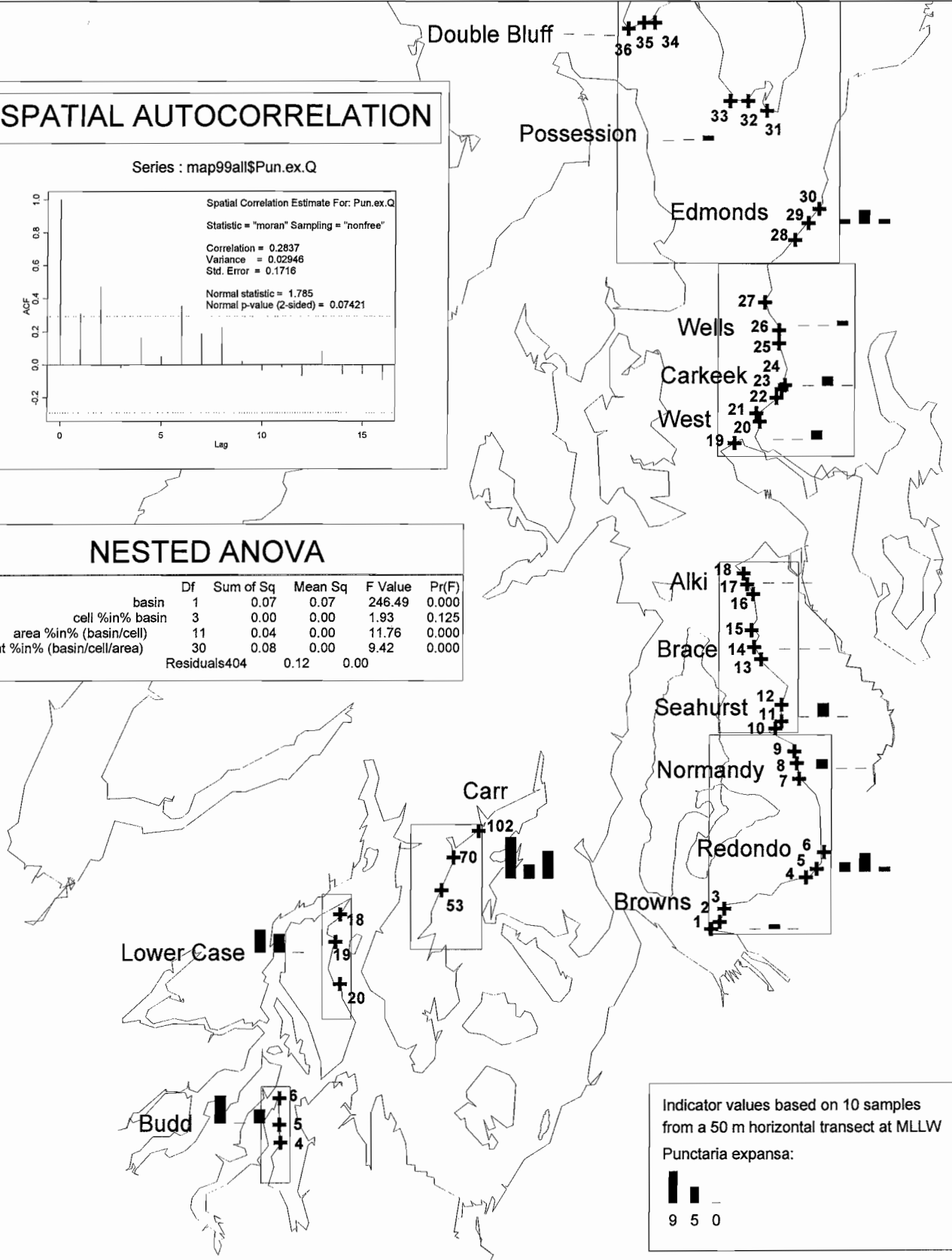
# Appendix E47. Spatial distribution of *Punctaria expansa* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.07	0.07	246.49	0.000
cell %in% basin	3	0.00	0.00	1.93	0.125
area %in% (basin/cell)	11	0.04	0.00	11.76	0.000
segment %in% (basin/cell/area)	30	0.08	0.00	9.42	0.000
Residuals	404	0.12	0.00		



Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Punctaria expansa*:

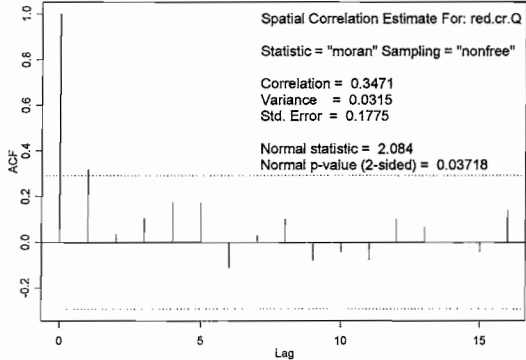
9 5 0



# Appendix E48. Spatial distribution of red crusts (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

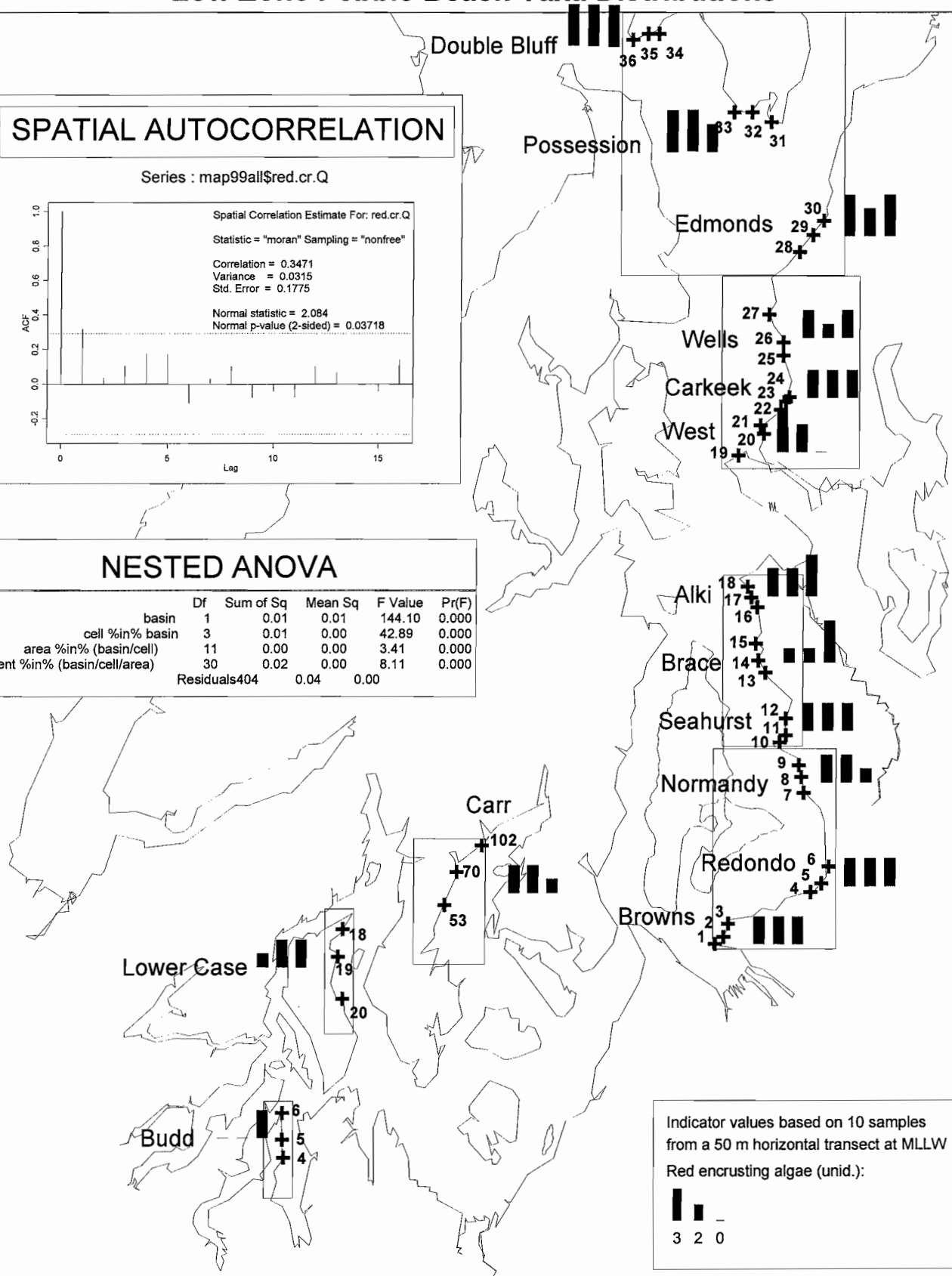
## SPATIAL AUTOCORRELATION

Series : map99all\$red.cr.Q

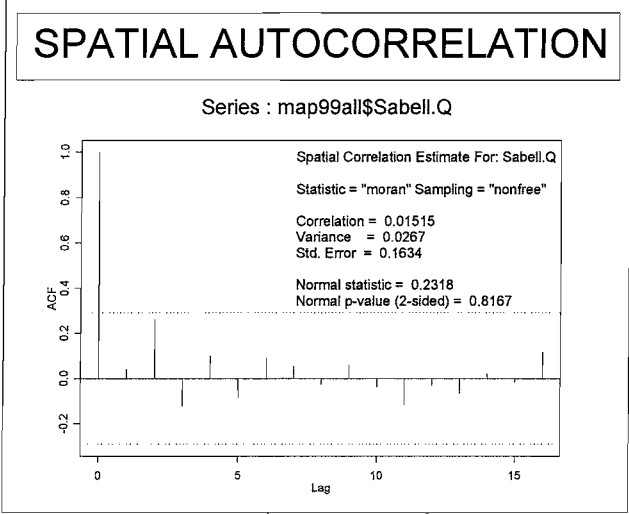


## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	144.10	0.000
cell %in% basin	3	0.01	0.00	42.89	0.000
area %in% (basin/cell)	11	0.00	0.00	3.41	0.000
segment %in% (basin/cell/area)	30	0.02	0.00	8.11	0.000
Residuals	404	0.04	0.00		

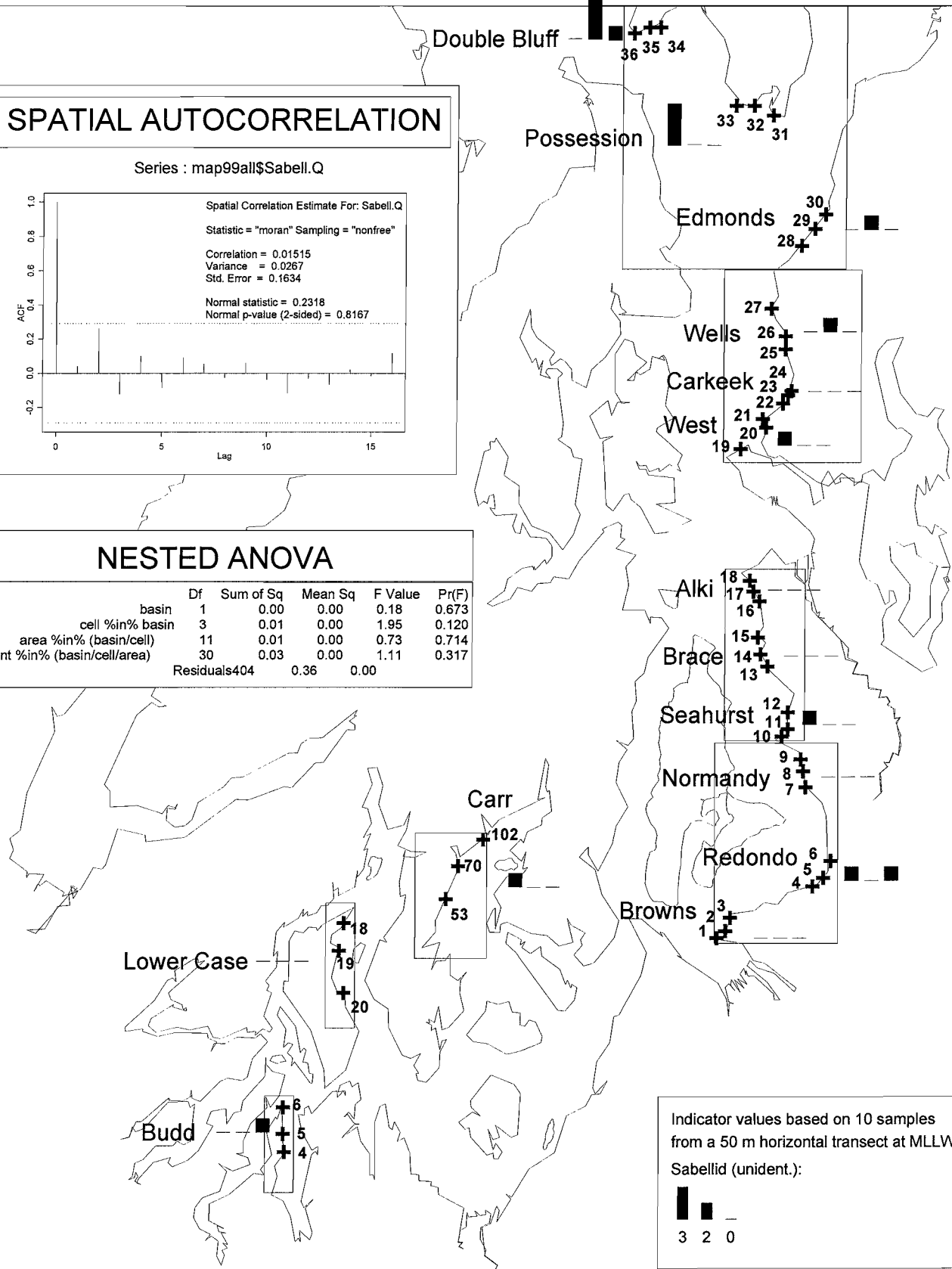


# Appendix E50. Spatial distribution of Sabellids (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions



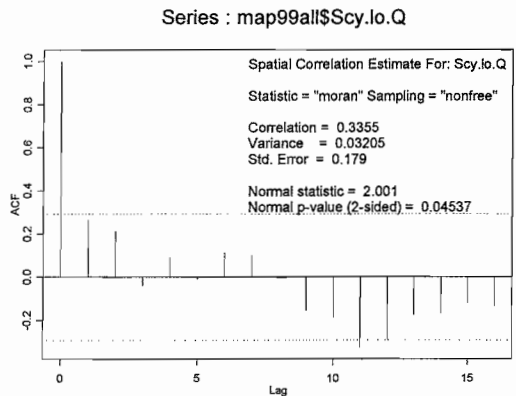
### NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.00	0.00	0.18	0.673
cell %in% basin	3	0.01	0.00	1.95	0.120
area %in% (basin/cell)	11	0.01	0.00	0.73	0.714
segment %in% (basin/cell/area)	30	0.03	0.00	1.11	0.317
Residuals	404	0.36	0.00		



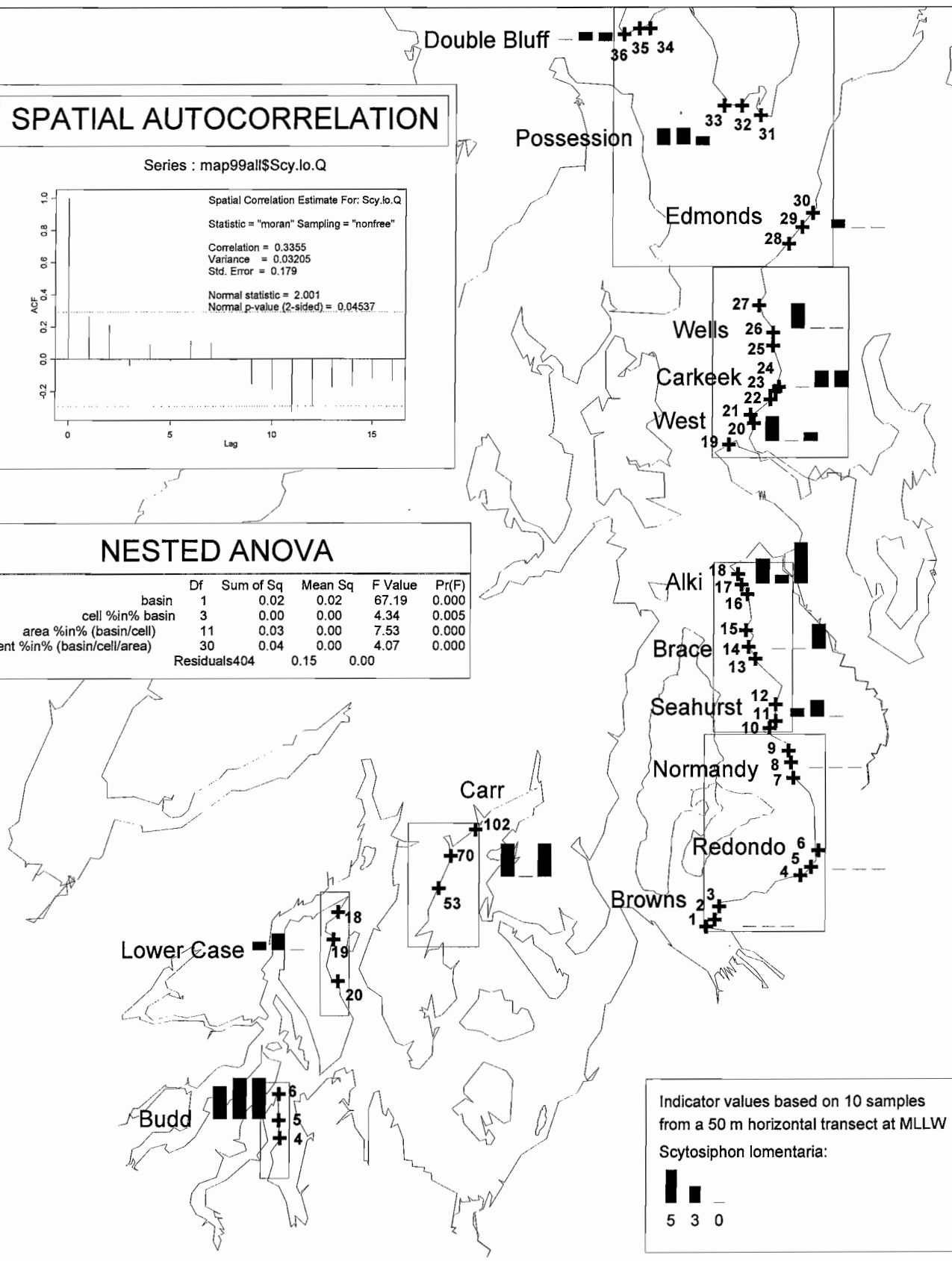
# Appendix E51. Spatial distribution of *Scytosiphon lomentaria* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.02	0.02	67.19	0.000
cell %in% basin	3	0.00	0.00	4.34	0.005
area %in% (basin/cell)	11	0.03	0.00	7.53	0.000
segment %in% (basin/cell/area)	30	0.04	0.00	4.07	0.000
Residuals	404	0.15	0.00		

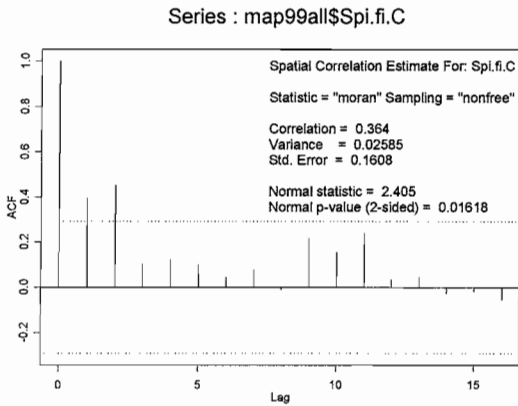


Indicator values based on 10 samples from a 50 m horizontal transect at MLLW  
*Scytosiphon lomentaria*:

5 3 0

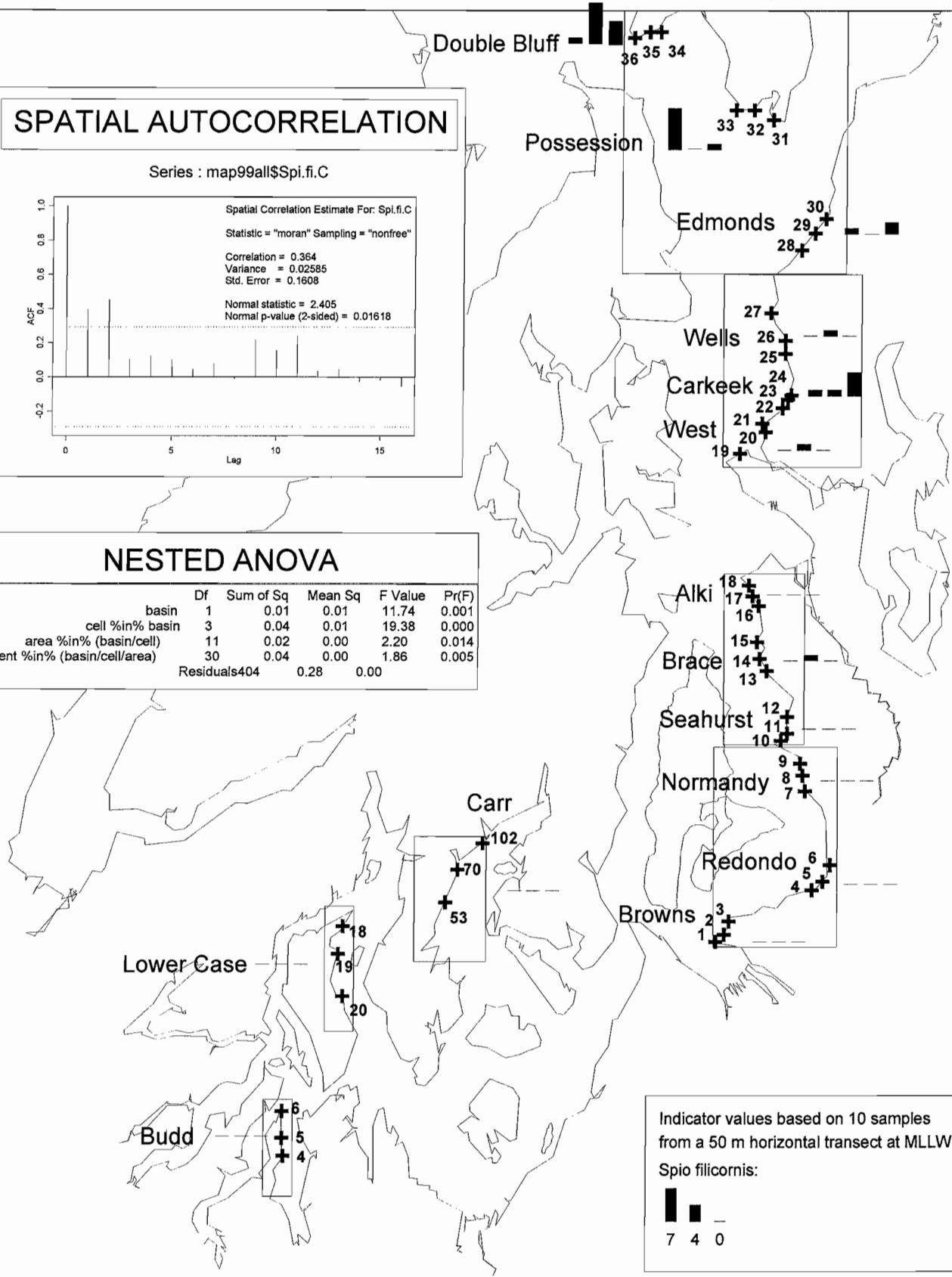
# Appendix E52. Spatial distribution of *Spio filicornis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	11.74	0.001
cell %in% basin	3	0.04	0.01	19.38	0.000
area %in% (basin/cell)	11	0.02	0.00	2.20	0.014
segment %in% (basin/cell/area)	30	0.04	0.00	1.86	0.005
Residuals	404	0.28	0.00		



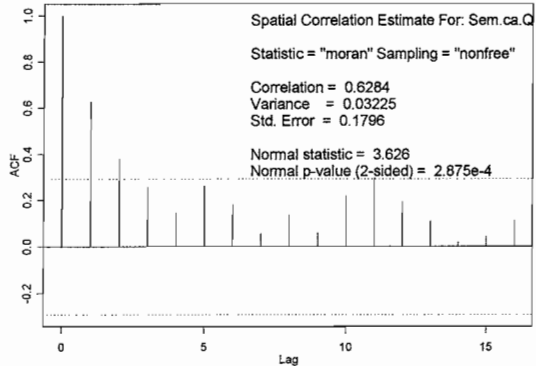
Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Spio filicornis*:

7 4 0

# Appendix E53. Spatial distribution of *Semibalanus cariosus* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

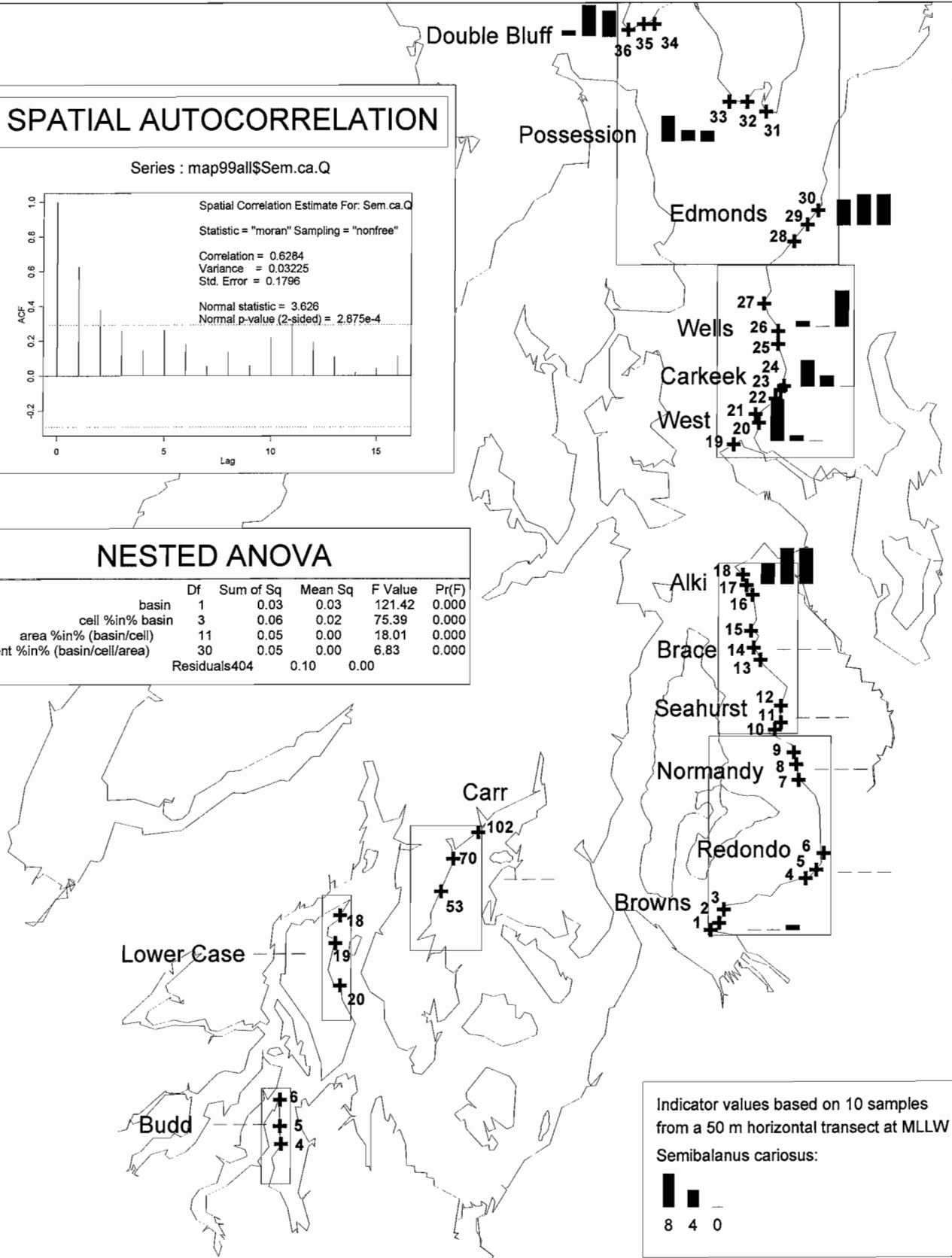
## SPATIAL AUTOCORRELATION

Series : map99all\$Sem.ca.Q



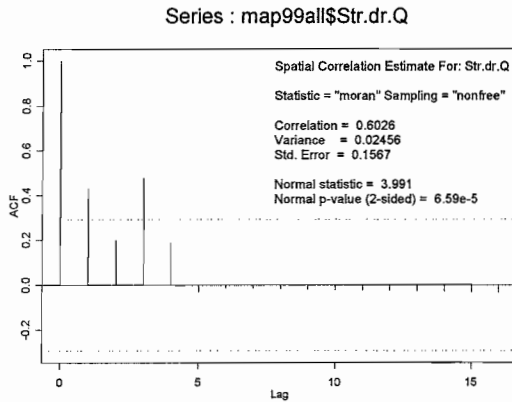
## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.03	0.03	121.42	0.000
cell %in% basin	3	0.06	0.02	75.39	0.000
area %in% (basin/cell)	11	0.05	0.00	18.01	0.000
segment %in% (basin/cell/area)	30	0.05	0.00	6.83	0.000
Residuals	404	0.10	0.00		



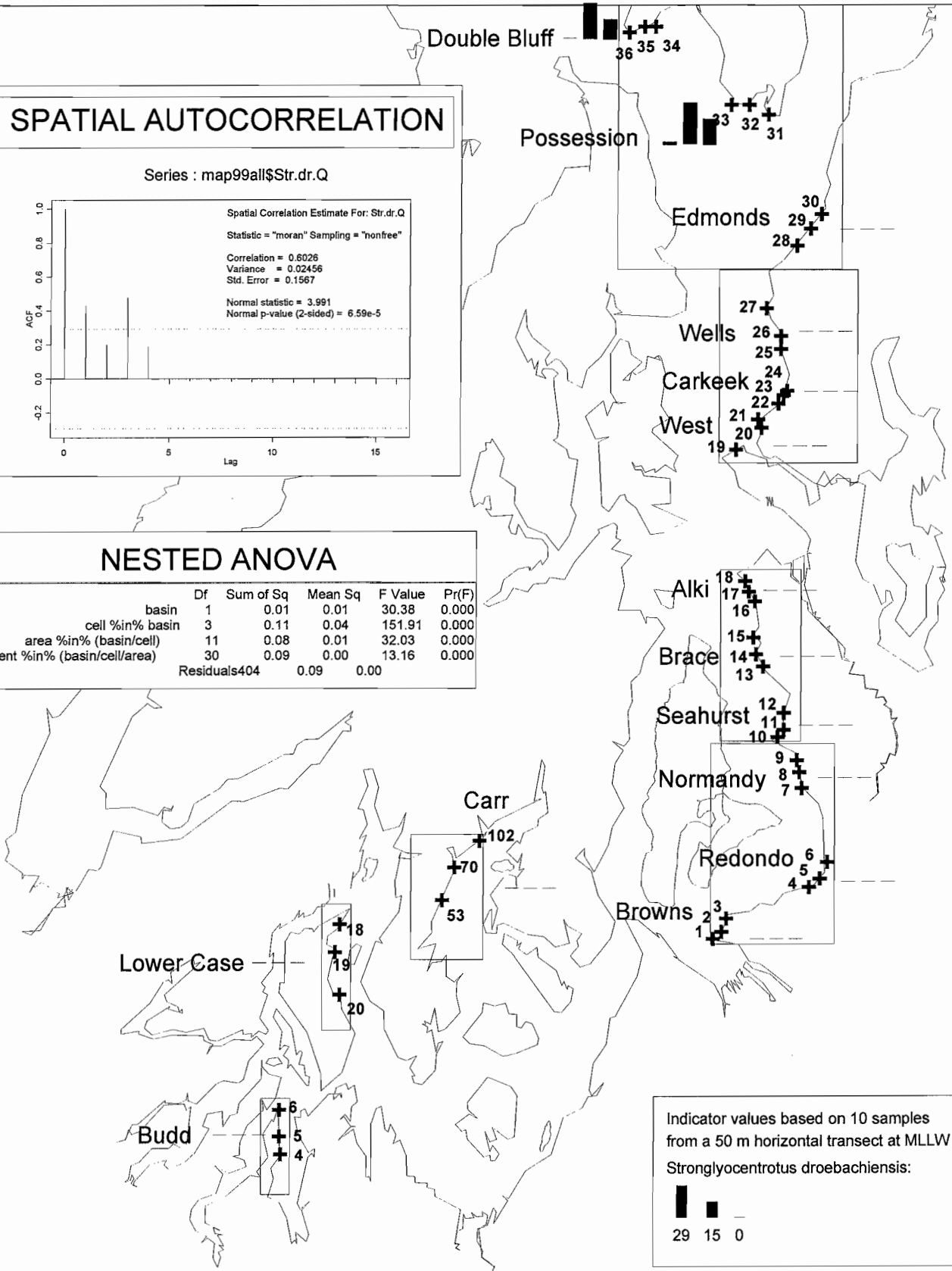
# Appendix E54. Spatial distribution of *Stronglyocentrotus droebachiensis* Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	30.38	0.000
cell %in% basin	3	0.11	0.04	151.91	0.000
area %in% (basin/cell)	11	0.08	0.01	32.03	0.000
segment %in% (basin/cell/area)	30	0.09	0.00	13.16	0.000
Residuals	404	0.09	0.00		

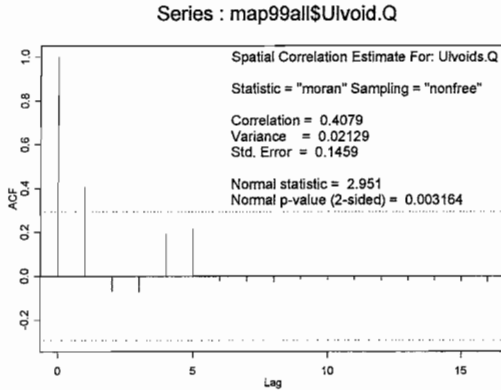


Indicator values based on 10 samples  
from a 50 m horizontal transect at MLLW  
*Stronglyocentrotus droebachiensis*:



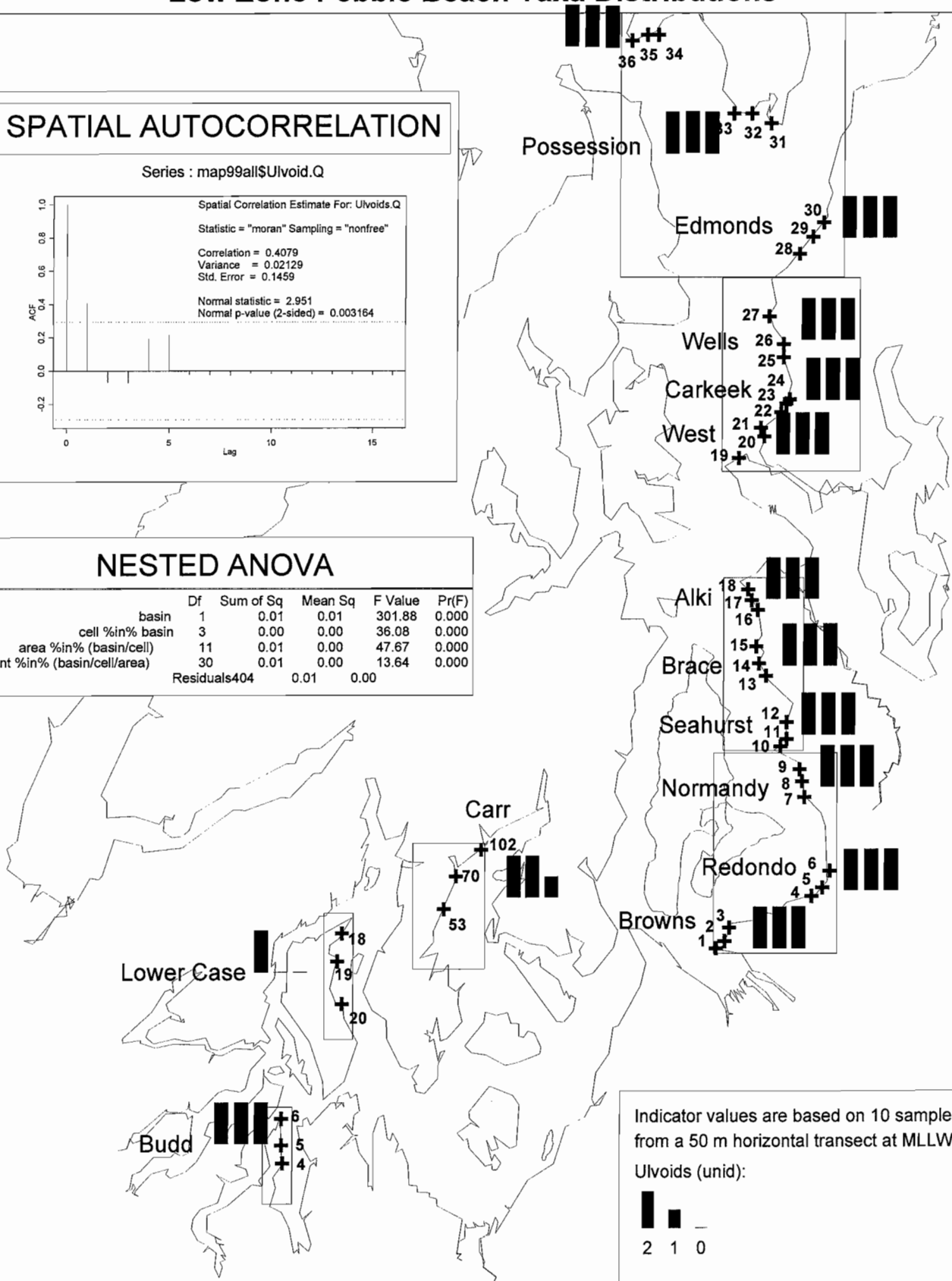
# Appendix E55. Spatial distribution of Ulvoids (all) Puget Sound 1999: Central and South Basin Low Zone Pebble Beach Taxa Distributions

## SPATIAL AUTOCORRELATION



## NESTED ANOVA

	Df	Sum of Sq	Mean Sq	F Value	Pr(F)
basin	1	0.01	0.01	301.88	0.000
cell %in% basin	3	0.00	0.00	36.08	0.000
area %in% (basin/cell)	11	0.01	0.00	47.67	0.000
segment %in% (basin/cell/area)	30	0.01	0.00	13.64	0.000
Residuals	404	0.01	0.00		



Indicator values are based on 10 samples from a 50 m horizontal transect at MLLW  
Ulvoids (unid):  
2 1 0

## **APPENDIX G**



Appendix G. Species found in 1999 SCALE samples, with qualitative abundance information, and similar information from Armstrong et al., Thom et al., and Staude (West Pt. Only). Only comparable data (e.g. mixed-sediment, sand, or cobble, at 0.0') given for historic surveys.																													
Area	1		2		3		4		5		6		7		8		9		10		11		12		13	14	15		
SPECIES	Budd	Case	Case	Carr	Brown, Dash	Redondo	Normandy	Seahurst	Brace, Lincoln	Aiki	West Pt	Carkeek	Wells, Richmond	Edmond	Possess	Double	NOTES												
	SCALE	SCALE	SCALE	SCALE	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	SCALE	SCALE	SCALE	SCALE		
Acrosiphonia coalita	C		R	R	C		C	R	C		C	R	C	R	C	C	C	C	C	C	C	C	C	C	C	A			
Alla gausapata	A		C	C	R		R		R				R																
Allorchestes angusta		R	C										A	C	A		A		A		A		A				2		
Americorophium salmonis						Ch							Ch																
Amphiodia periercta																									R	C	C		
Amphipholis squamata													R	C	C										C		1		
Amphiodia urtica															R														
Ampithoe dalli					C		R		C						C		C		C		C					C			
Ampithoe lacertosa			R												C	R		R		R									
Anisogammarus pugettensis															C		C	C	R	C	C		C			R	C		
Anthopleura elegantissima							R	R	R	R	R	R	R	C	R	C	C	C	R	C	R	C	R	C	R	R	R		
Armandia brevis	R			R							R	C		A	R	A	C	A	A	A	A		A	A	A	C	C		
Axiothella rubrocincta		R		R	R				R																	R		2	
Balanus glandula	A	A	A	A	A		A	R	A	A	A	R	A	C	C	A	A	A	A	A	A	A	A	A	A	A	A	2	
Calliostoma sp.																				R							R		
Cancer sp.															C		C		C		C	R	C	R		R	R	3	
Capitella capitata													R				R		R		R		R		R	C	C		
Caulacanthus sp.		R																											
Caulerietta ?pacific									R								C		R						R				
Ceramium sp.							R																						
Cerebratulus sp.	C	C	C	R	R									R		R	R	R		R	R	R	R	R	R	R			
Cirratulus cingulatus	R																										C		
Cirratulus multicolata(?)														C				C	R	R			R		R	A	C	4	
Cirratulus robustus																													
Cirriformia sp.A		R																								A			
Clinocardium nuttallii	R			R					R		R		R	C	R	C	R	C	R	C	C	C	C	R	R	R	R		
C. nuttallii juveniles																										C	R		
Crassostrea gigas		R	R												R														
Crepidula dorsata		R	R	R	R		C		R		R		R		R		R		R						R				
Crepidula fornicata	C		R		R		R																						
Cryptomya californica	R										R					R		R		R		R							
Dendraster excentricus				R							R					R	R										R		
Desmarestia viridis																				R						R	R		
Diopatra ornata																R		R		R		R		R					
Dorvillea annulata														C		C		C	R	C		C						5	
Edwardsia sipunculoides	R	C																											
Eogammarus oclairi				C																									
Eteone pacifica									R						C		C		C	R	C		C					6	
Euclymene sp.A																R		C	R	C								7	
Euclymene cf. zonalis	C																												
Eulalia parvoseta																					R								
Eupolymnia sp. A				R																									
Exosphaeroma inornata					R		R		R		R			C	A	R	A	C	A	R	A	C	A	C	A	A	A		
Fabia subquadrata											R			R										R	R	R	R	C	





App. G, continued	Budd	Case	Case	Carr	Brown, Dash	Redondo	Normandy	Seahurst	Brace, Lincoln	Alki	West Pt.	Carkeek	Wells, Richmond	Edmond	Possess	Double	NOTES
SPECIES	SCALE	SCALE	SCALE	SCALE	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	OLD	SCALE	SCALE	SCALE
Polinices lewisii									R			R	R		R		
Polynoid (unid, in quadrat)	R	R	R	C					R			C	C	R	R	R	26
Polysiphonia spp.	R	R	R		R		R		R		R	C	R	R	R	R	
Pontogeneia spp.									C	C							
Porphyra sp.			C	C	R		C	R	C		C	C	R	C	C	R	
Prionospio multibranchiata									C	R	C	C	C	C			
Prionospio steenstrupi					R				C	R		R	C	C			27
Prionitis spp.									R						R		
P. staminea juv.		R					C	R	C		C	C	C		A	C	C
Protothaca staminea			R	R			R	Ch	R	Ch	R	C		A	R	R	R
Pugettia gracilis							R		R		R	R	R	C	R	R	R
Punctaria expansa	C	C	C	C	R		R		R		R	R	R		C	R	R
Red encrusting algae	C	C	C	C	C		C		C		C		C		C	C	C
Sabellid (unident.)	R			R			R						R		R	R	R
Sarcodiotheca spp.									R	R						R	
Sargassum muticum							R		R						R	R	
Saxidomus giganteus							R		A		C	R	C	A	R	C	C
S. giganteus juveniles			R	R	C		C		C		C	A		C	C	C	
Scleroplax granulata	R						R										
Scoloplos armiger											C		C		C		
Scolecipis squamata									C		C	R	C			R	
Scytosiphon lomentaria	C	C	R	C	R		R		R	C		R	R	R	R	R	R
Semibalanus cariosus					R												
Serpulid sp. (unident.)																	
Smithora naiadum									R								
Spiophanes bombyx									C		C		C		C		C
Spio filicornis									R	C	C	R	C	C	C	R	C
Spiochaetopterus tubes	C	R	R	R	C		R		R	C	R	R	R	C			
Stronglyocentrotus droe									R		R	R		R			C
Syllis heterochaeta									C					C			
Syllis ?stewarti																R	
Tectura scutum															R	R	R
Tellina modesta							R		R		C	R		C			R
Tellina nuculoides													R				R
"Terebellids"	R	R		C	R		R		R				R	C	C	A	
Tonicella lineata									C		C		R				
Transenella tantilla									A		A	R	A		A		
Tresus capax									R	C	R	C	C	C	R	C	
Tresus capax juveniles					R		R		A		A	C	C		C	A	A
Ulvoids (unident.)	A	C	A	A	A		A	A	A	A	A	A	A	A	A	A	A
Zostera marina									R								

Codes: Ch = 'Characteristic species' (Thom et al.); A, C, and R as in Armstrong et al., SCALE data converted to these units for species with counts: A = >1.0 per core, C = 0.1 - 1.0 per core, R = fewer than 0.1 per core.

For percent cover data and taxa in large quadrats (SCALE), A = average >10% cover or >25/quadrat; C = 1-10% cover or 1-14 per quadrat; R = present but less than C.

NOTE: Thom et al. only list very common taxa (Brown, Redondo, Normandy, Seahurst); Armstrong et al. do not list algae at all (Brace to Wells). Staude lists algae for West Point only.

