

INTER-AMERICAN TROPICAL TUNA COMMISSION COMISION INTERAMERICANA DEL ATUN TROPICAL

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March 5, 1999

Ref: 0132-814

Dr. Michael F. Tillman
Science Director
Southwest Fisheries Science Center
P.O. Box 271
La Jolla, California 92038-0271

Dear Dr. Tillman:

Thank you for your letter of February 26, including arrangements for the peer review, the revised documents, and the responses to comments made by the Marine Mammal Commission and the staff of this Commission in our letters of January 14, February 3, and February 17.

We have not circulated your papers to the members of the Commission but, as I noted in discussion with you, copies of our letters, have been sent to the IATTC Commissioners. Not being able to advise them of the contents of the earlier papers, nor of the contents of your draft report to Congress, puts me in a somewhat difficult situation. There is an intergovernmental meeting starting the week after the review committee meets, and I hope that it would be possible for the United States to brief the other countries on its progress at that time.

I would like to respond to some of the comments made by Drs. Goodman and Wade and the unattributed responses. The staff will be prepared to elaborate on these at the review committee meeting. In particular, Dr. Wade sought additional information on data on frequencies of color stages in the kill and the effect of fishing effort in improving the fit of a model. Also the unattributed comments indicated an interest in Dr. Joseph's comment in page 4, paragraph 4, in his letter of January 14. I understand the preference in these requests for analyses that have undergone peer review. However, this is not always possible in this type of situation. Indeed, some of the estimates we have previously provided which are already being used in the NMFS analyses have not been peer reviewed. In particular the estimates of relative abundance using TVOD since 1992 have not been reviewed externally.

Dr. Goodman agrees that "the proposed tolerance levels in the proposed decision rule are protective," and states that this is appropriate for an agency charged with implementing the provisions of the MMPA and ESA, as they apply to these dolphin populations. As I noted in my letter of February 19, this might be appropriate in the case of the NMFS making a decision concerning conservation or management of a living resource. However, in this case the decision is to be made by the Secretary of Commerce, who has responsibilities other than resource management, and it is in respect of a labeling matter under a statute concerned with consumer protection. I believe my point is still correct.

Our concern about the tuna vessel observer data stems first from an examination of the detection functions for each year and the trends in the effective strip half-width (esw). Attachment A is a table showing the calculated esw which were used in the estimates of relative abundance. Attachment B is a set of figures showing the detection functions for each year.

You will note that in the early years there are a large number of observations on the track line, and that over time this disappears. There are apparently too few observations for recent years close to the track line. This pattern likely reflects changes in the procedure used by observers to estimate the angles to sightings close to the track line. In earlier years, observers often recorded the angle to sightings after the vessel has turned toward the herd, and were prone to round small angles to zero. There may also be changes in recent years during which some vessels chose not to set on dolphins at all during a trip, and did not search for them. Buckland *et al.* 1992¹ noted that if the bias arising from the failure of an assumption is consistent over time the estimates may be used as an estimate of relative abundance. Bias resulting from this change is clearly not consistent over time, and compromises the use of the index to reflect relative abundance over a long time period.

The table of esw shows an increasing trend esw over time. These estimates have been published in the IATTC Annual Reports. Of itself the trend is not a problem, but, in recent years (after 1992) the esw has approached 4 nautical miles, which is close to the 5 nautical miles used as a cut-off distance for truncation of observations. This means that a large proportion of the sightings was made beyond the truncation distance. Extending the cut-off distance to ten nautical miles incorporates these sightings into the analysis, which increases sample size and improves the estimation. Furthermore, it reduces the influence of the sightings close to the trackline in the estimation of the esw, thus mitigating the effect of the above-mentioned changes in bias.

¹ Buckland, S. T., K. L. Cattanach, and A. A. Anganuzzi. 1992. Estimating trends in abundance of dolphins associated with tuna in the eastern tropical Pacific Ocean, using sightings collected on commercial tuna vessels. Fish Bull. 90:1-21.

We have carried out initial analyses in which the cut-off distance was extended to 10 nautical miles, and also data selection to reduce effects of under-reporting of dolphin herds by vessels engaged in fishing for tunas not associated with dolphins. We believe this helps correct some of the trends in bias over time, but it does not directly address the problem of the change in the proportion of sightings on the line. While we still prefer to address these issues in the context of the new estimation procedure which incorporates environmental information, we have included a revised set of relative abundance estimates which we believe are better than those published in the IATTC Annual Reports (Attachment C).

Our point about the effect of fishing effort on the fitting of the model stems from a strong correlation between the relative estimates of abundance of northeastern spotted dolphins and the numbers of dolphin sets in the northeastern offshore spotted dolphin area (Attachment D). We do not know the reason for such a marked correlation. It is unlikely that setting on dolphin-associated fish changes real abundance of dolphins in such a way, and while dolphin sets might be expected to track population size, the variation observed in both estimates of relative abundance and sets (up and down over time) does not seem to be reasonable. We are concerned that the estimates of relative abundance may be unduly influenced by the number of sets, which may occur if fishermen behavior changes when they are planning on fishing tuna associated with dolphins. If that is the case the effect can be removed by using the number of sets on dolphins as an explanatory variable in the model.

Another feature of the attached figure on number of dolphin sets is that it addresses one of the responses from Dr. Wade concerning the number of dolphin sets during 1993-1997. As seen in the figure, the hypothesized increase in stress-related northeastern offshore spotted dolphin mortality occurs during a period of years which show a substantial reduction in dolphin sets in the northeastern offshore spotted dolphin area, as compared to the previous eight years.

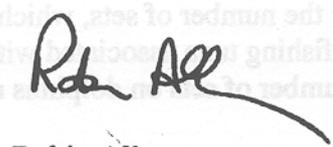
Attachment E is a chart and a table showing the variation in the composition of the dolphins killed, by color phase.

Dr. Goodman's response indicates that he believes the fitting of the population model takes the magnitude of the variances of the TVOD relative abundance estimates into account. My point was, however, that the reliability of the TVOD indices depends upon both their sample variance and what I had termed process error. Buckland *et al.* (1992) recognized that year to year differences, while statistically significant with respect to the estimated variances were implausible. Anganuzzi (1993)² described these as "year to year fluctuations in the estimates due to changing biases." In the face of this, using the sample variances alone for the TVOD estimates of relative abundance gives them an unrealistically high reliability, compared to the survey estimates.

² Anganuzzi, A. A. 1993. A comparison of tests for detecting trends in abundance indices of dolphins. Fish. Bull. 91:183-194.

Finally, I would like to touch on the response by Dr. Wade to the suggestion that dolphin abundance may have been affected by other species occupying a niche vacated by dolphins and constraining their recovery. His response referred to management action to restrain the catches of yellowfin tuna, "presumably because there were too few yellowfin." Part of the basis for our advancing the possibility is the change the estimates of the numbers of yellowfin tuna recruited over the last 30 years which is shown in attachment F. The only plausible explanation so far for these changes has been related to environmental conditions, and it is possible that any such changes also affect dolphin stocks. These estimates, which been published in successive IATTC Annual Reports and show three levels of recruitment, which have increased over time. We have recommended restriction of yellowfin catches, despite high recent levels of recruitment, because of growing fleet capacity and reduction in the average size of the tuna in the catch.

Yours sincerely,



Robin Allen
Assistant Director

CC: Commissioners

Attachment A

Published and revised estimates of effective strip half-widths for northeastern spotted dolphins, 1980-1997 using truncation at 10 nautical miles and elimination of trips in which less than 50% of sets were made on dolphins. Standard errors are shown in parentheses.

Year	Published Estimate	Revised Estimate
1980	2.49 (0.31) ^a	3.63 (0.47)
1981	2.74 (0.27) ^a	3.99 (0.56)
1982	2.63 (0.34) ^a	3.28 (0.57)
1983	3.28 (0.35) ^a	3.71 (0.62)
1984	2.97 (0.32) ^a	4.42 (0.45)
1985	2.46 (0.18) ^a	3.35 (0.25)
1986	2.54 (0.20) ^a	3.54 (0.27)
1987	2.91 (0.13) ^a	3.74 (0.25)
1988	3.18 (0.24) ^a	4.34 (0.38)
1989	3.29 (0.24) ^a	4.92 (0.36)
1990	3.36 (0.18) ^a	4.81 (0.32)
1991	3.45 (0.17) ^a	4.99 (0.25)
1992	3.54 (0.16) ^a	5.09 (0.22)
1993	3.97 (0.12) ^b	5.33 (0.21)
1994	3.93 (0.13)	5.28 (0.18)
1995	3.95 (0.12) ^b	5.66 (0.19)
1996	4.05 (0.18) ^b	5.82 (0.20)
1997	3.85 (0.11) ^b	5.31 (0.20)

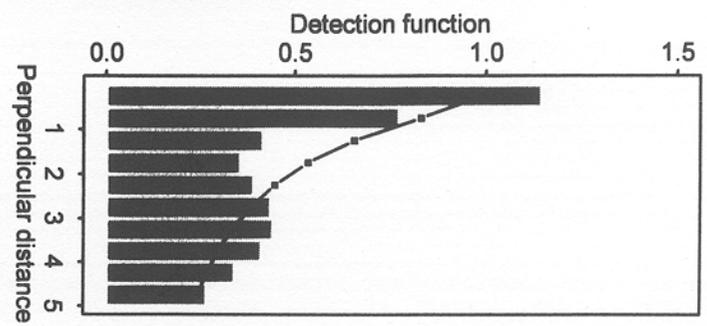
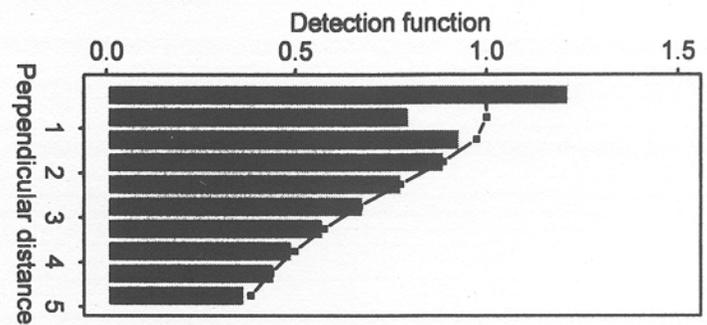
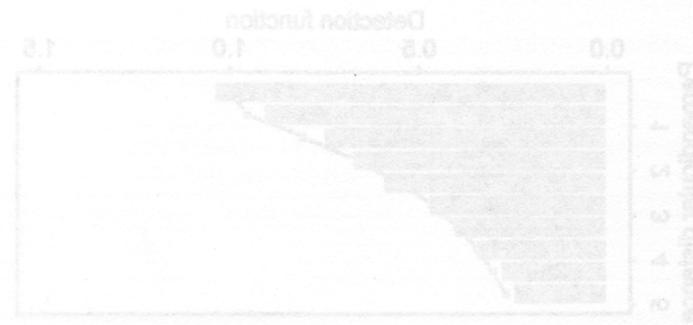
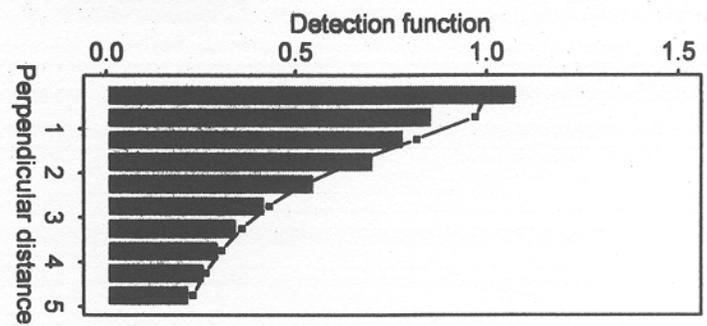
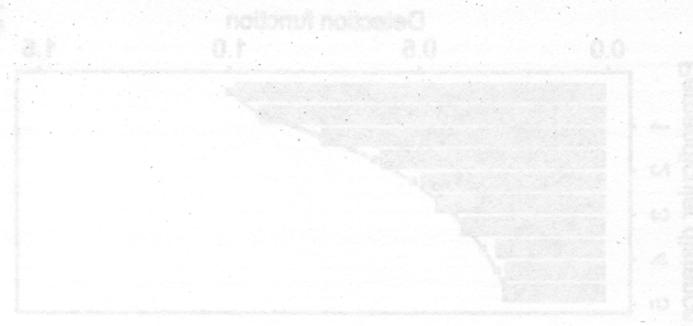
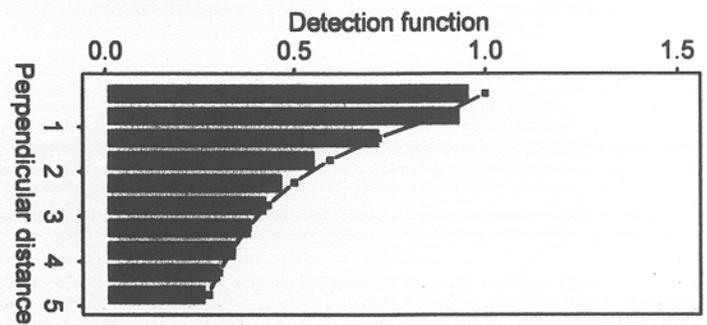
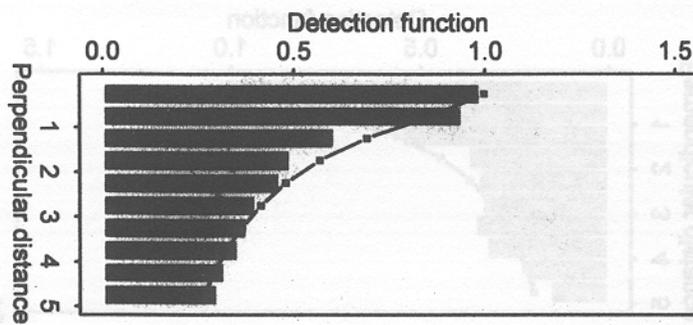
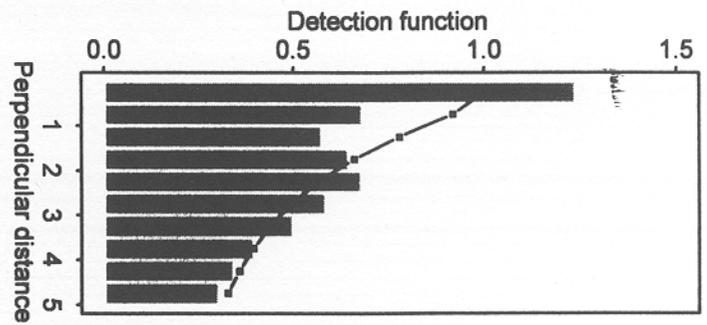
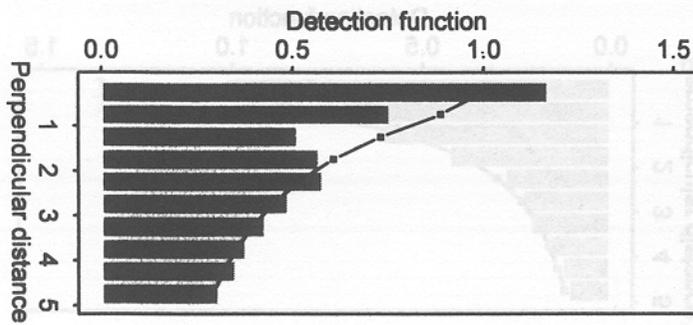
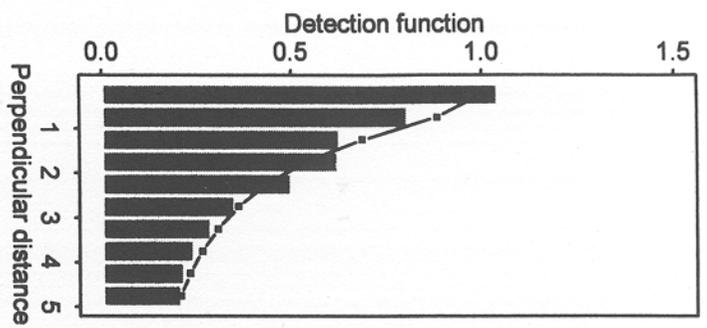
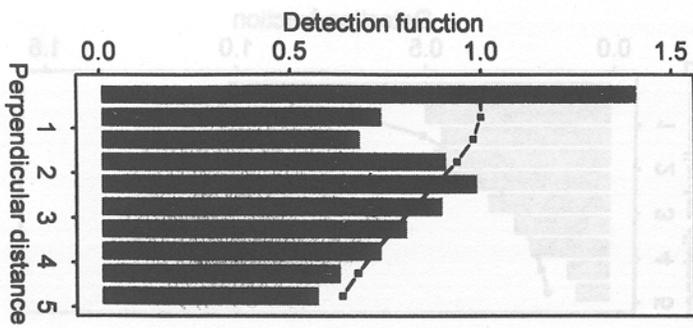
^a Anganuzzi, A.A. and Buckland, S. 1994. Relative abundance of dolphins associated with tuna in the eastern Pacific Ocean: Analysis of 1992 data. Rep. Int. Whal. Commn 44:361-366.

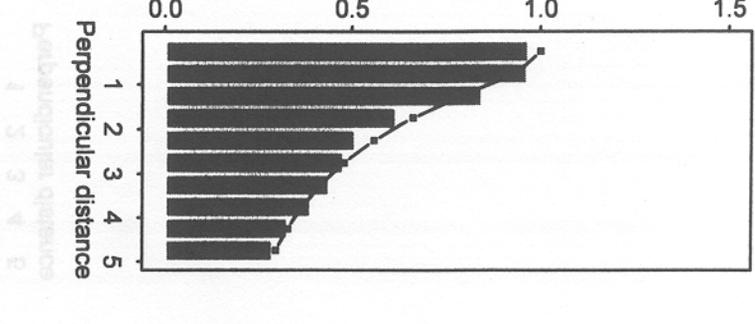
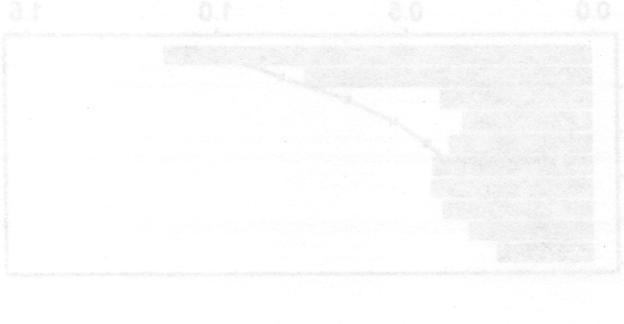
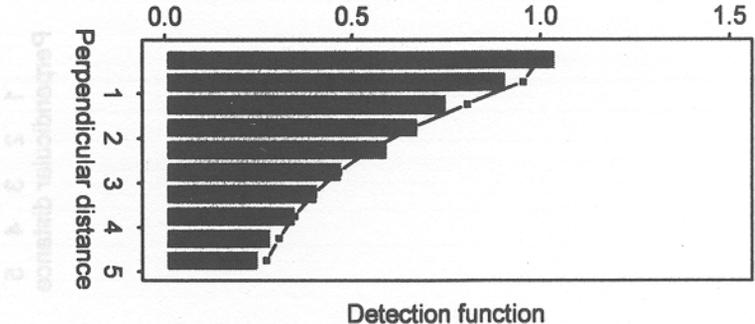
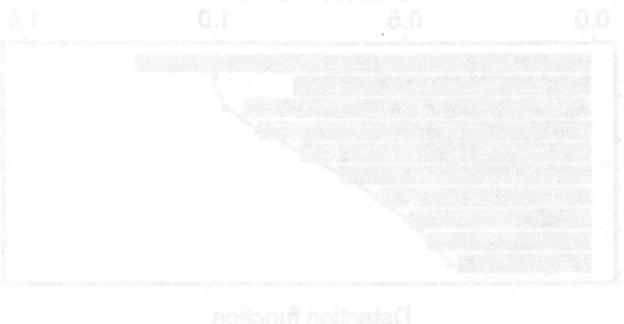
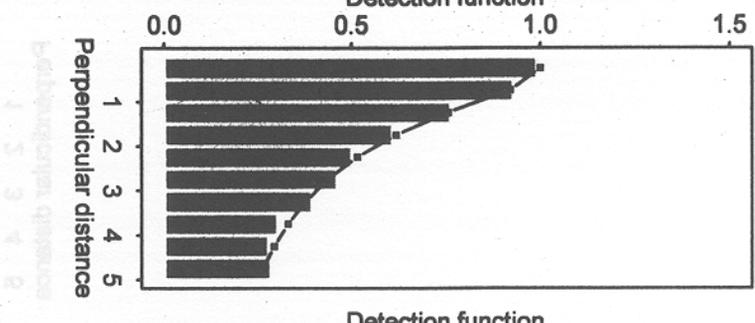
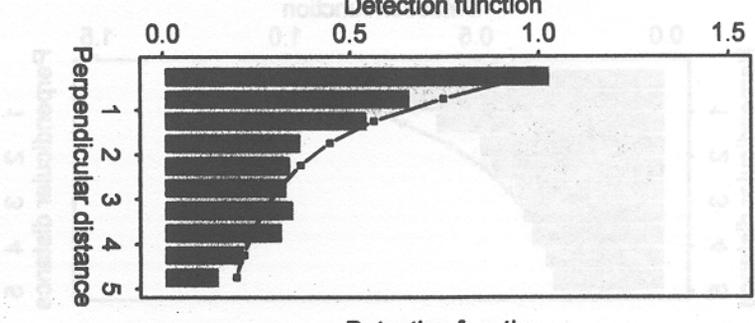
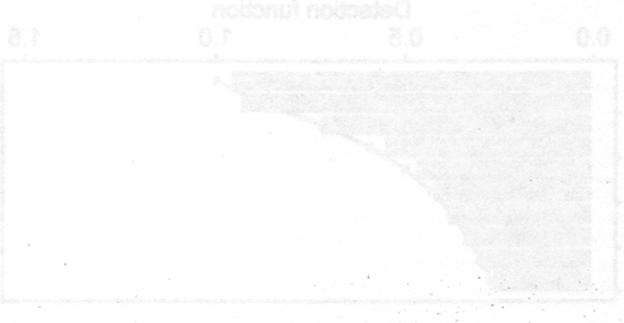
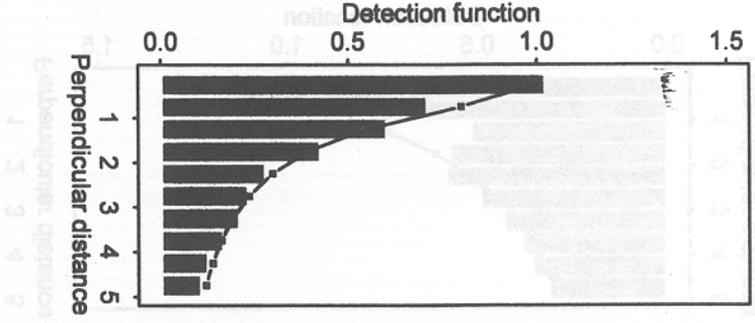
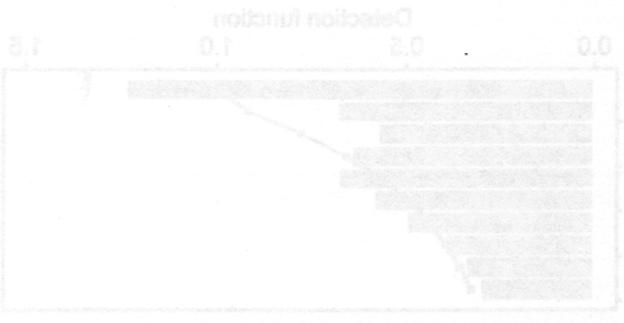
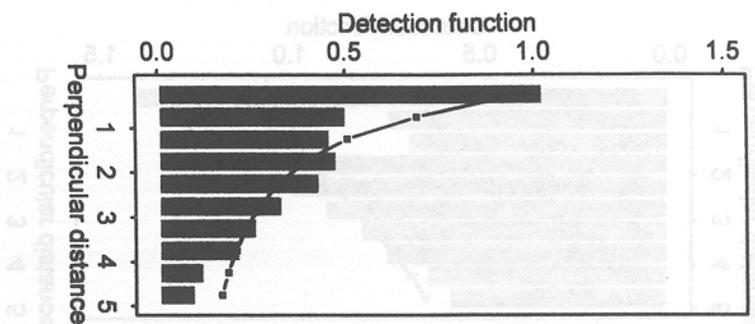
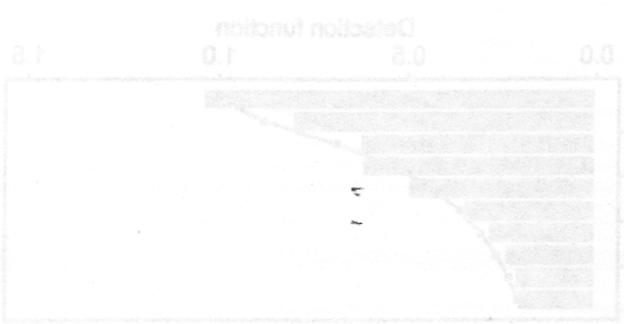
^b Annual reports of the Inter-American Tropical Tuna Commission.

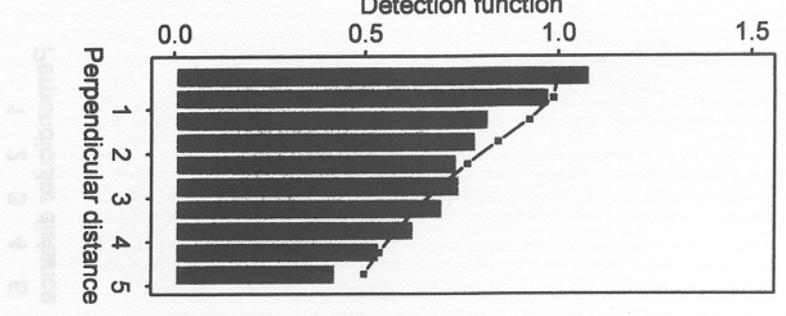
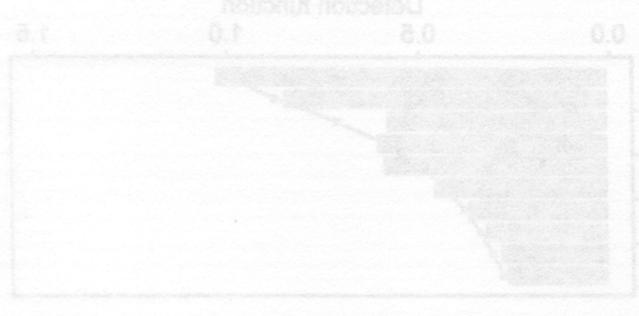
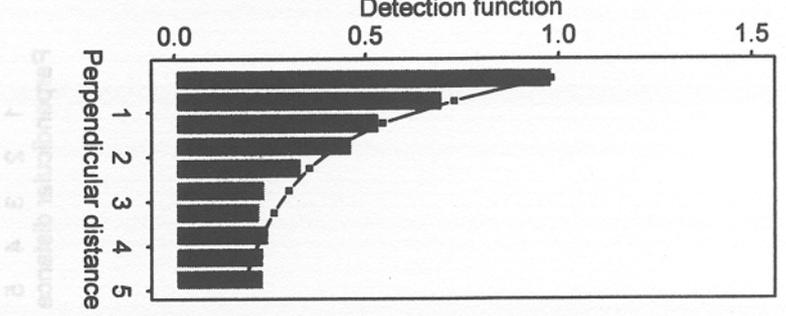
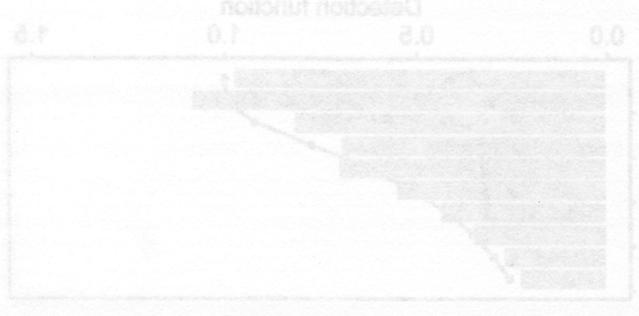
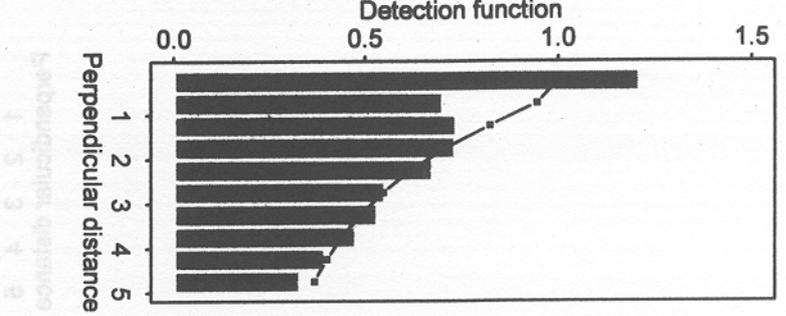
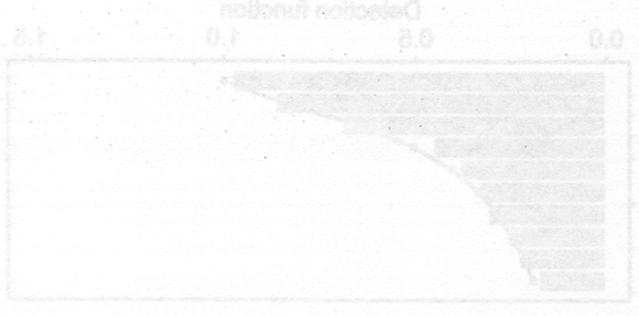
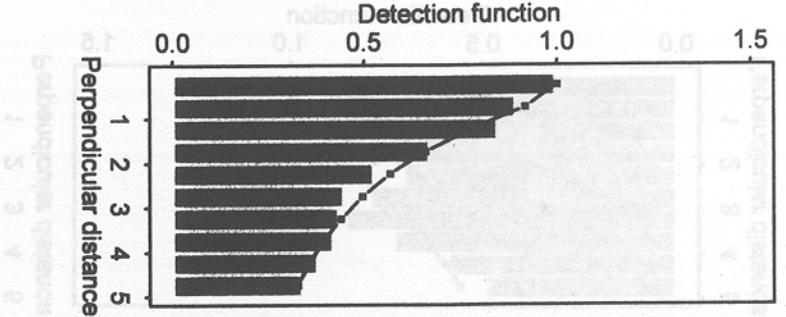
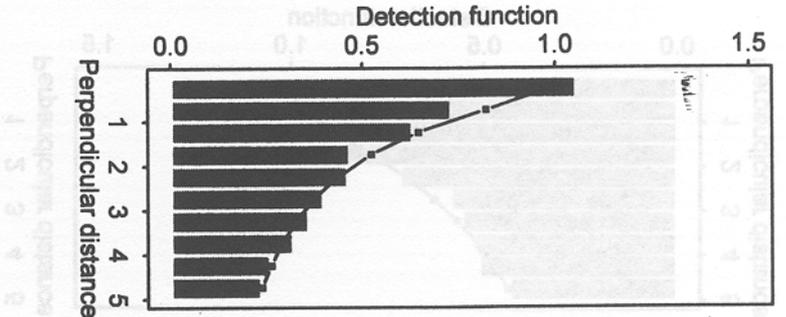
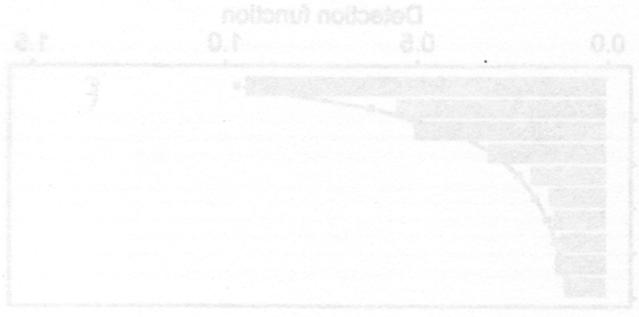
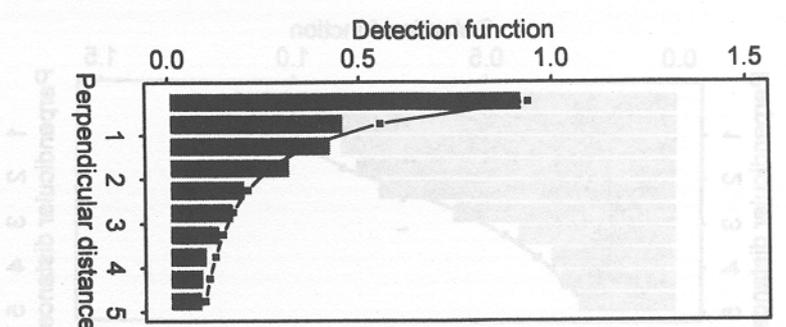
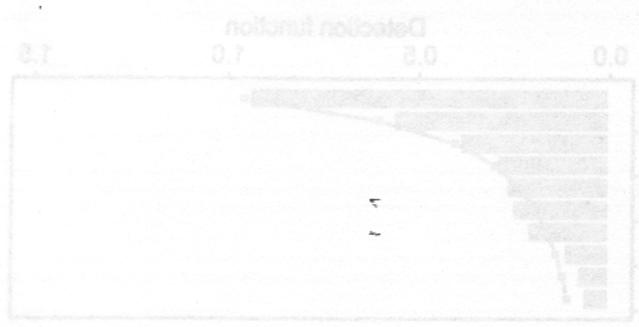
Attachment B

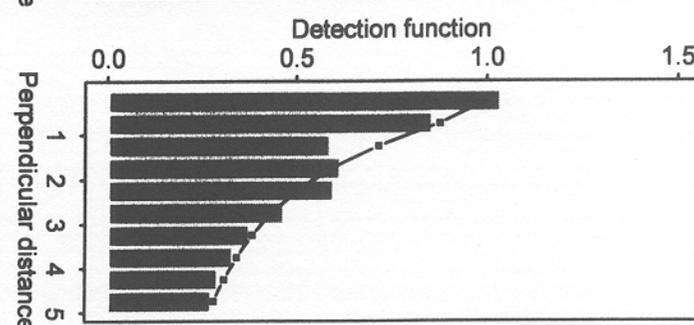
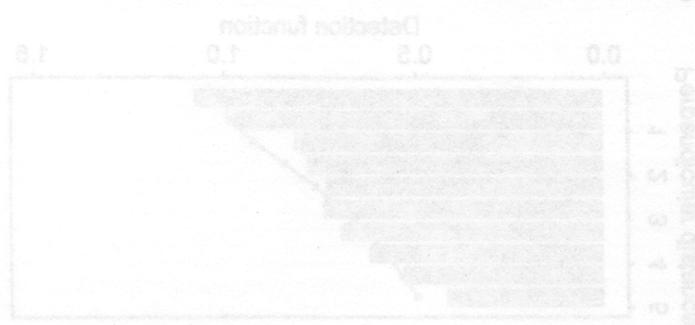
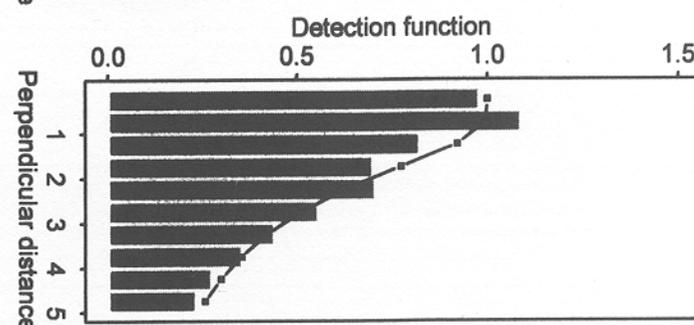
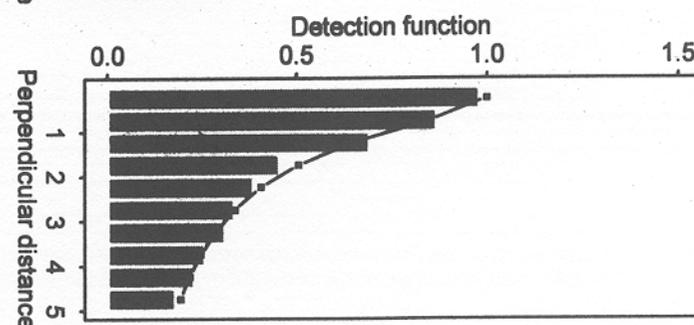
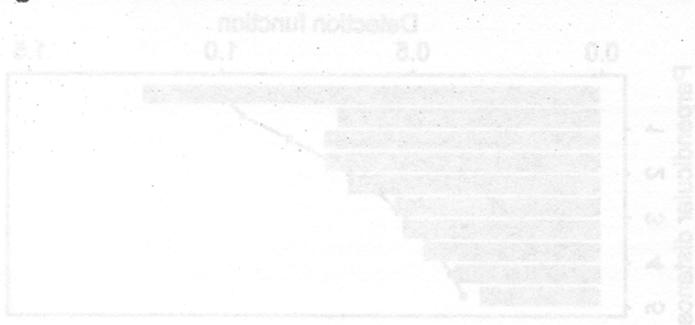
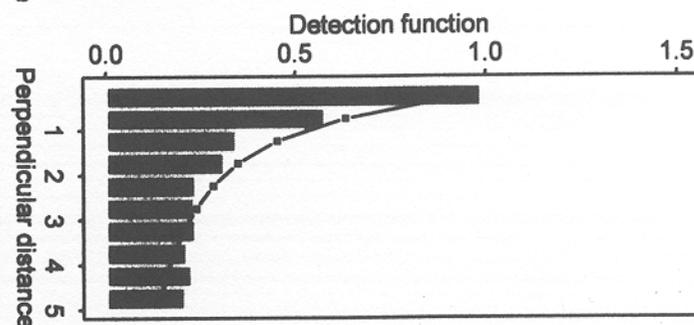
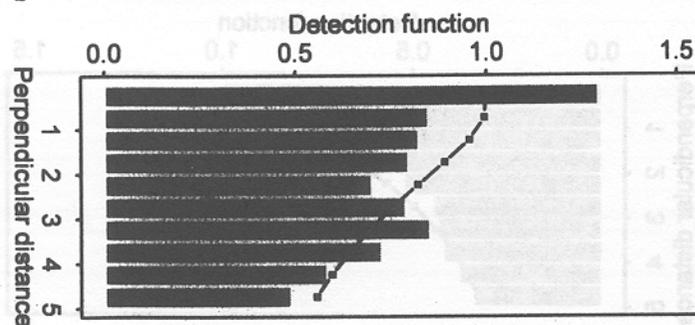
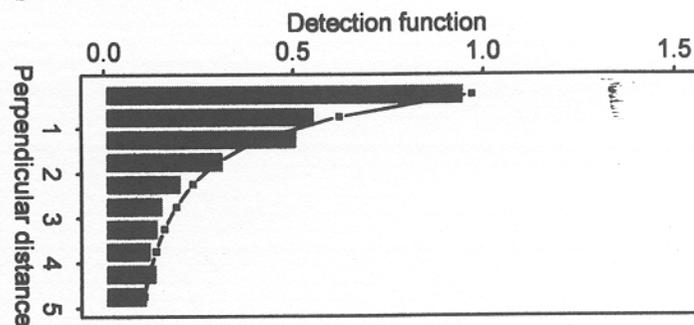
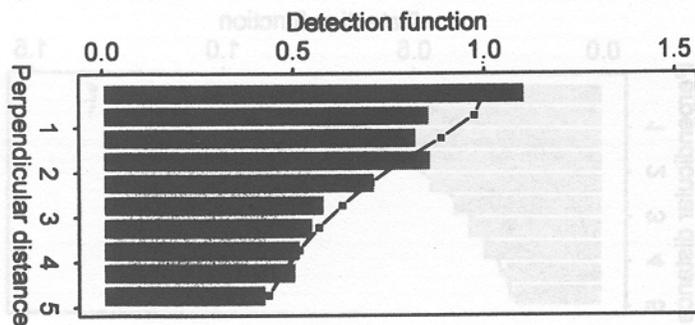
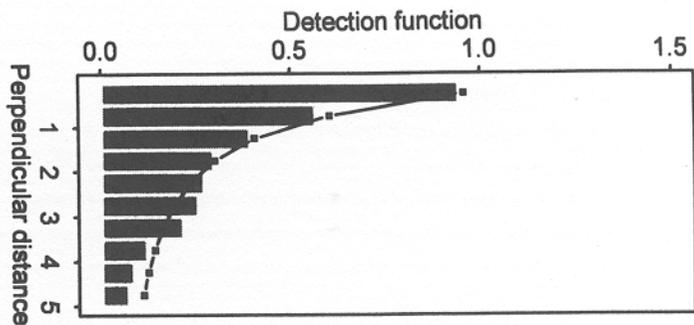
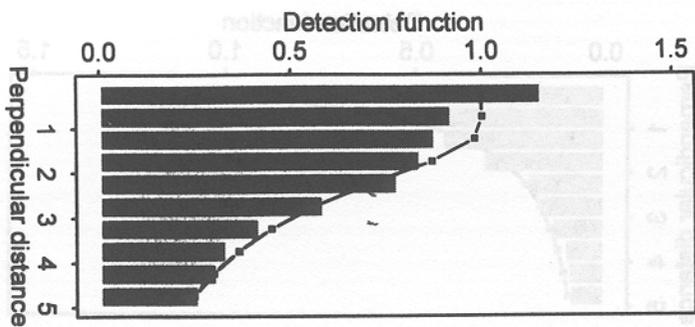
Estimated detection functions (black lines/points) and empirical distributions of perpendicular distances (gray bars) *versus* perpendicular distance from the track line, by area (panels) for each of years 1977-1996. Perpendicular distances are in nautical miles (nm). Estimates were based on a truncation distance of 5 nm. Areas were determined by a post-stratification procedure; the number of areas and their geographical boundaries may vary annually. Empirical distributions of perpendicular distances show the scaled frequency of sightings (after smearing) within each perpendicular distance interval.

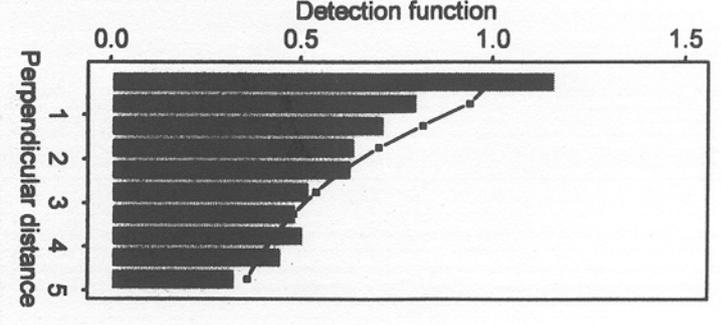
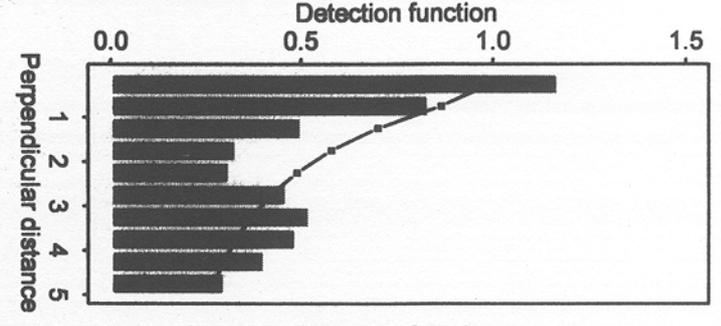
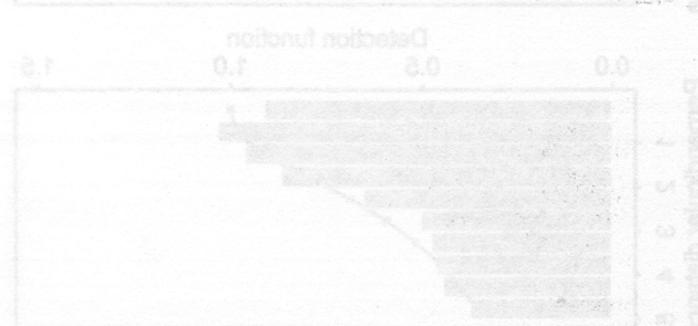
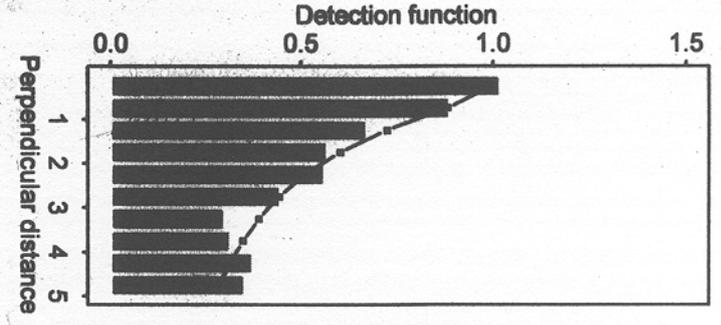
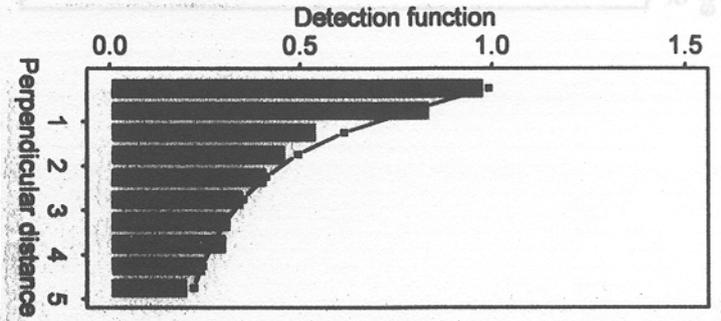
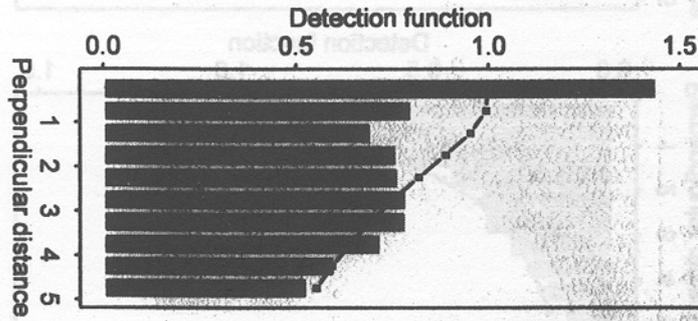
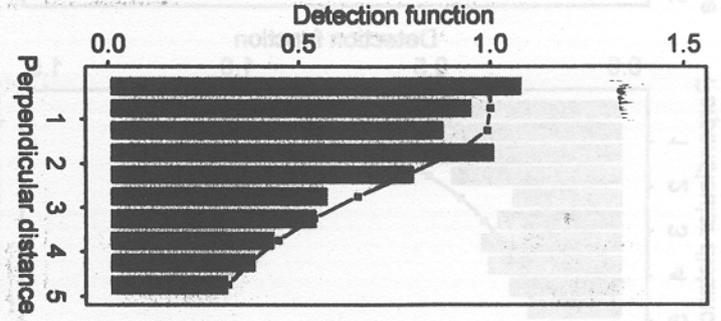
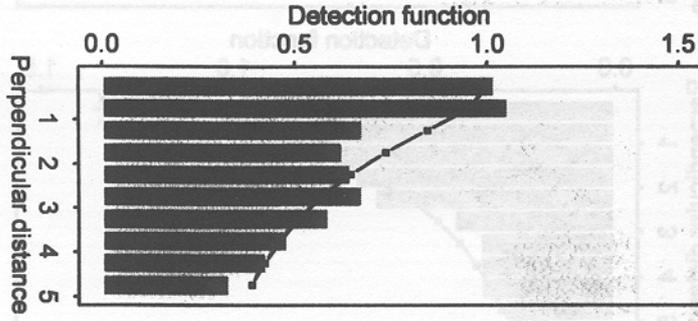
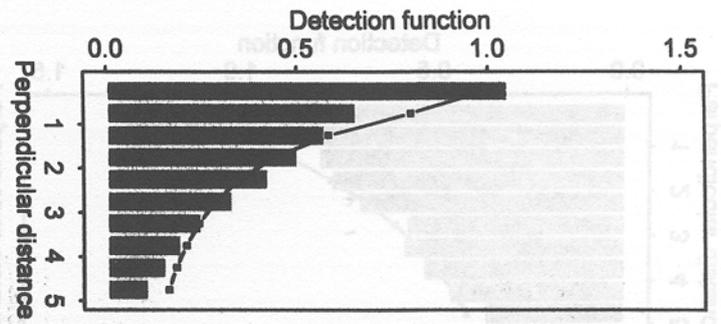
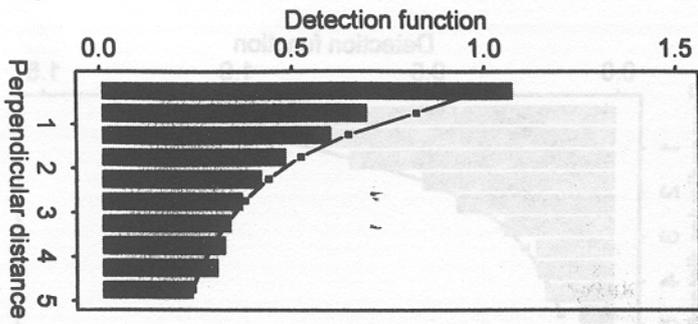
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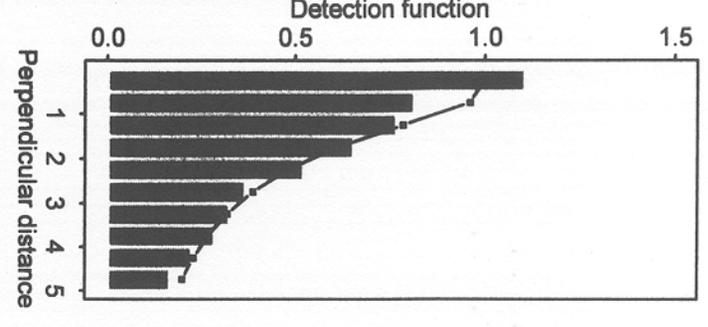
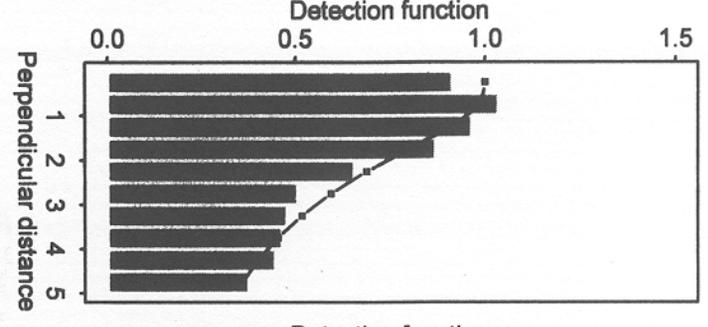
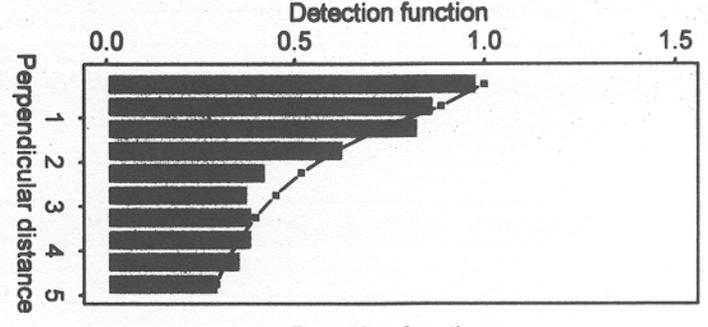
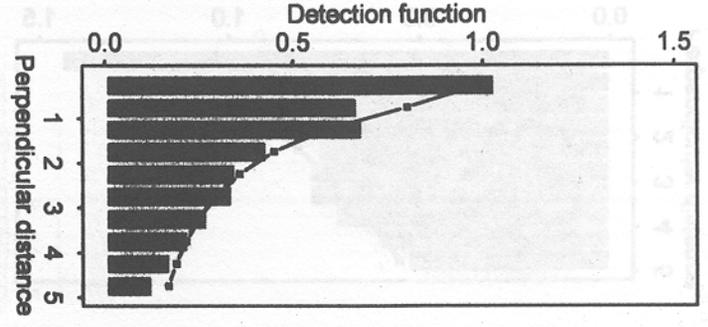
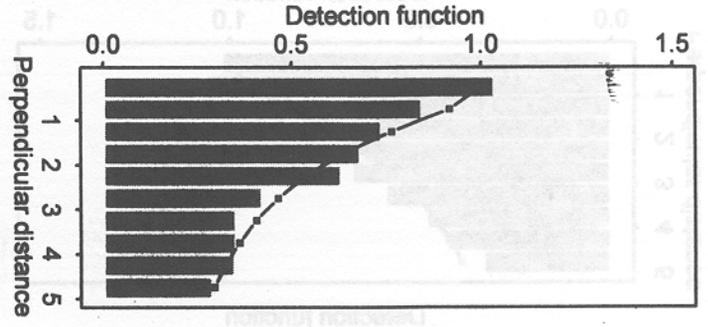
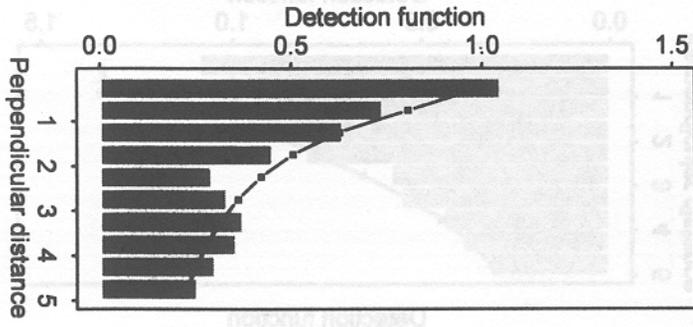
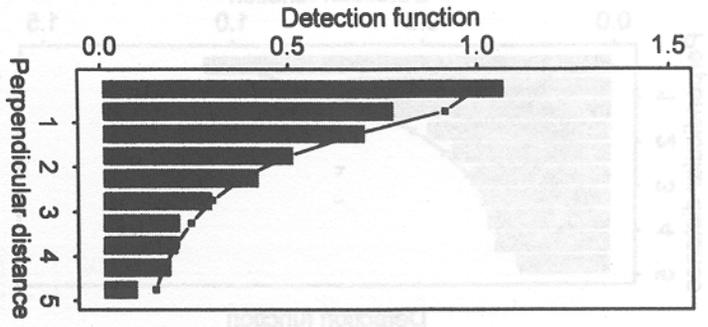
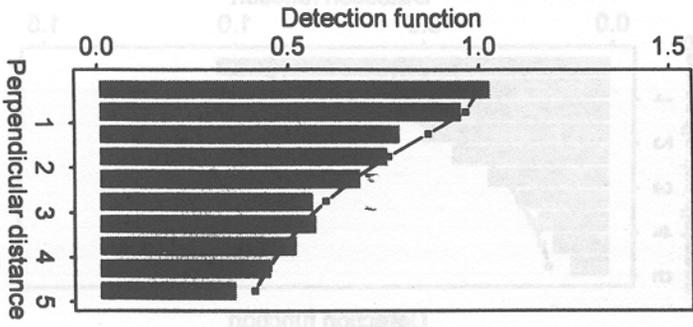


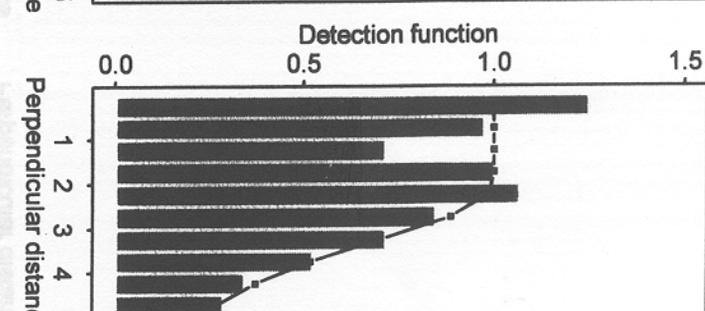
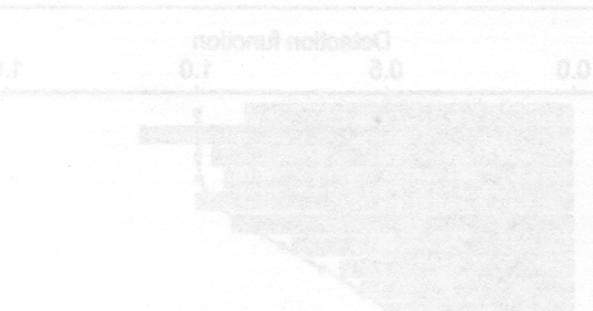
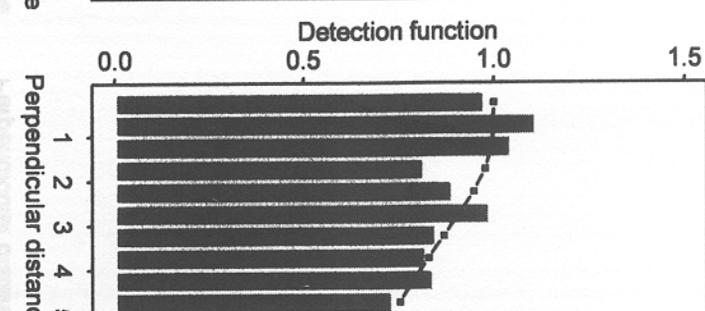
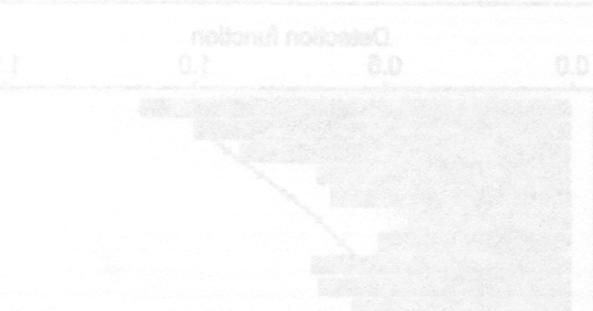
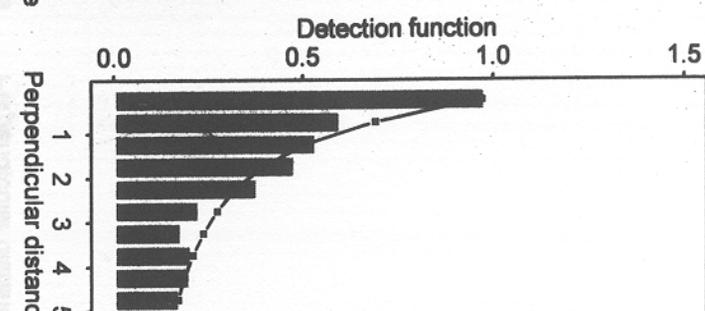
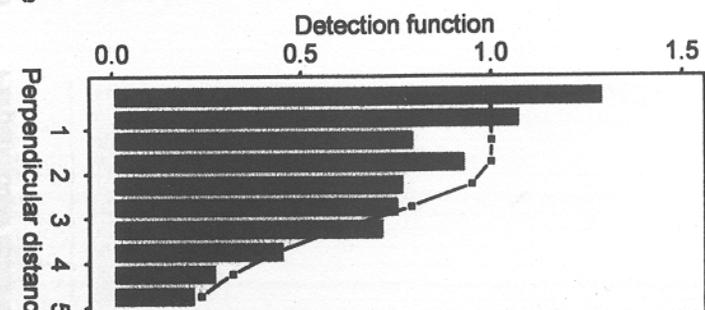
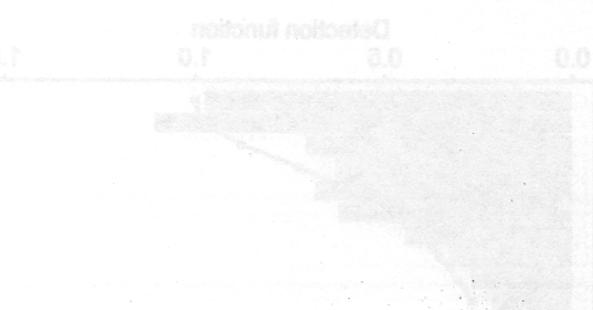
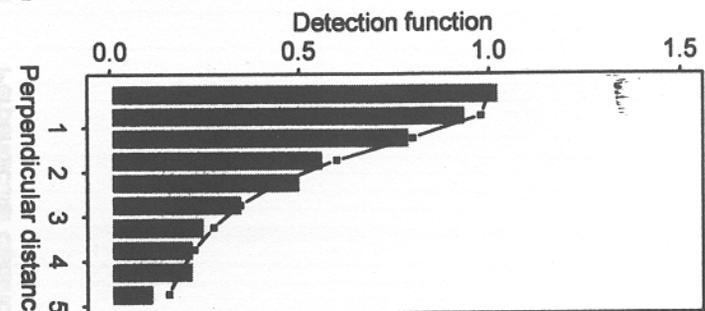
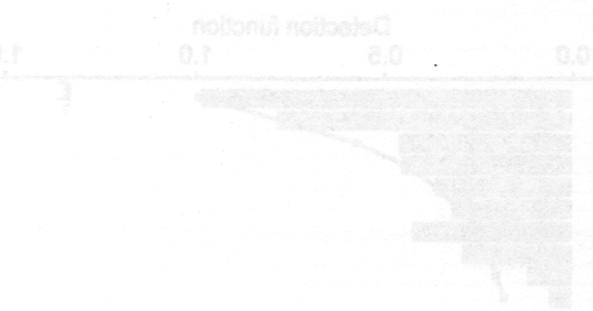
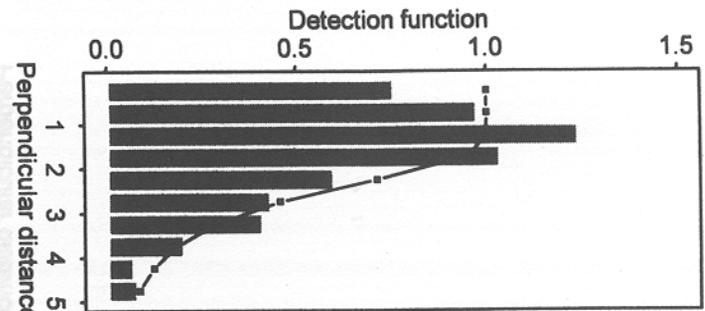


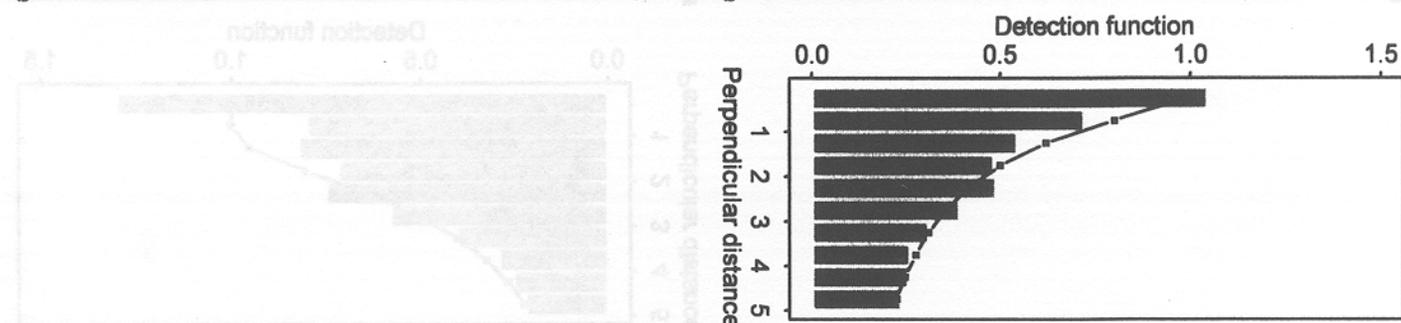
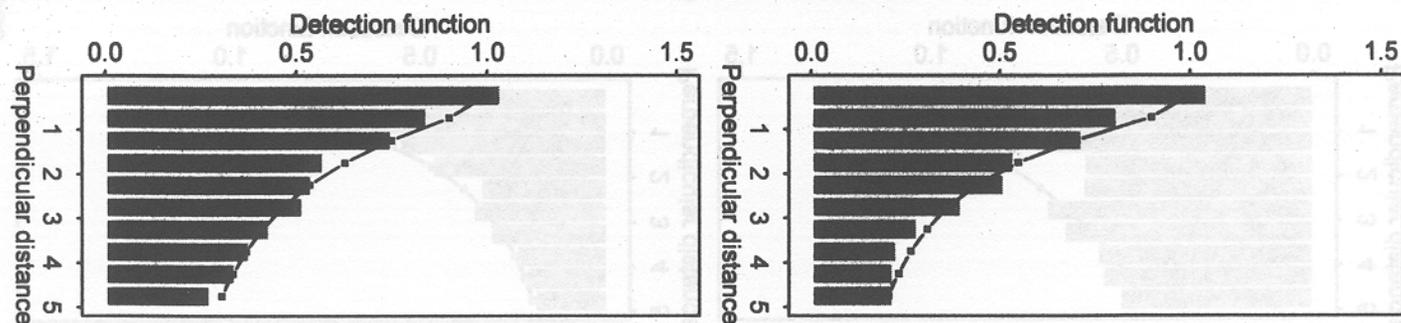
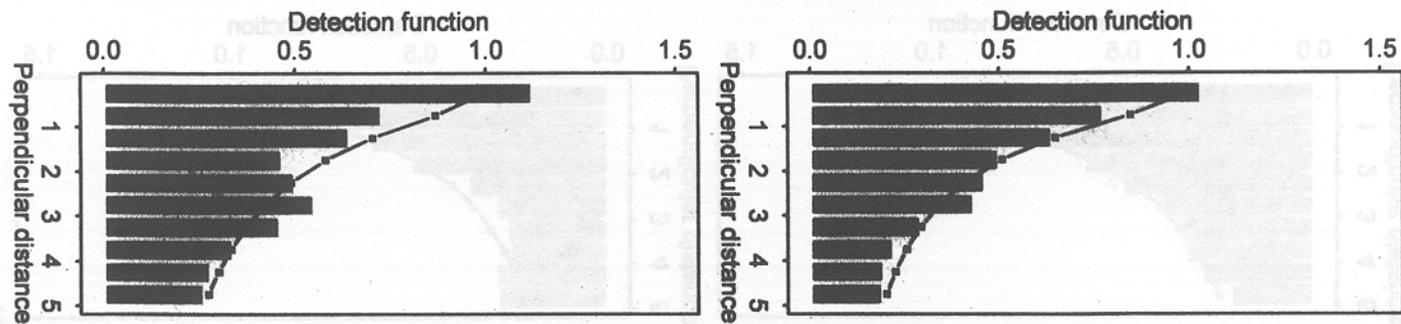
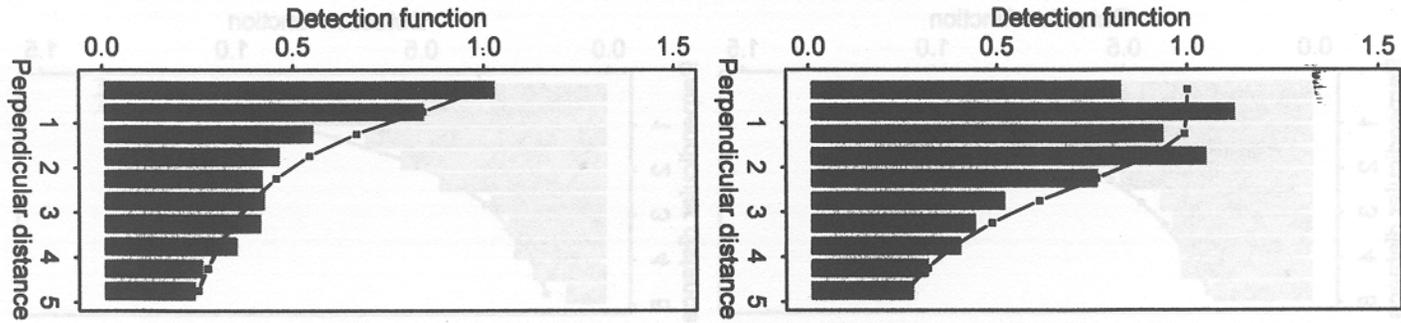
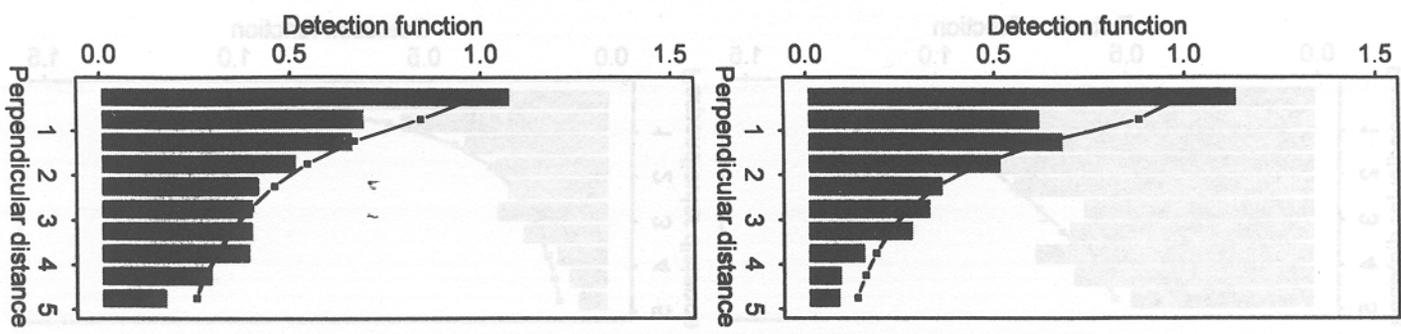




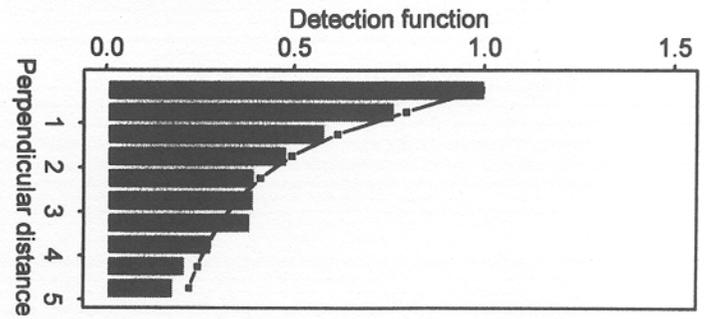
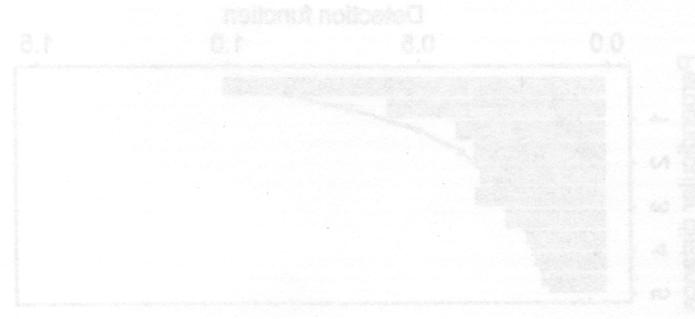
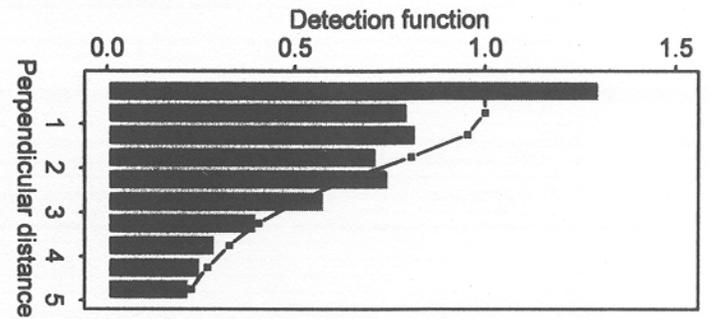
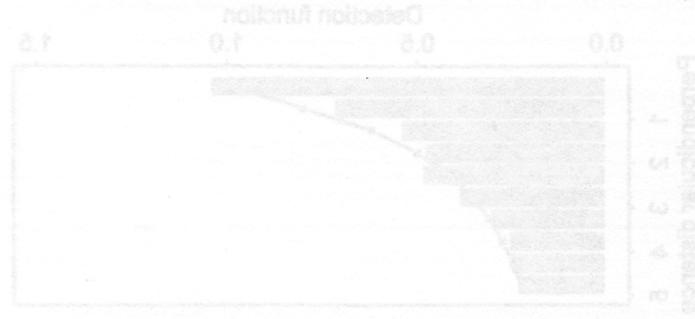
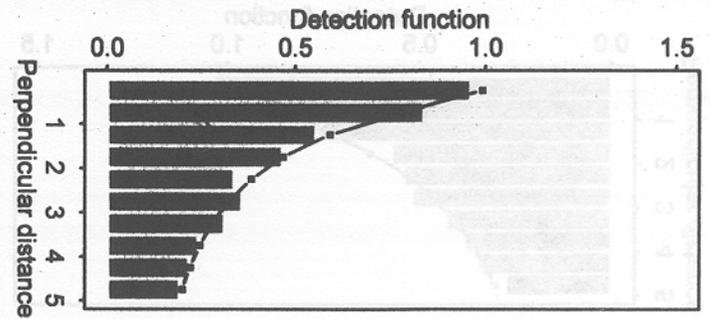
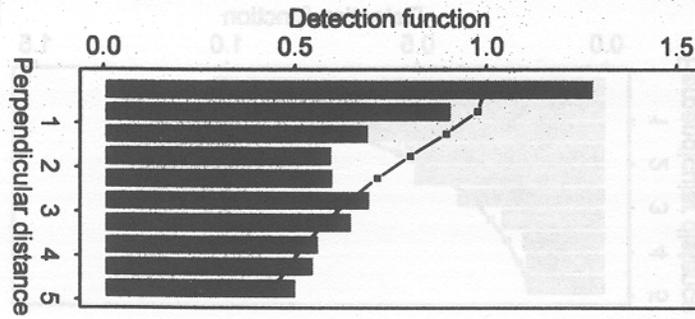
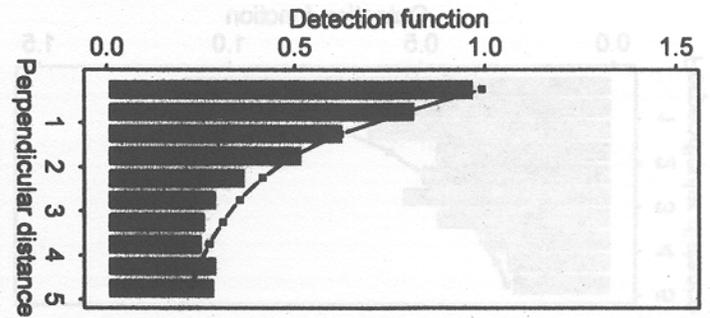
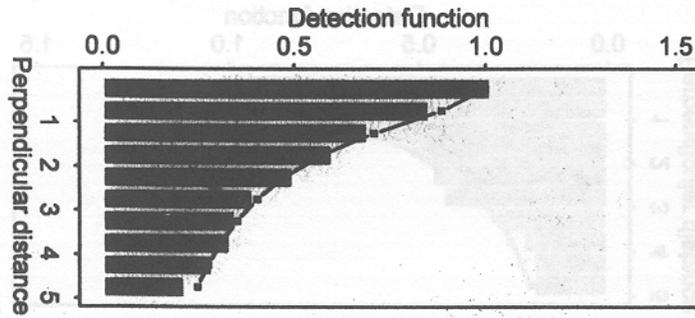
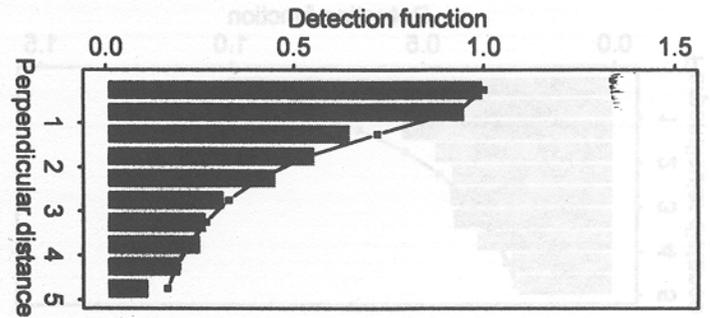
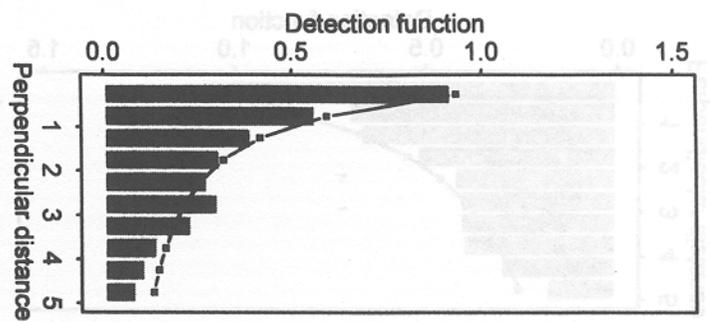
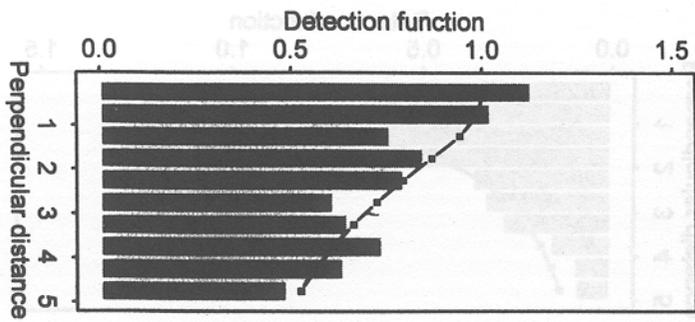


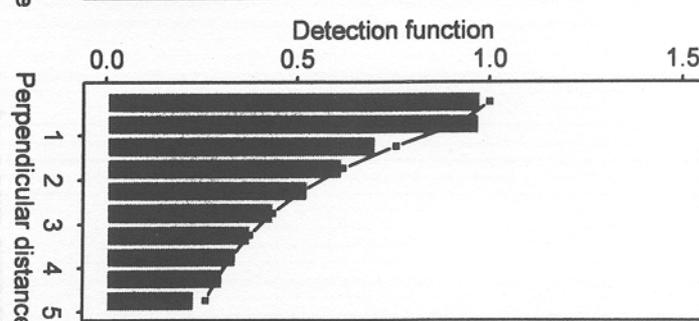
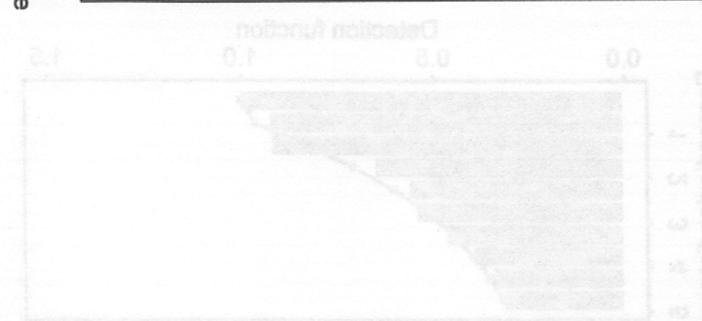
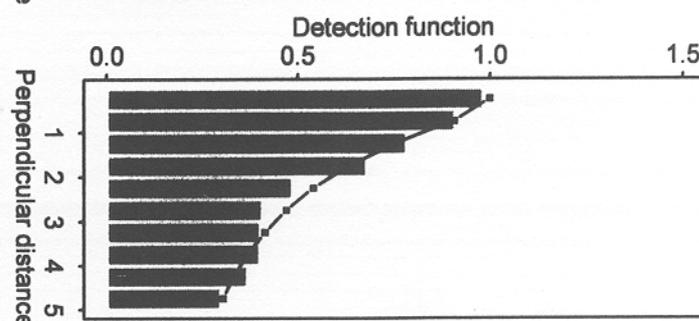
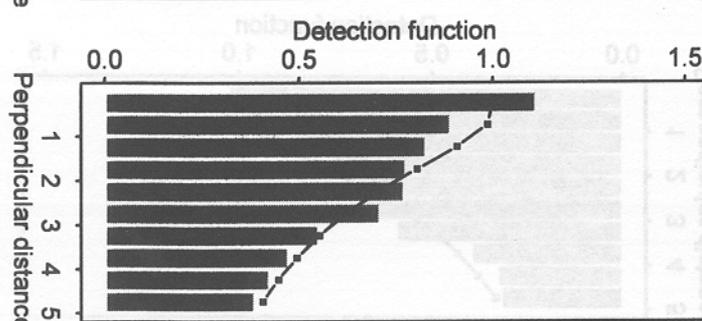
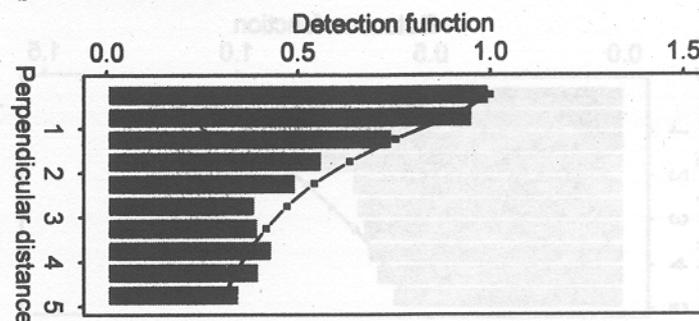
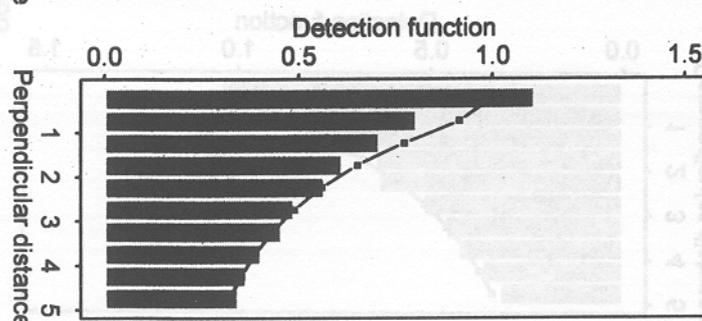
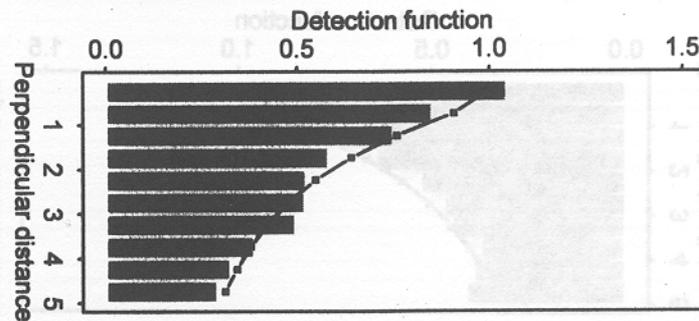
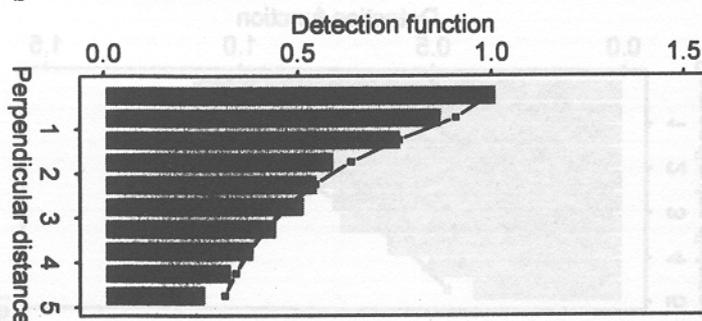
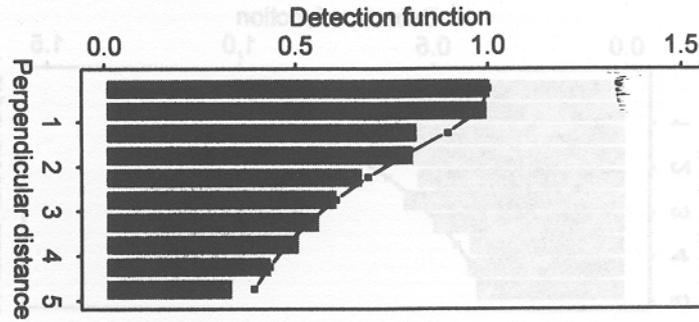
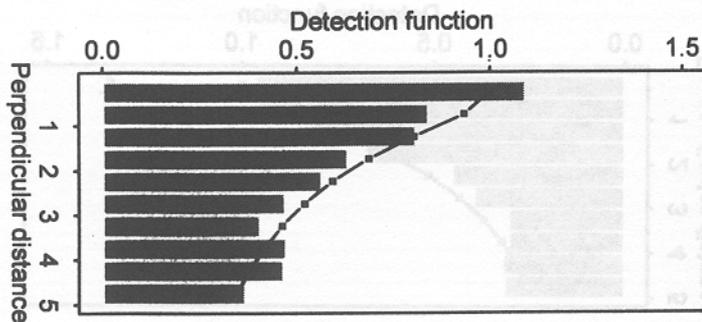
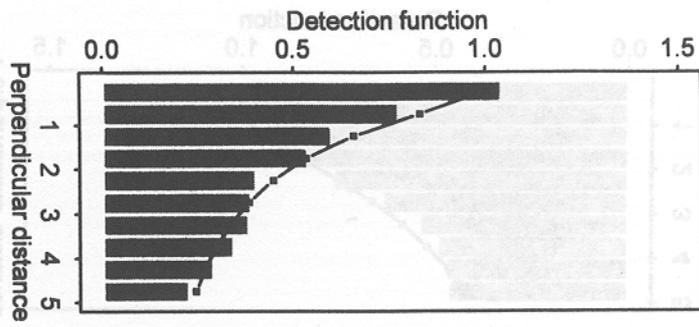
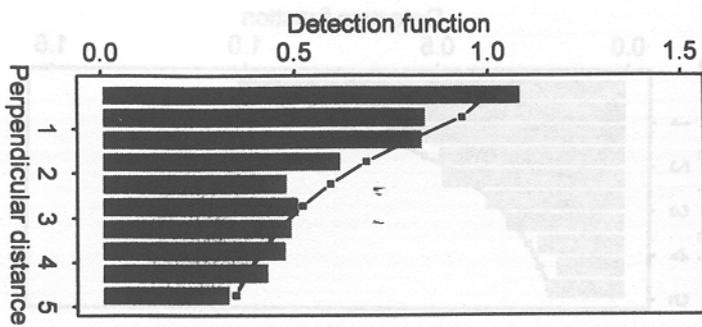


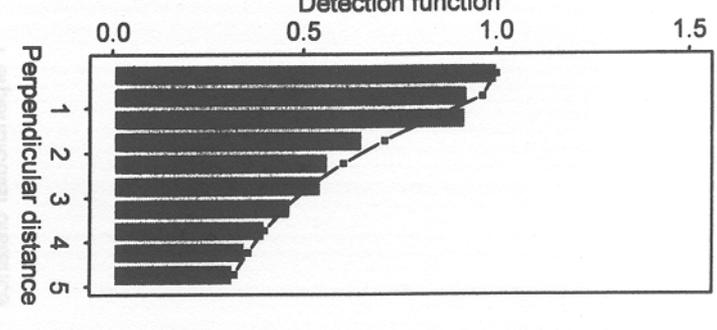
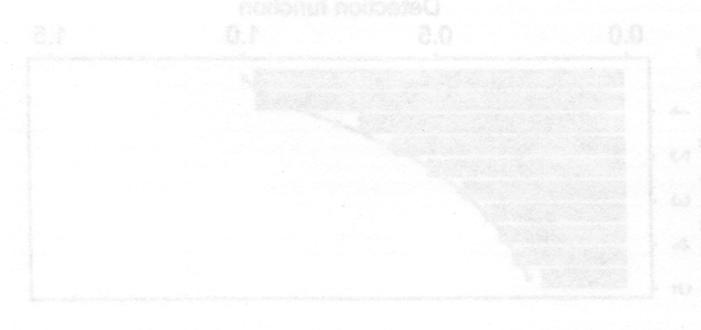
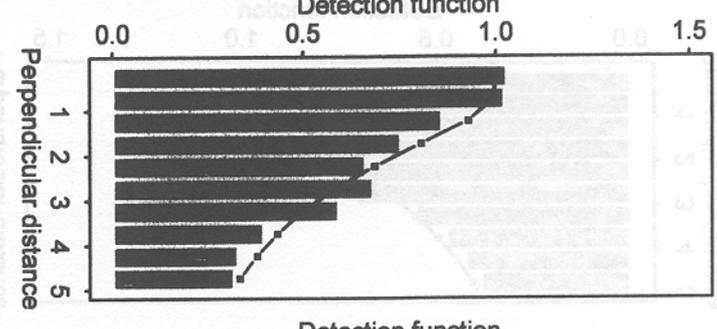
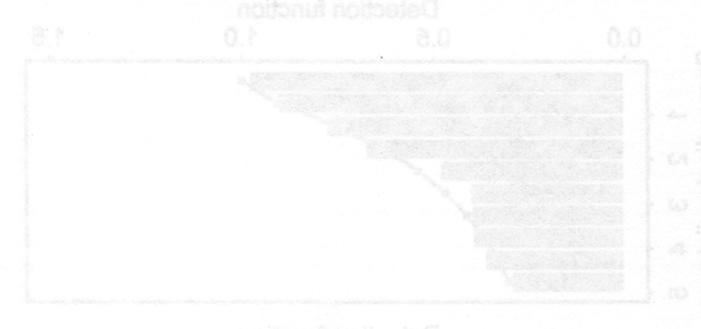
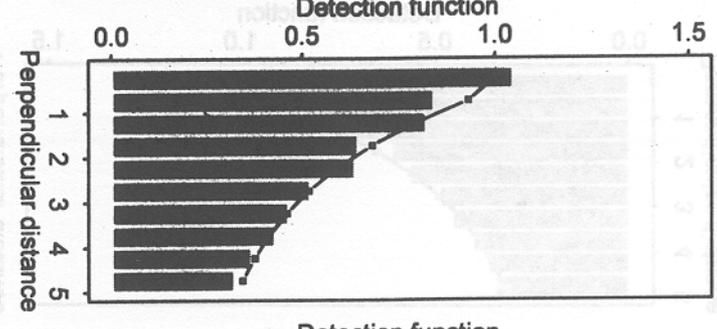
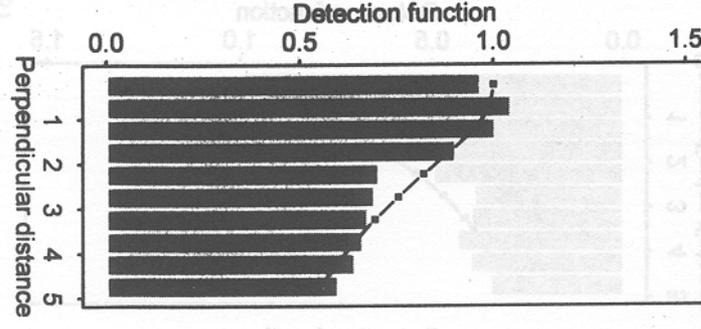
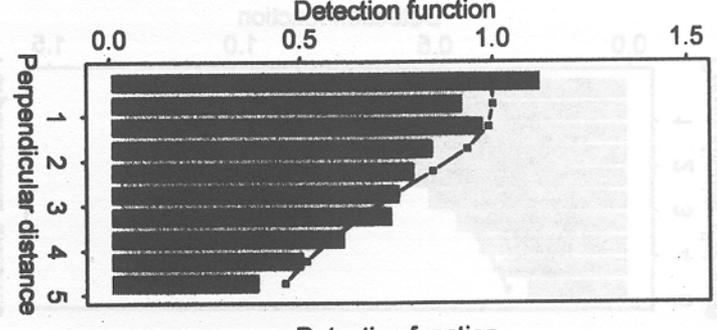
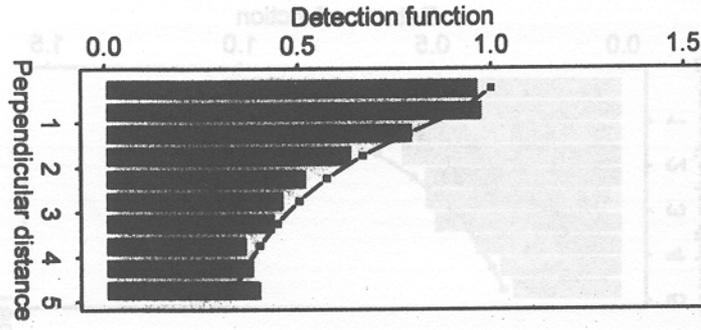
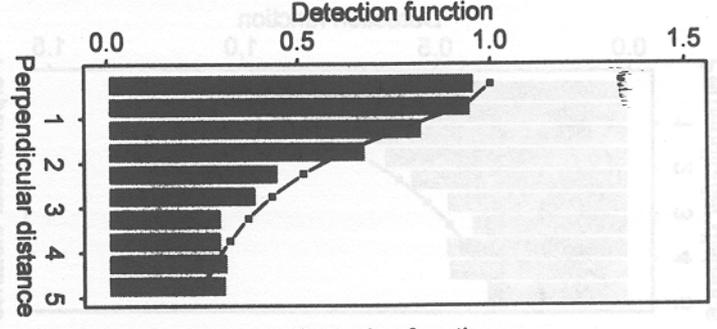
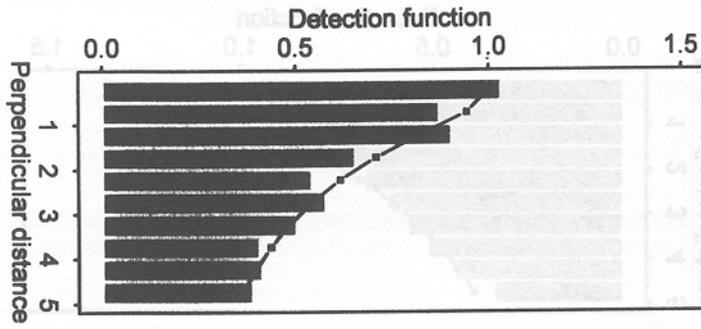
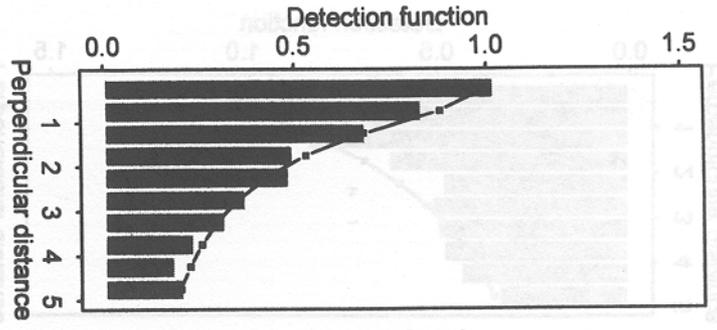
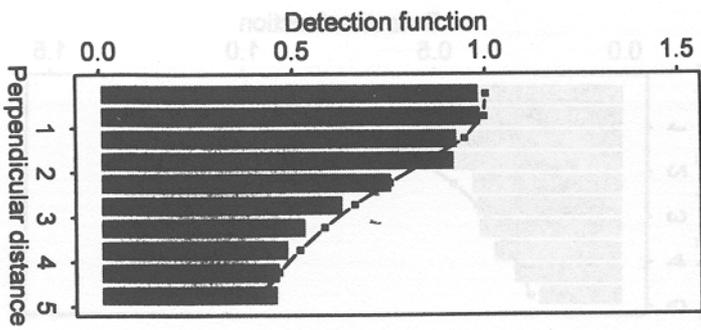


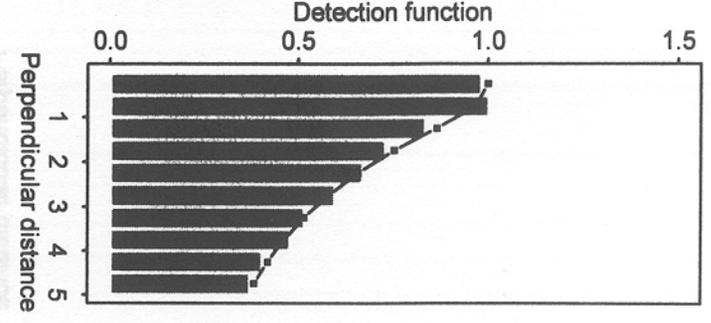
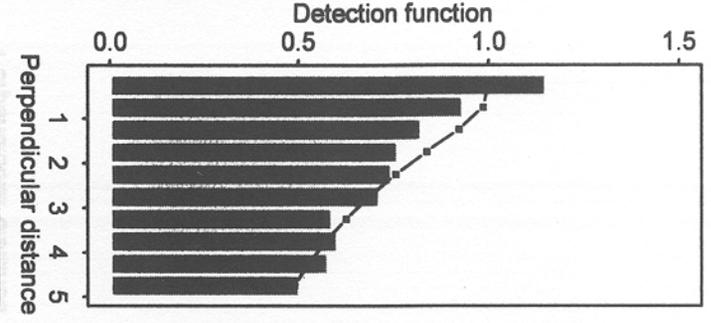
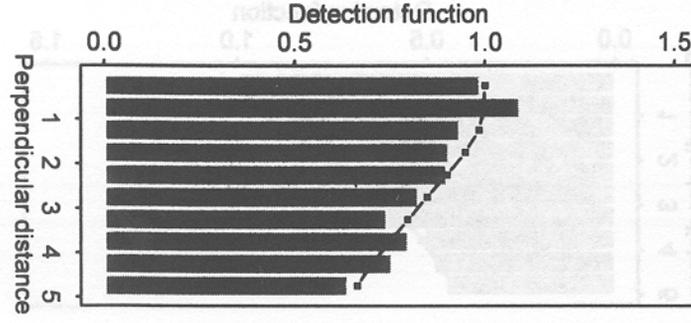
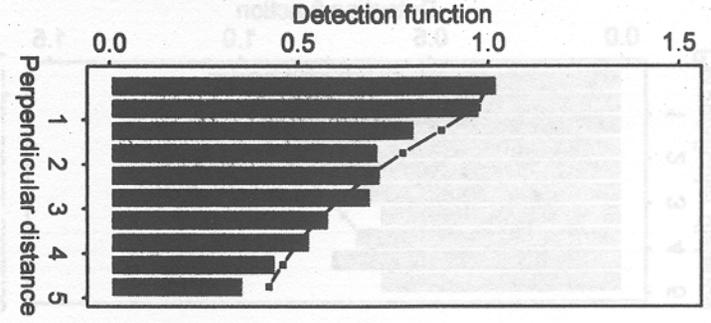
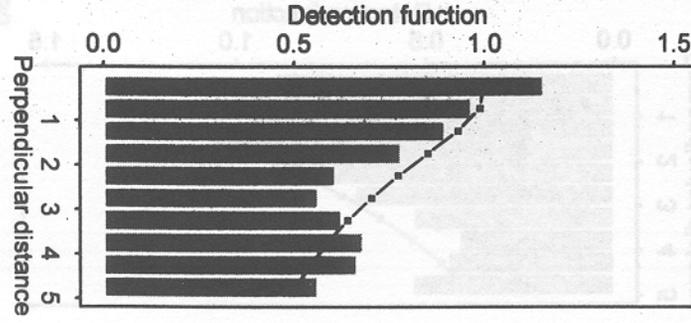
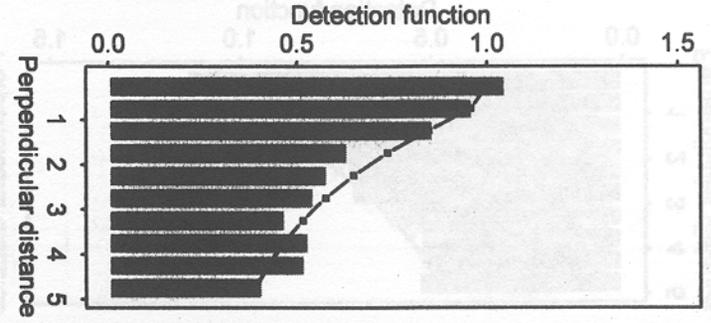
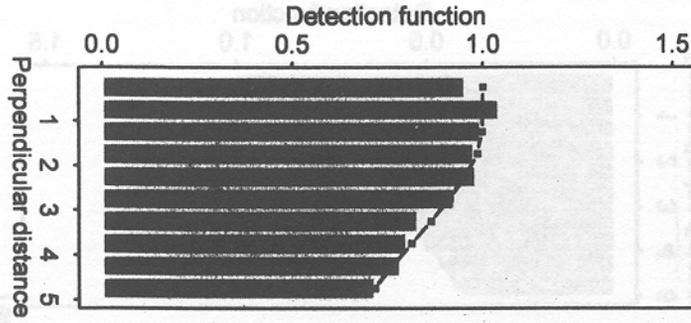
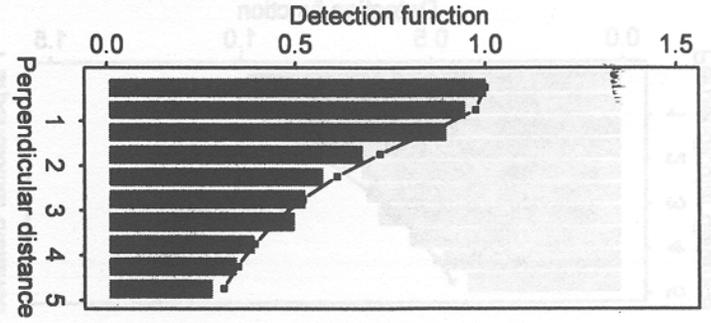
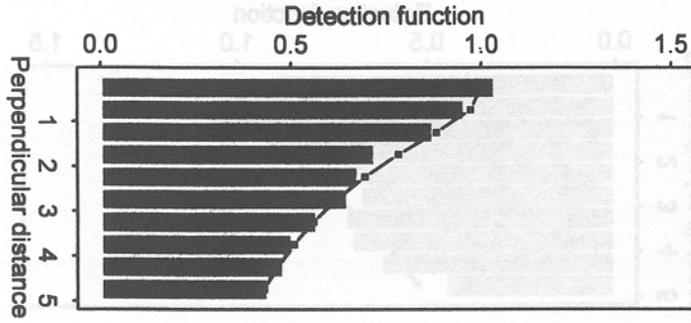
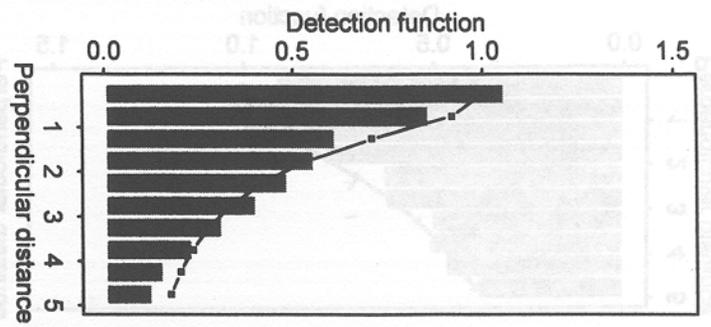
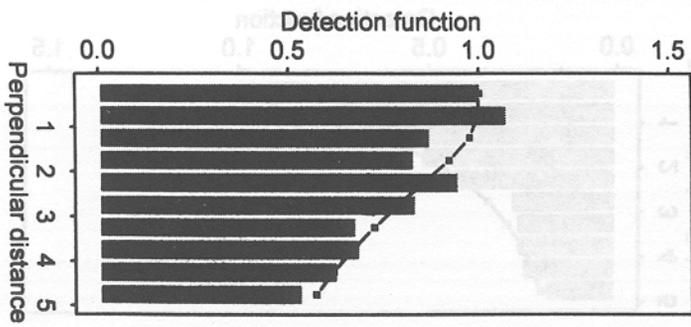


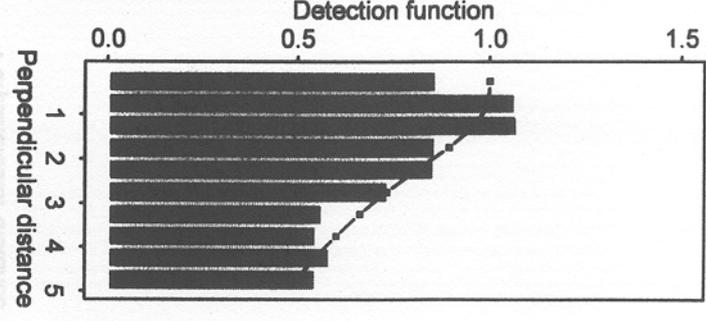
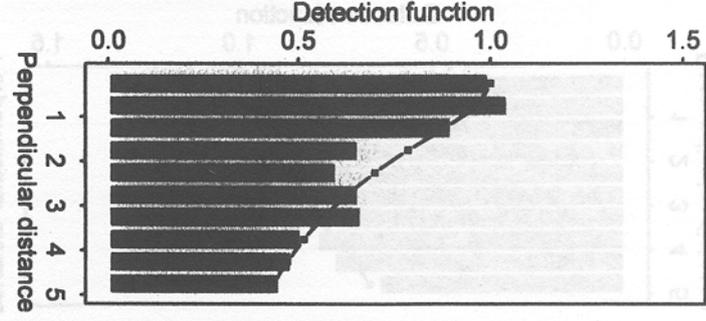
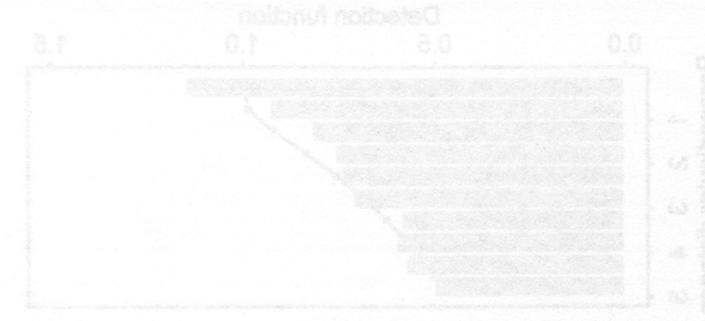
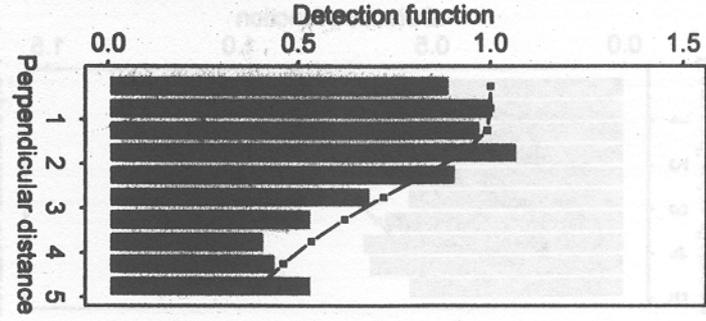
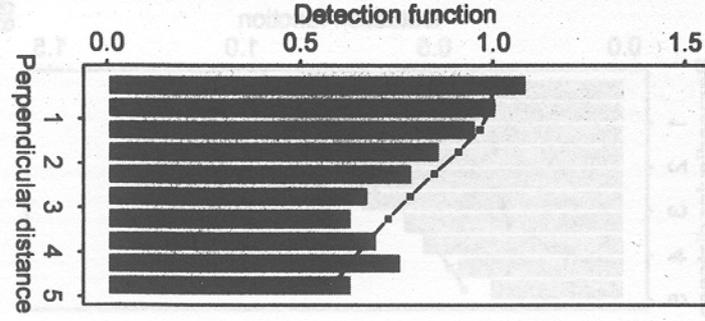
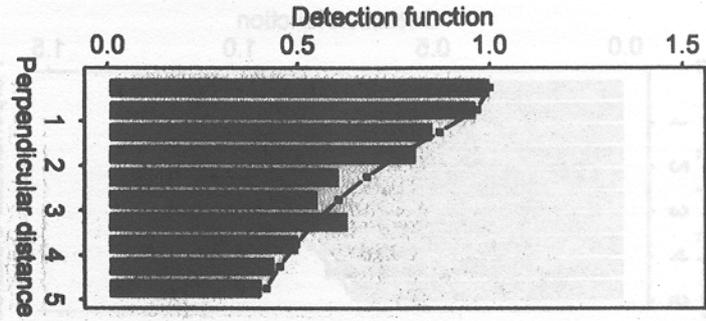
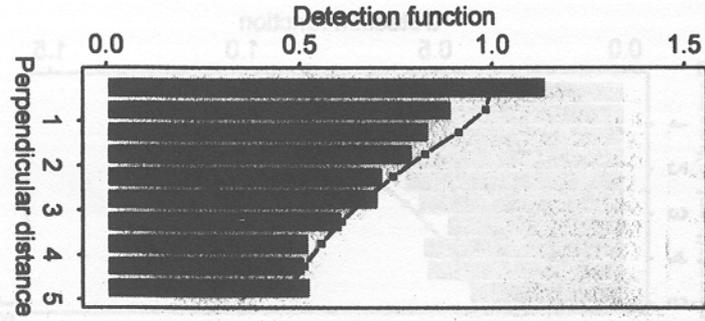
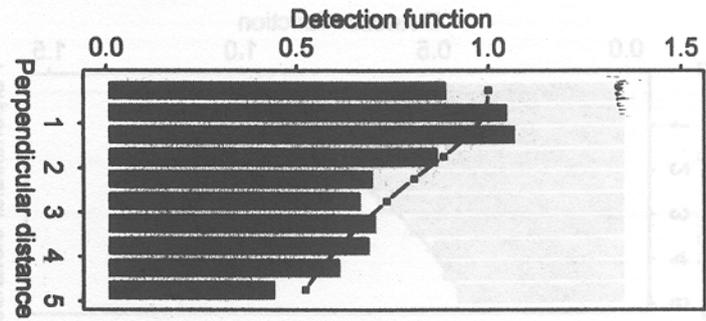
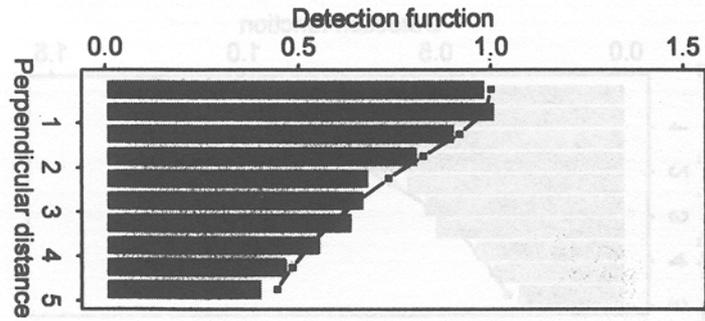
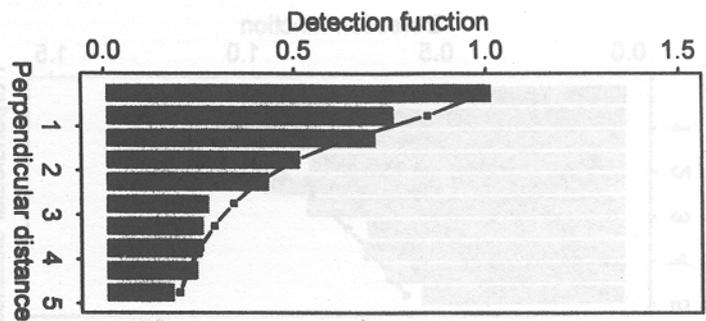
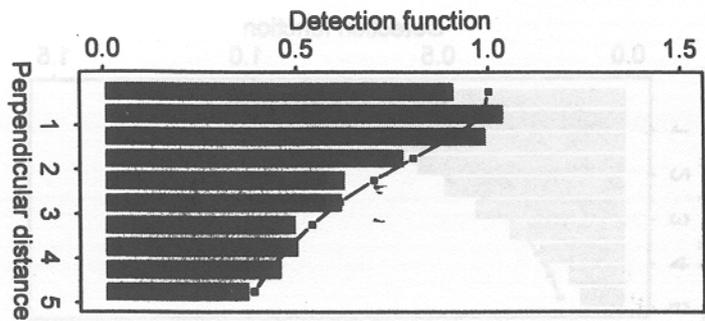
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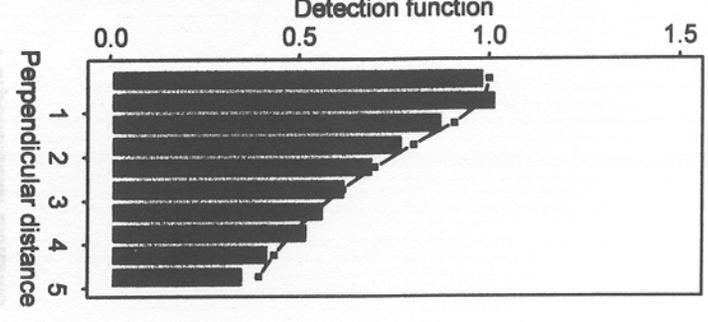
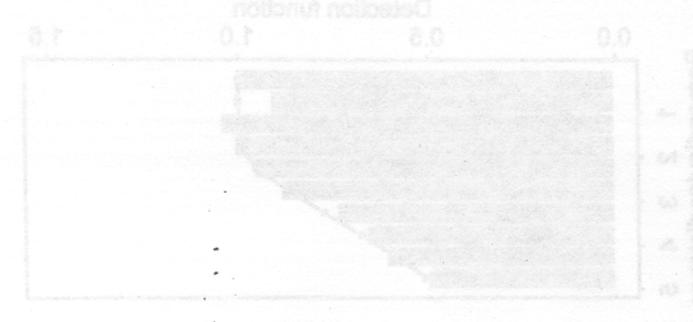
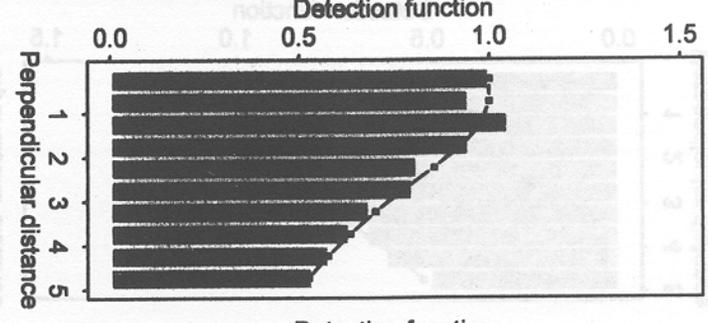
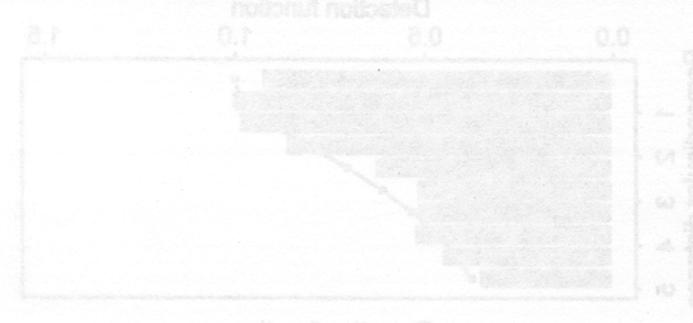
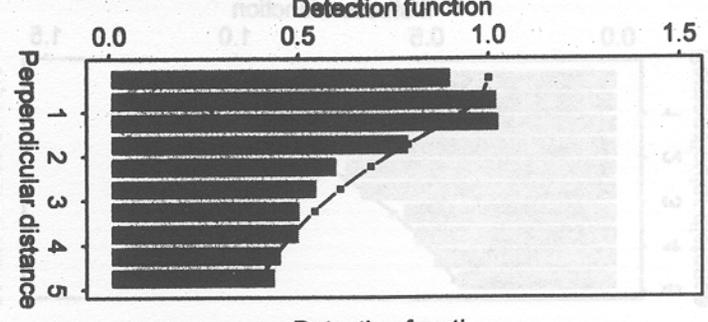
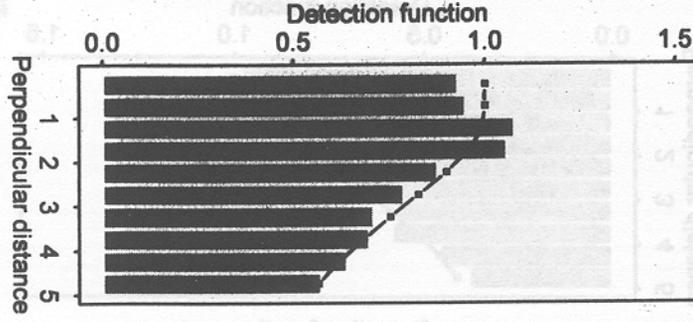
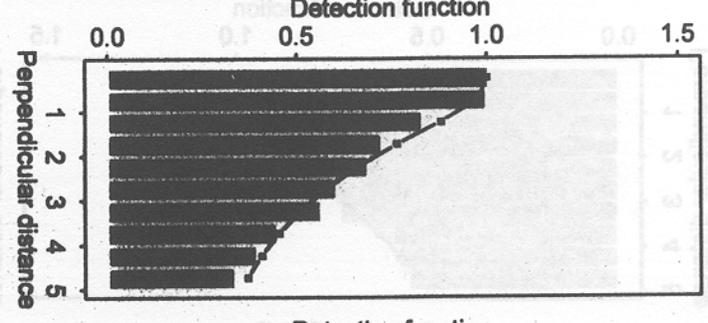
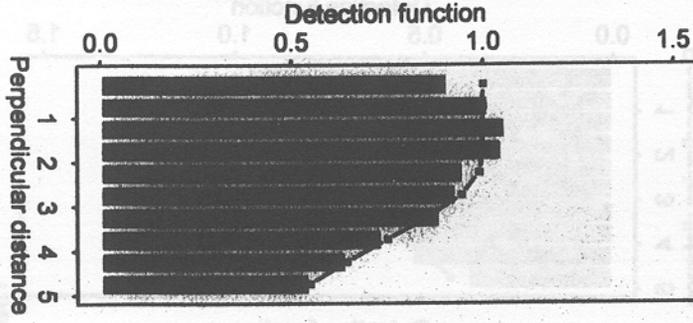
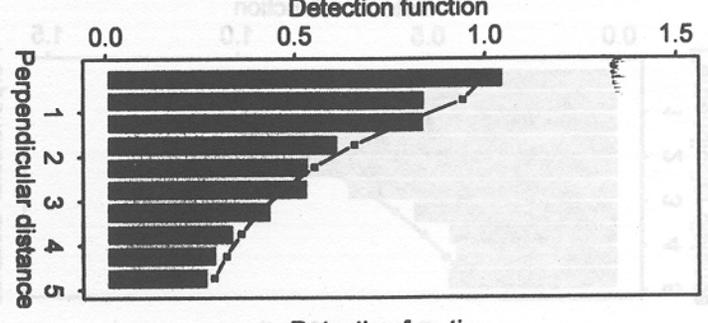
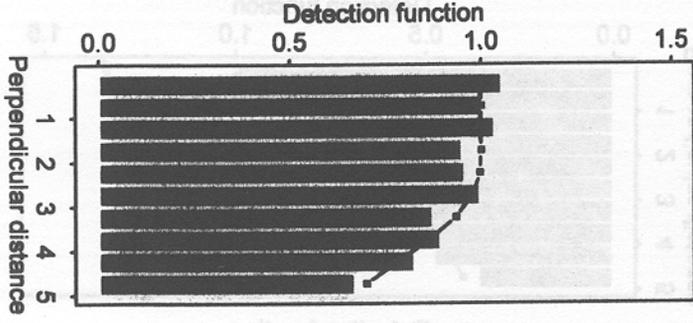
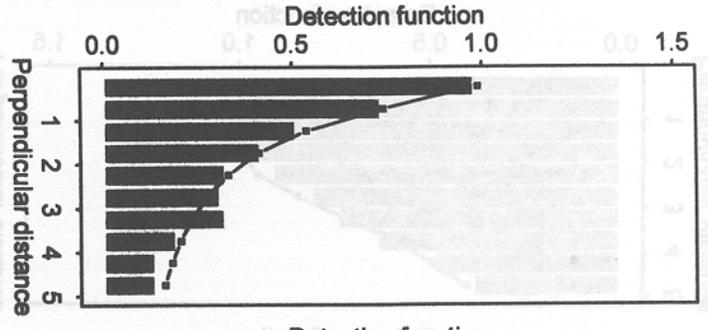
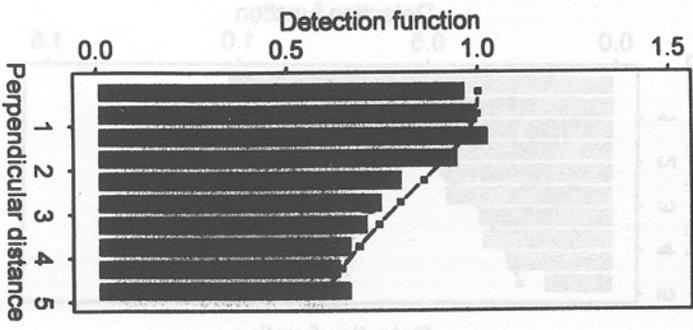


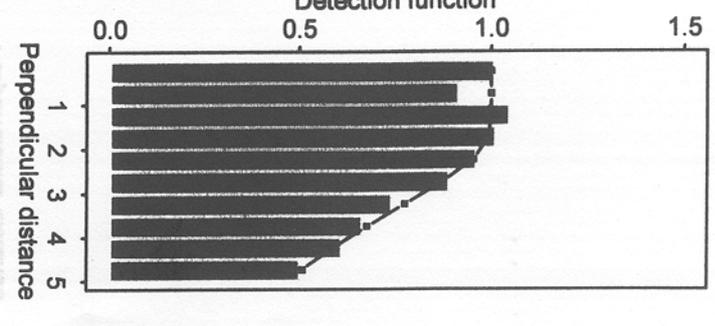
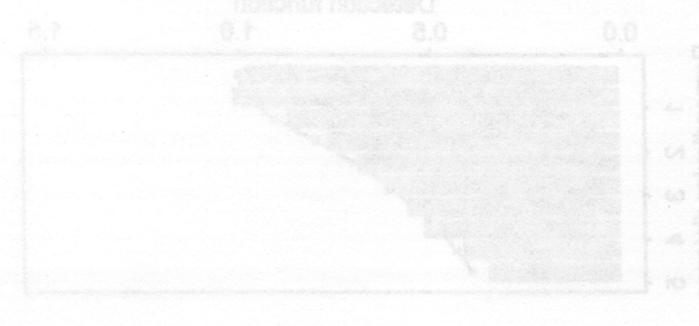
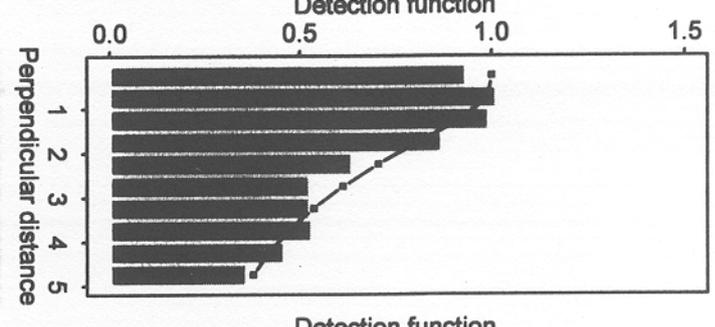
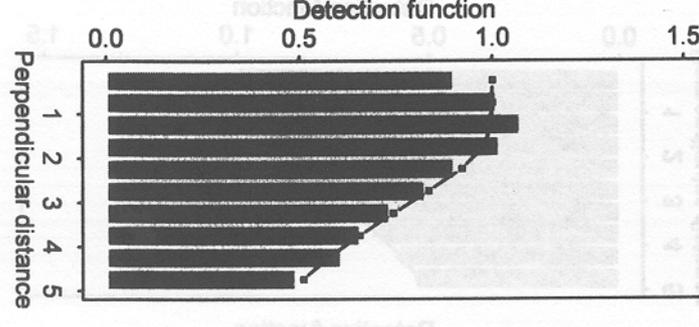
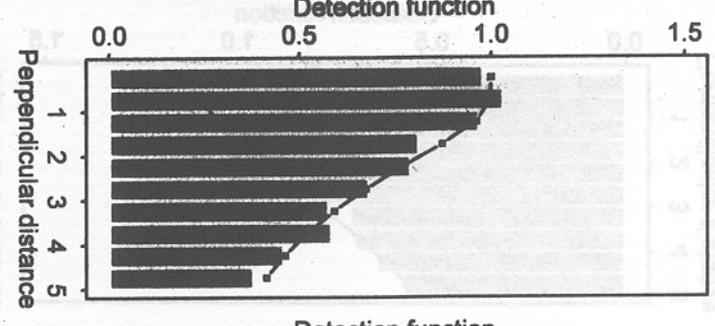
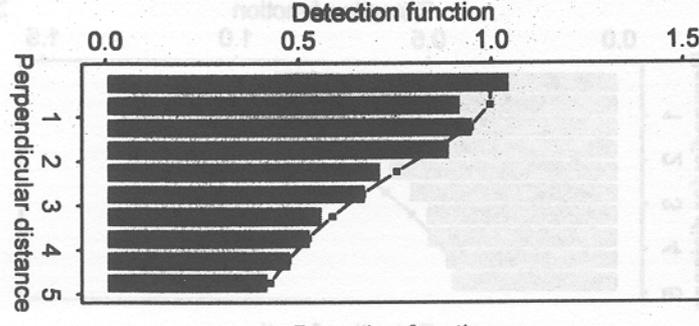
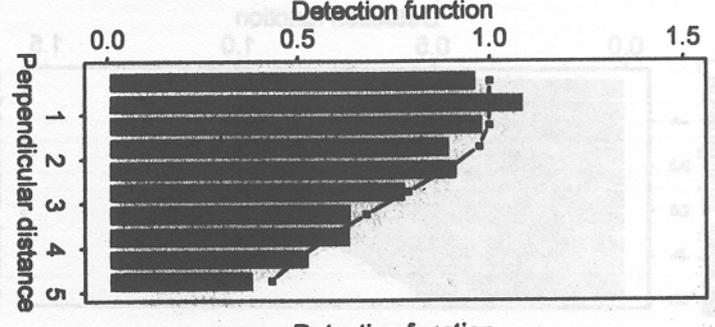
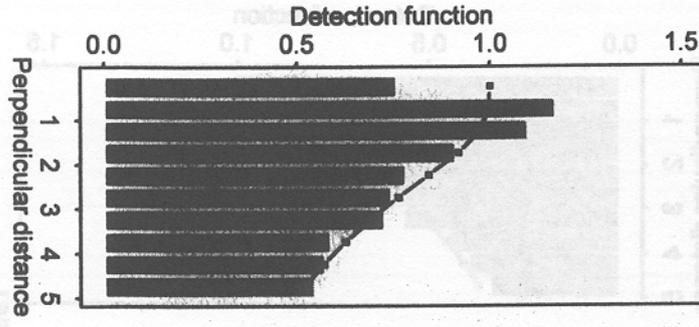
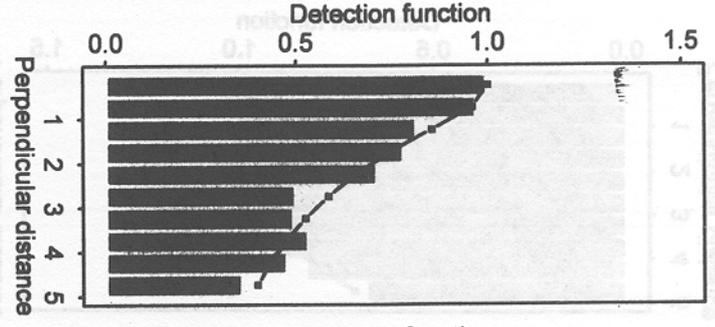
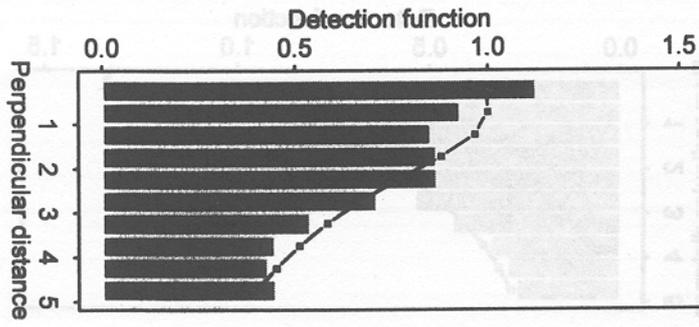
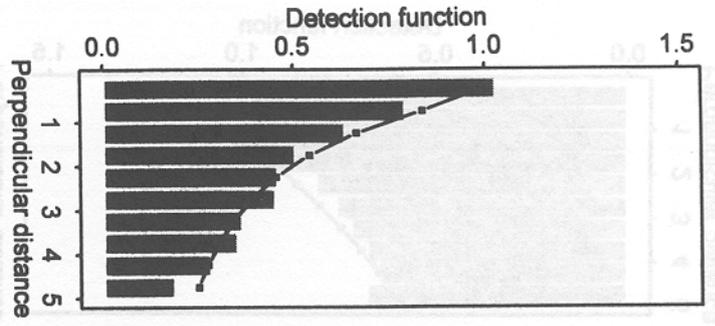
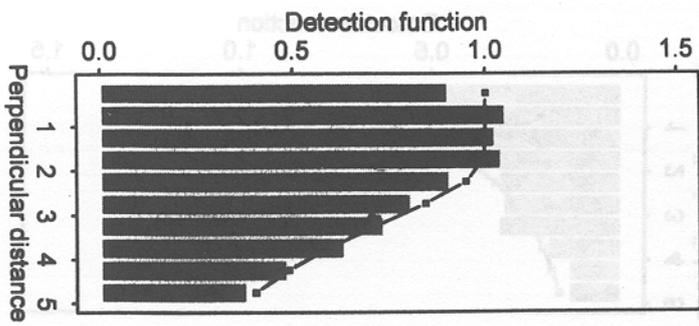


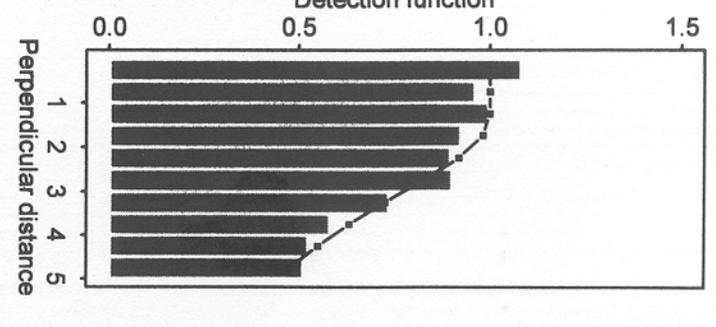
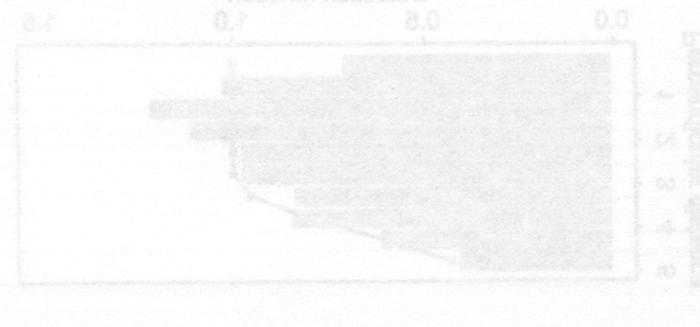
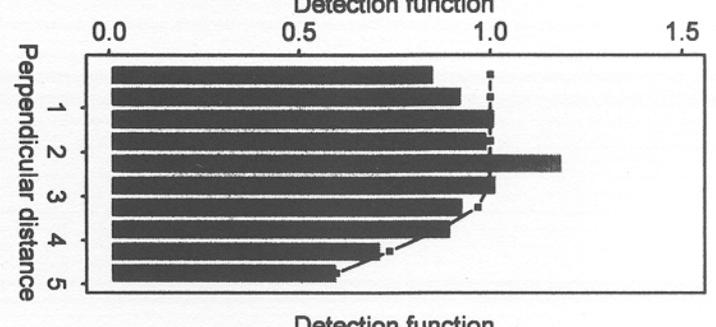
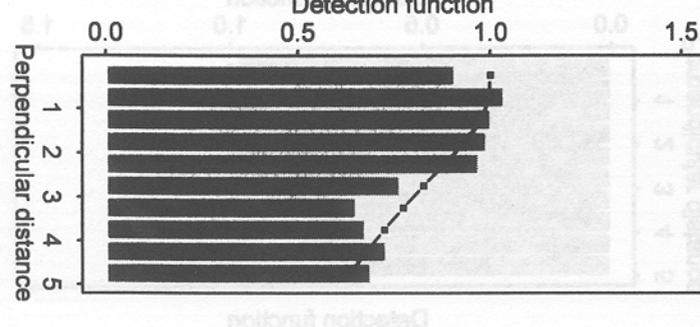
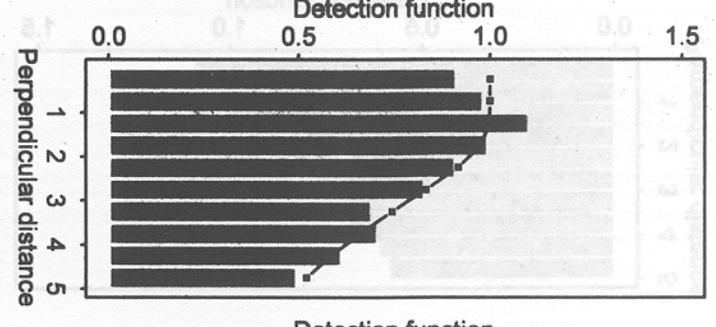
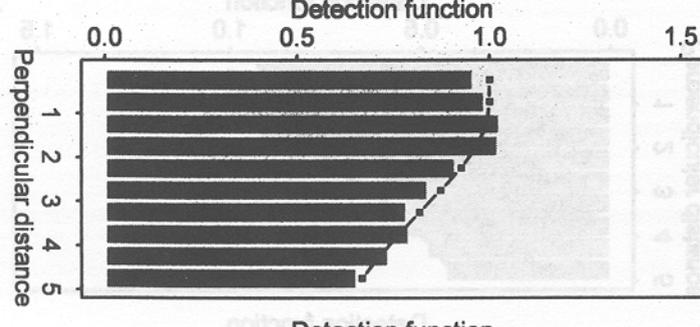
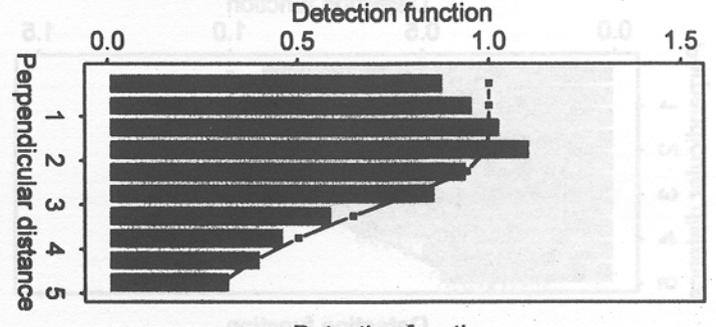
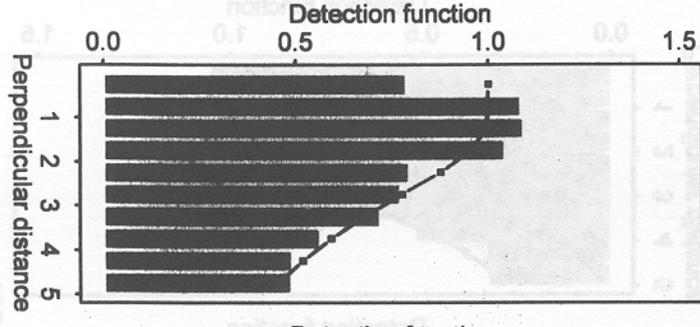
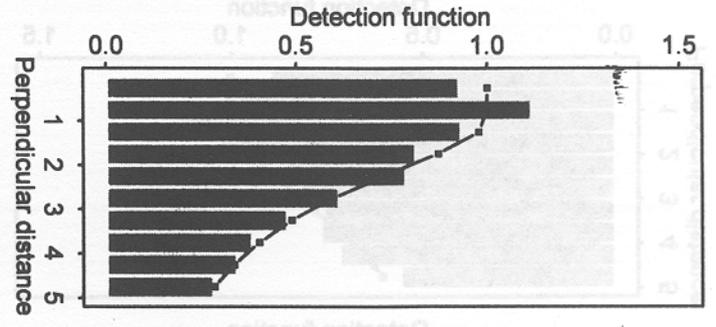
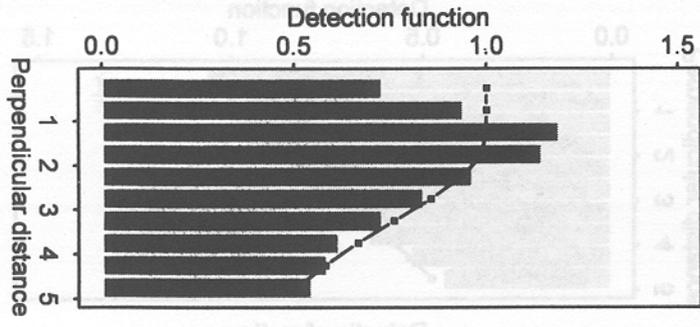
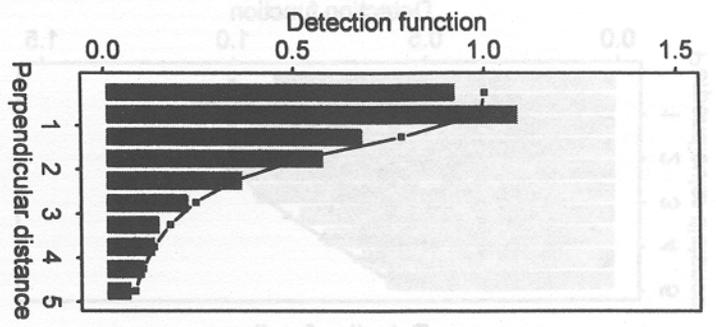
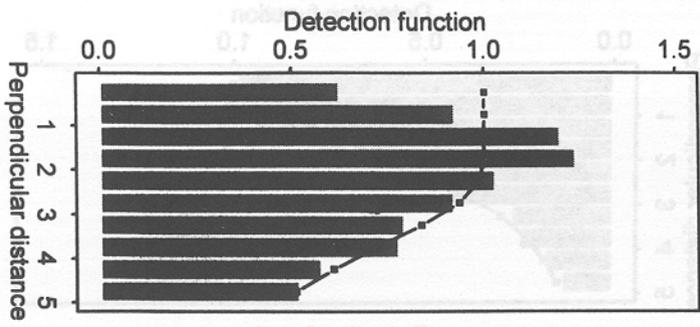


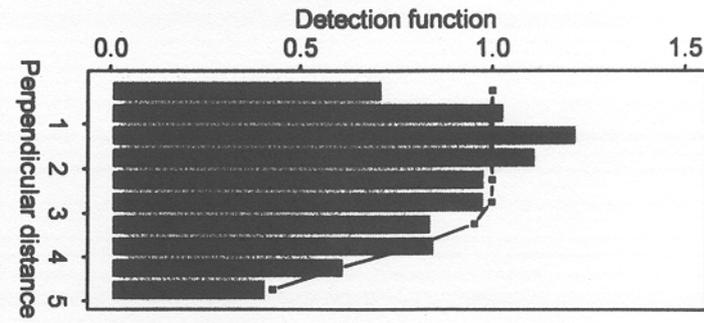
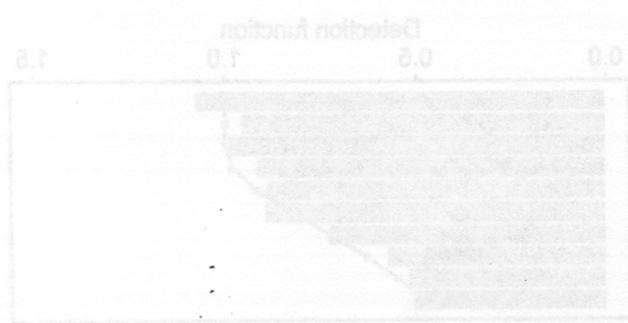
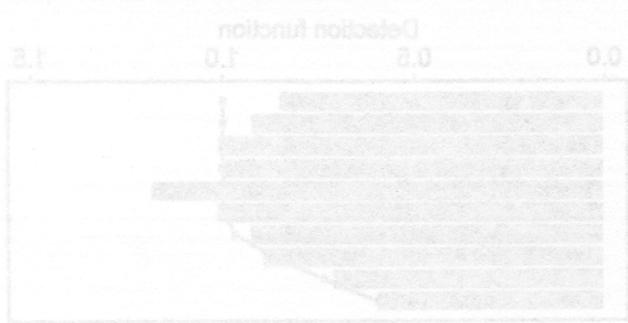
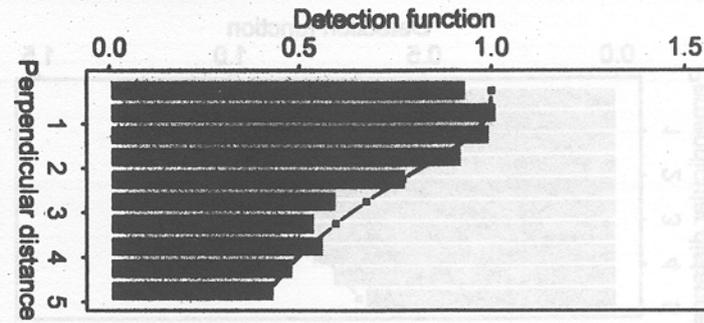
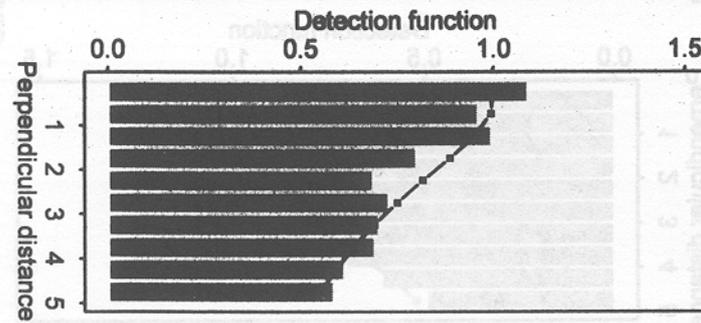
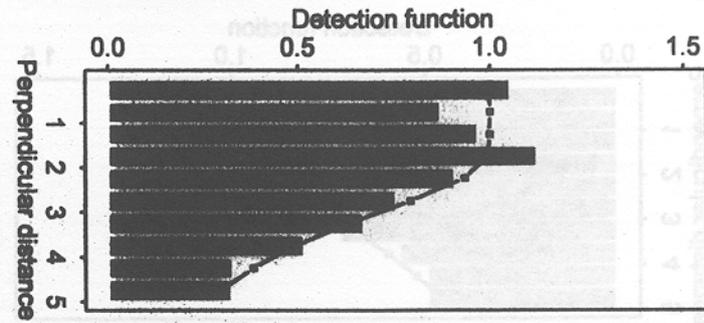
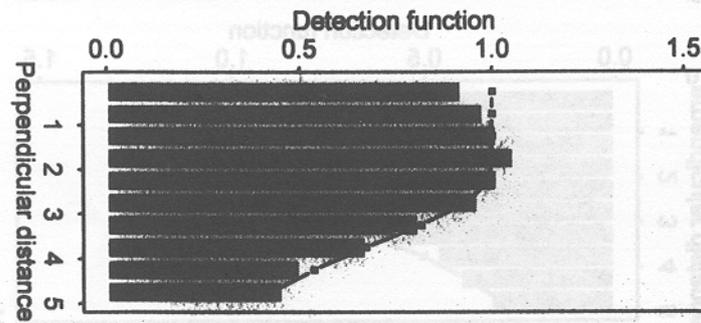
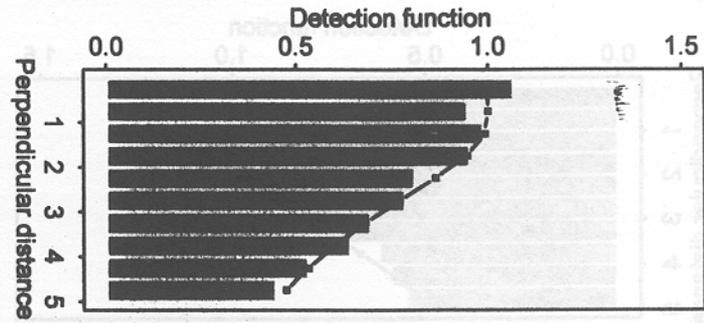
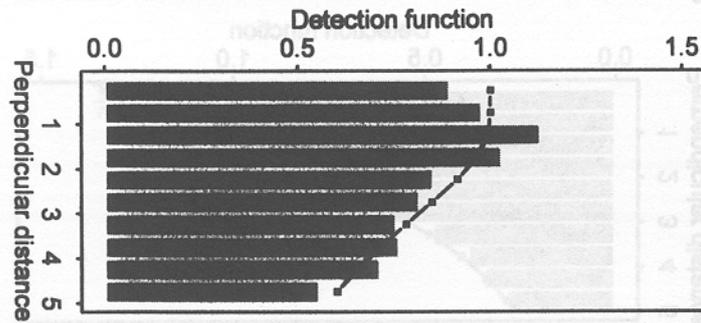
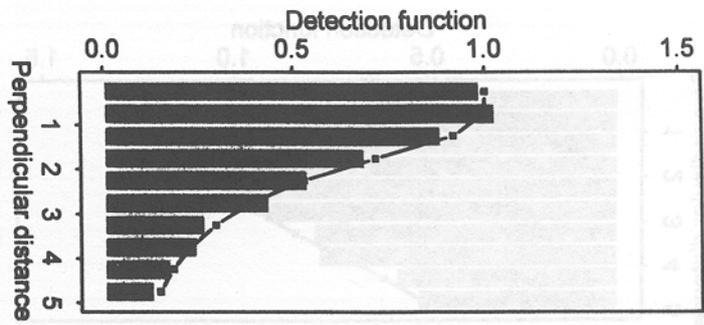
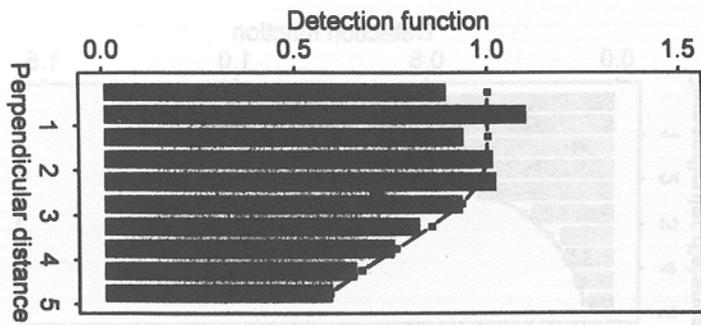


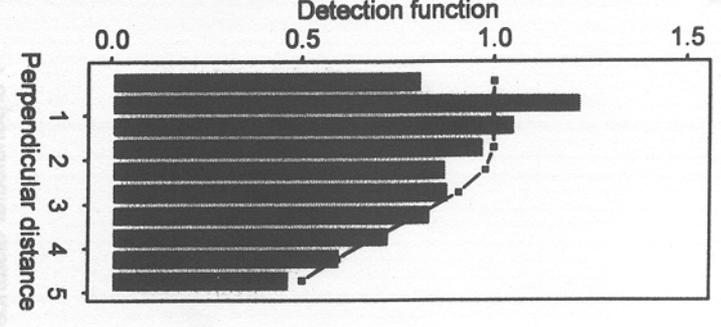
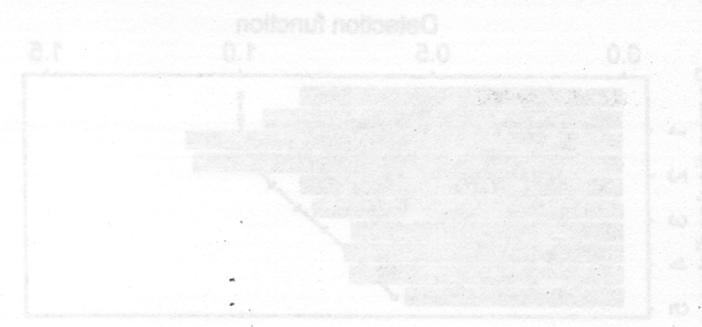
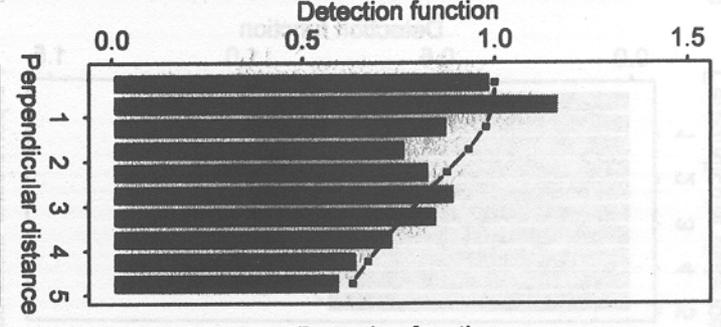
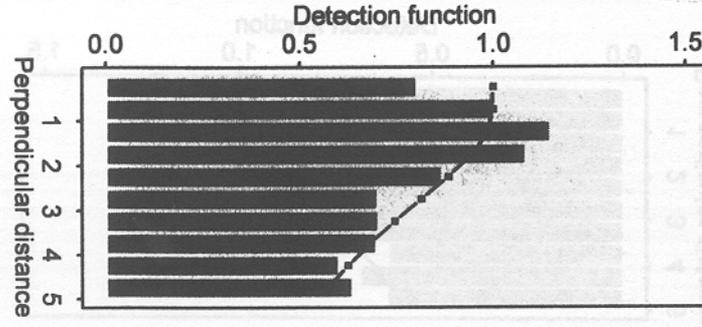
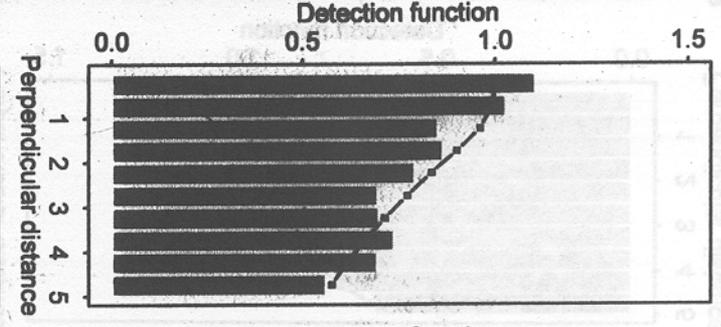
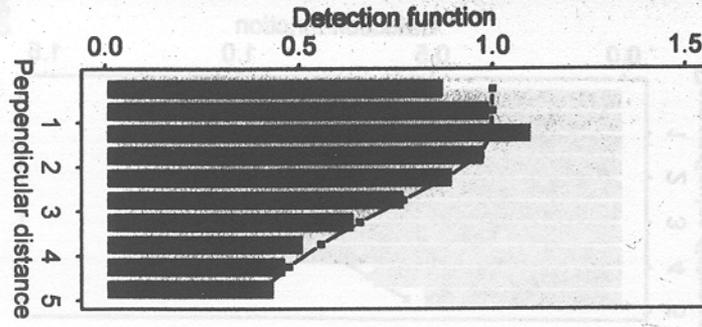
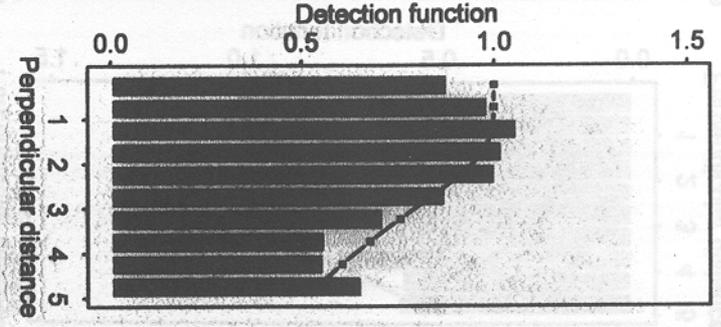
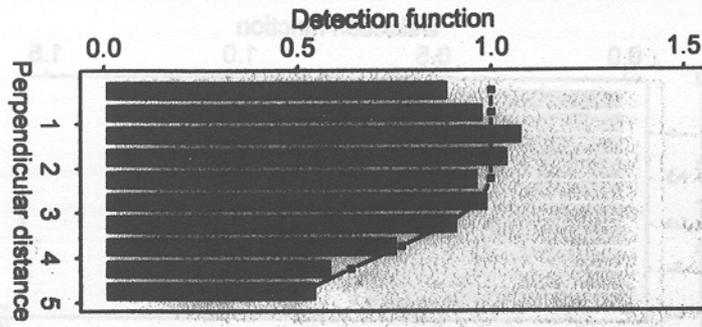
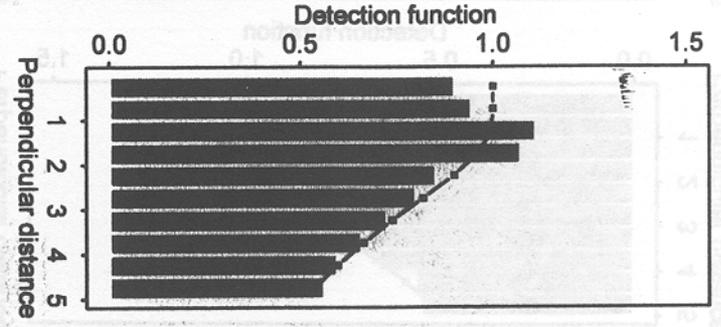
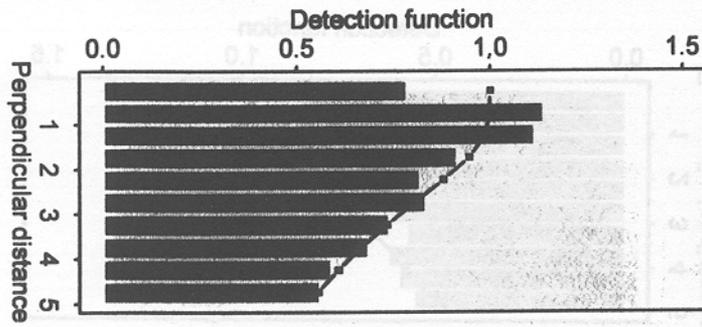
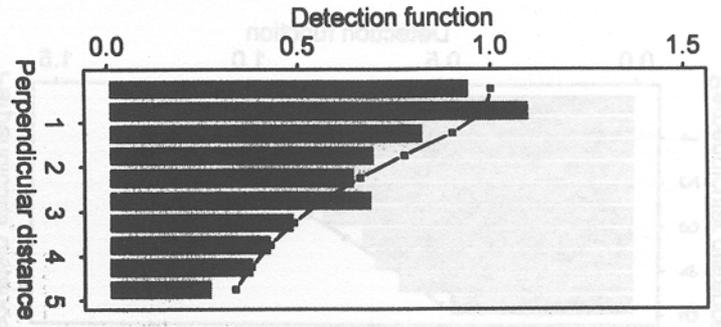
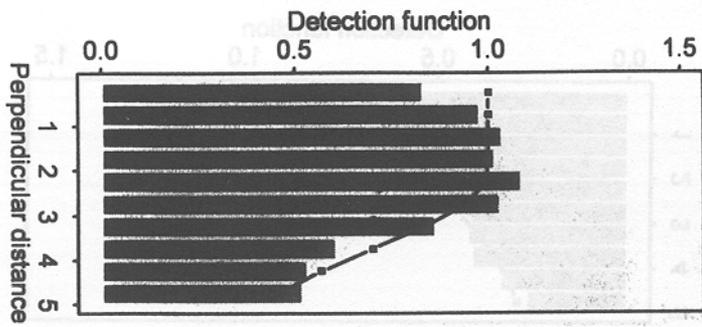
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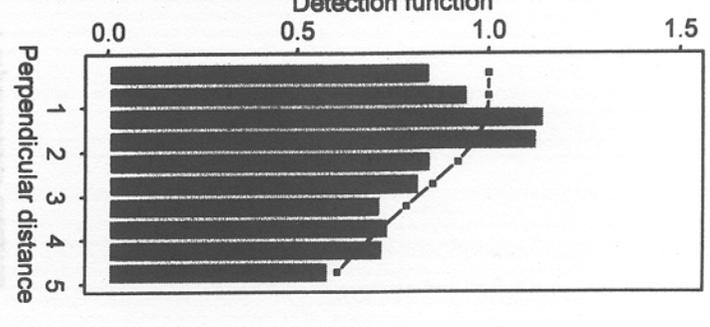
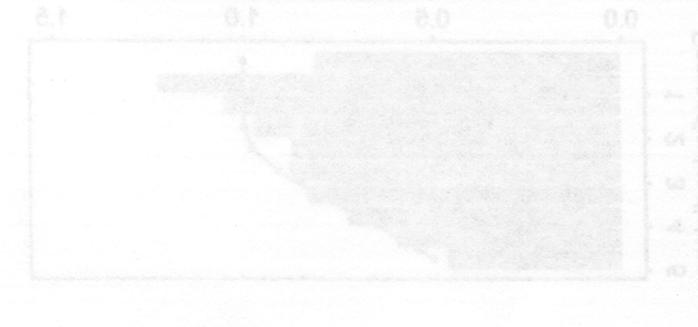
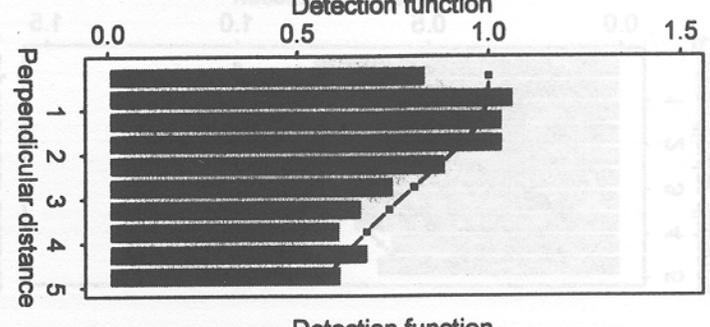
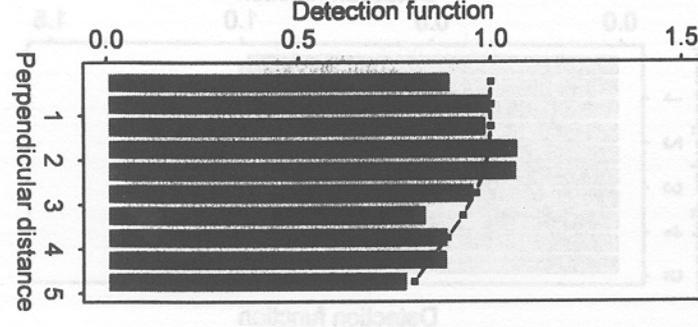
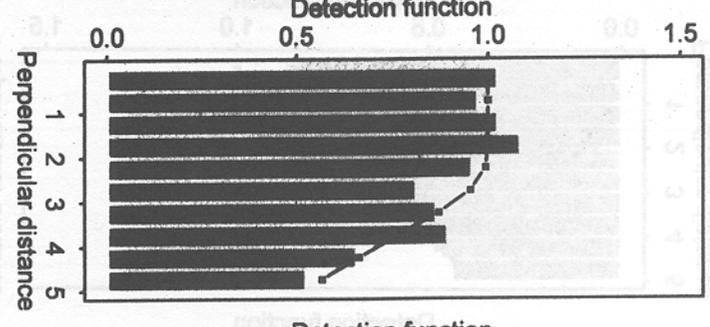
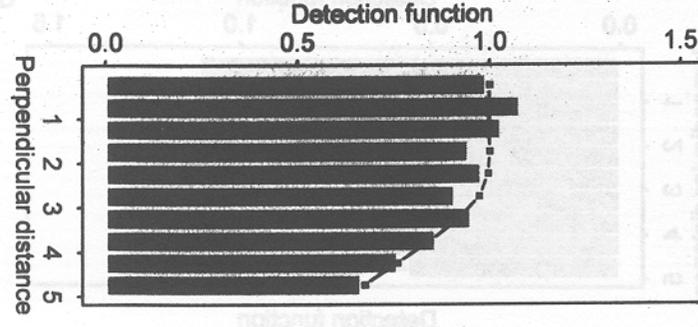
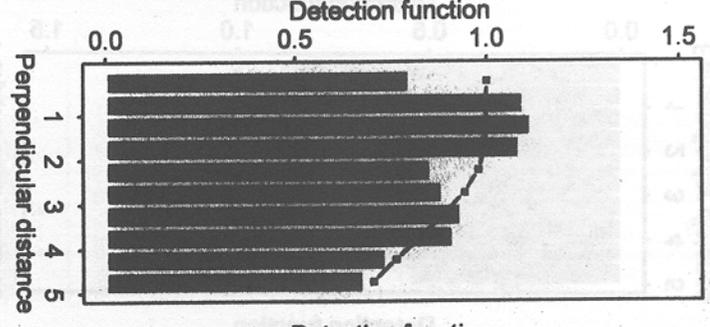
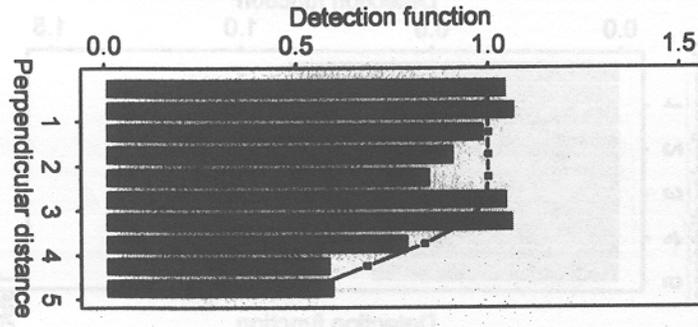
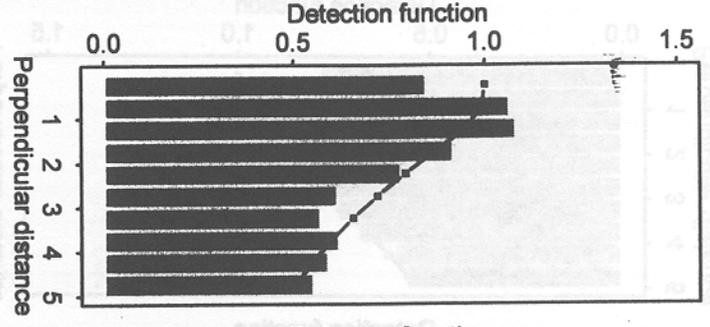
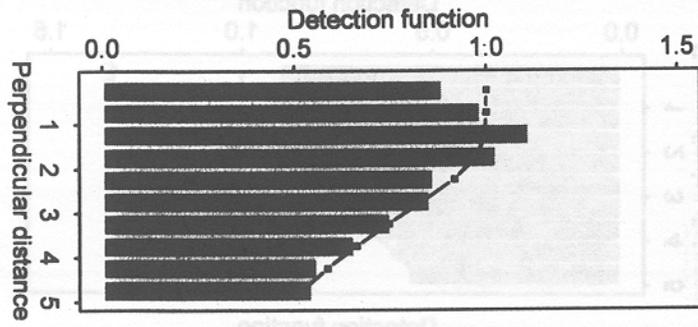
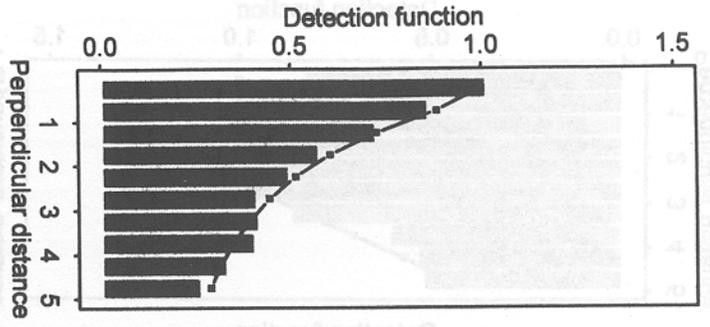
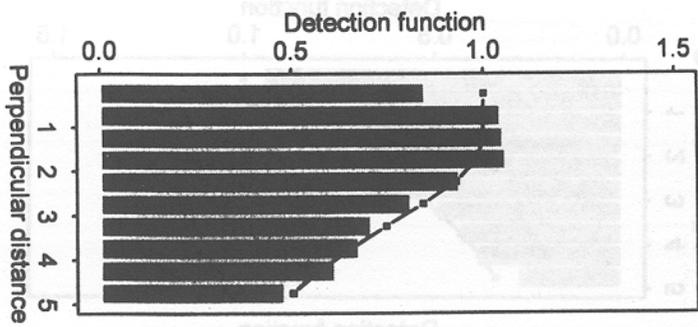












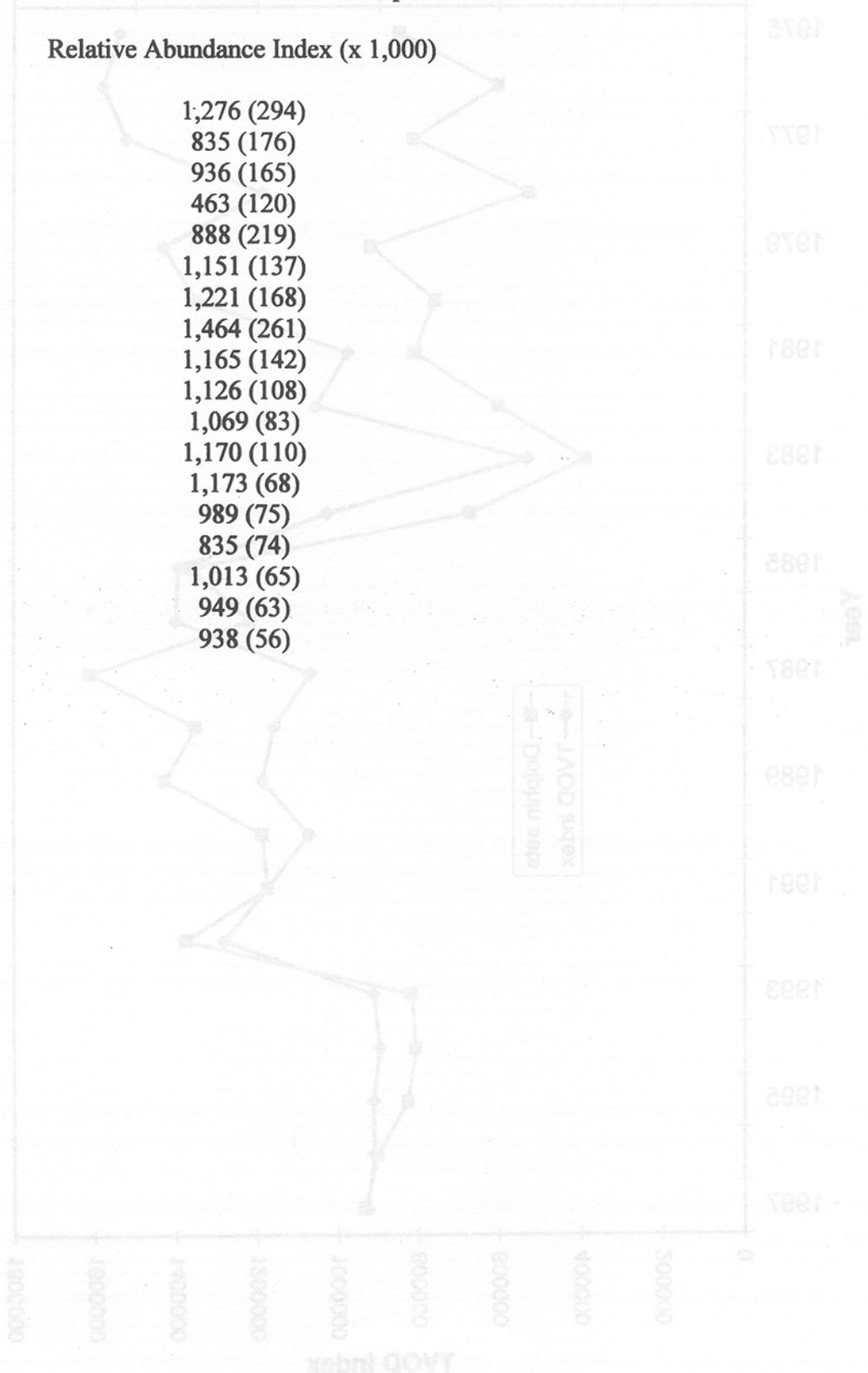
Attachment C

Revised (see Attachment 1) estimates of relative abundance for northeastern spotted dolphins, 1980-1997. Standard errors are in parentheses.

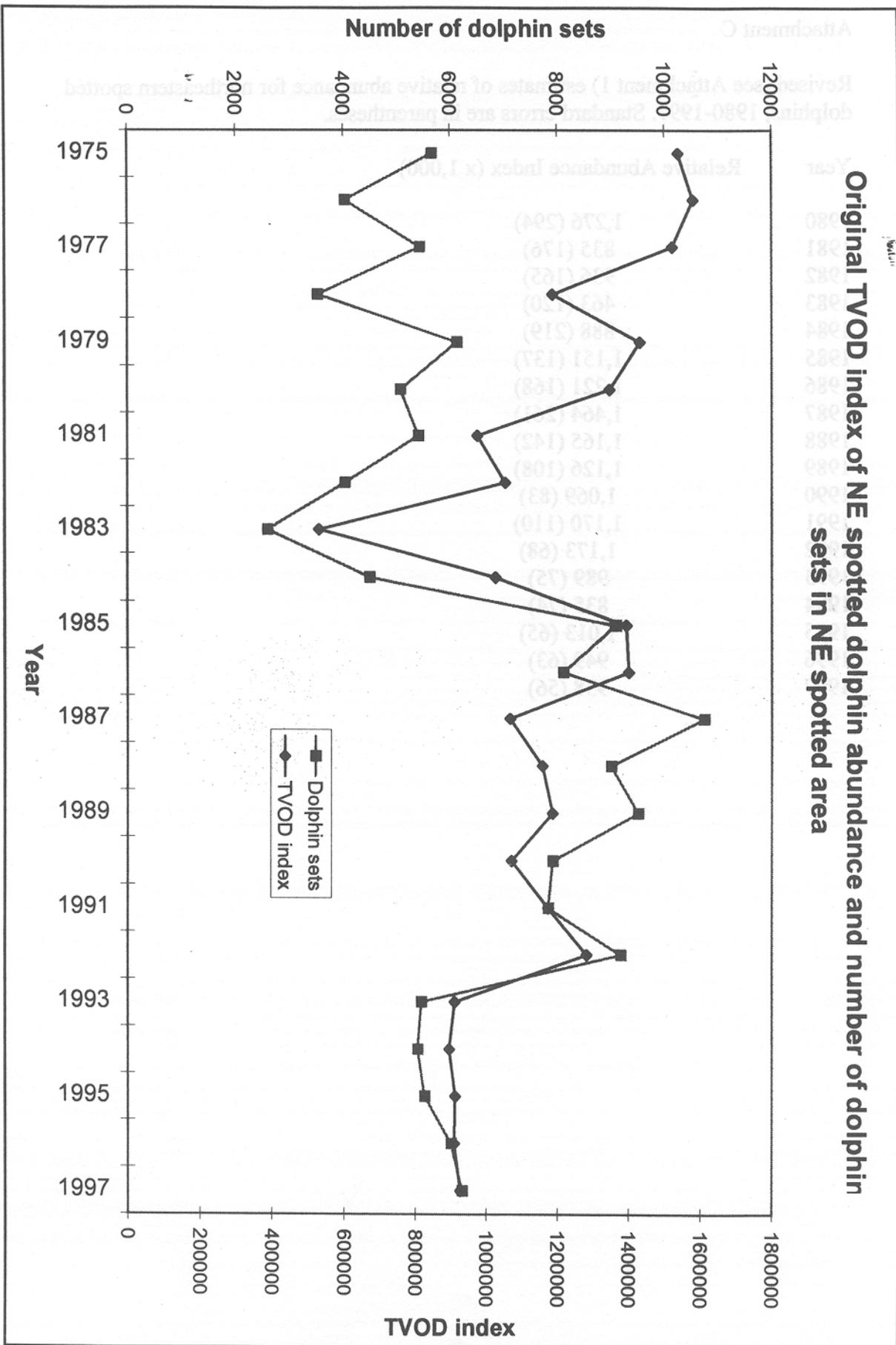
Year

Relative Abundance Index (x 1,000)

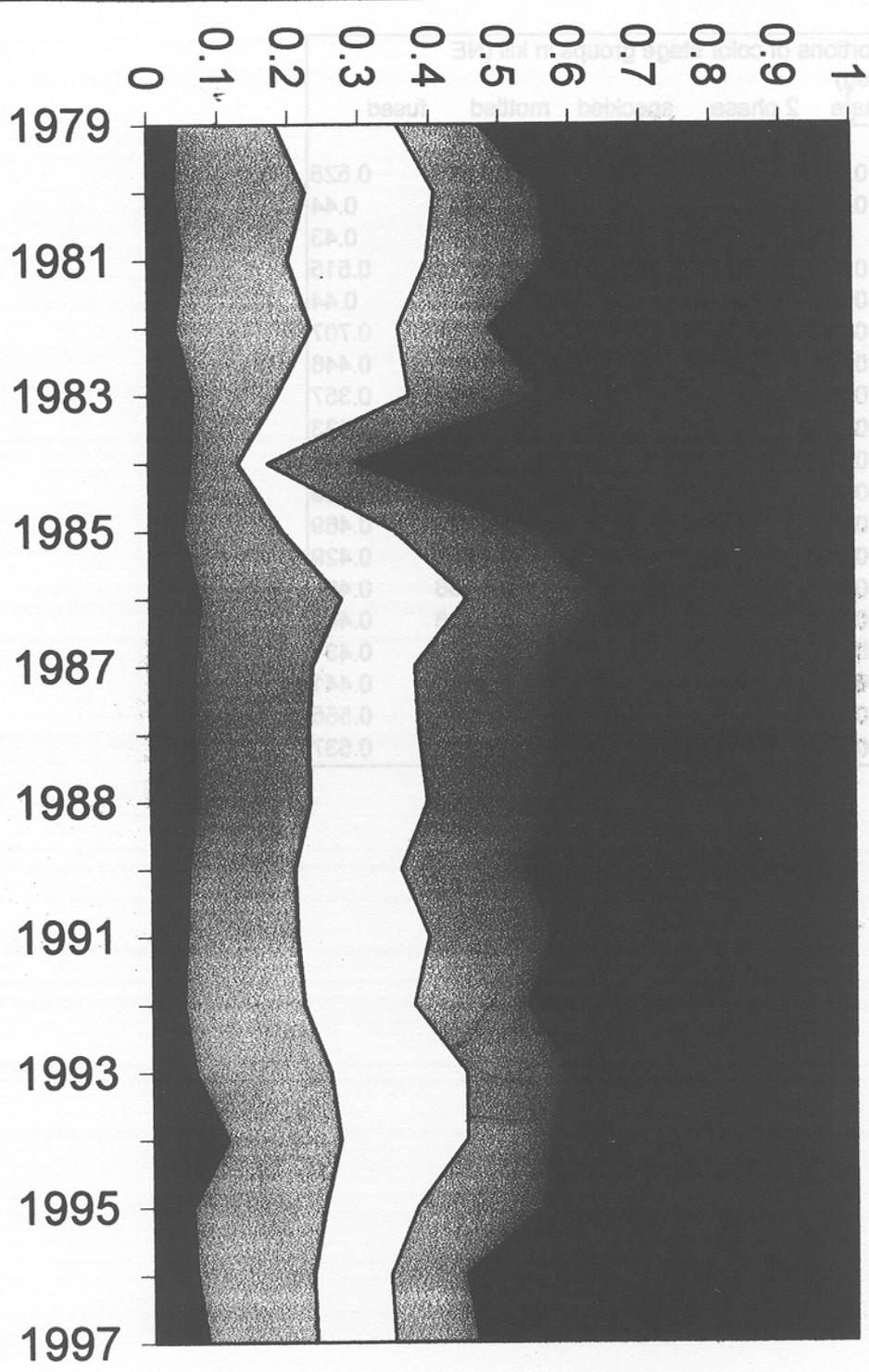
1980	1,276 (294)
1981	835 (176)
1982	936 (165)
1983	463 (120)
1984	888 (219)
1985	1,151 (137)
1986	1,221 (168)
1987	1,464 (261)
1988	1,165 (142)
1989	1,126 (108)
1990	1,069 (83)
1991	1,170 (110)
1992	1,173 (68)
1993	989 (75)
1994	835 (74)
1995	1,013 (65)
1996	949 (63)
1997	938 (56)



Original TVOD index of NE spotted dolphin abundance and number of dolphin sets in NE spotted area

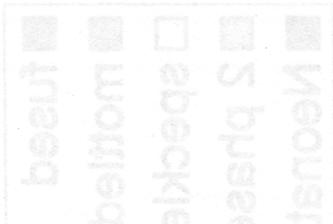


Proportion of color group stages represented in kill of NE spotted dolphins



- fused
- ▨ mottled
- speckled
- ▩ 2 phase
- Neonate

Year	Proportions of color stage groups in kill (NE spotted)				
	Neonate	2 phase	speckled	mottled	fused
1979	0.043	0.139	0.172	0.118	0.528
1980	0.038	0.186	0.183	0.153	0.44
1981	0.05	0.149	0.196	0.175	0.43
1982	0.039	0.193	0.122	0.132	0.515
1983	0.063	0.12	0.186	0.192	0.44
1984	0.058	0.068	0.042	0.126	0.707
1985	0.048	0.141	0.158	0.207	0.446
1986	0.072	0.2	0.178	0.194	0.357
1987	0.063	0.167	0.144	0.192	0.433
1988	0.061	0.163	0.156	0.197	0.423
1988	0.063	0.163	0.166	0.179	0.429
1990	0.053	0.15	0.15	0.178	0.469
1991	0.049	0.157	0.187	0.178	0.429
1992	0.045	0.171	0.155	0.166	0.464
1993	0.061	0.192	0.192	0.148	0.406
1994	0.106	0.16	0.18	0.122	0.431
1995	0.056	0.188	0.13	0.186	0.441
1996	0.061	0.166	0.108	0.11	0.555
1997	0.077	0.154	0.11	0.122	0.537



Attachment F

