ASSESSMENT OF HONG KONG'S INSHORE FISHERY RESOURCES

by

Tony J. Pitcher
Reg Watson
Anthony Courtney
&
Daniel Pauly

APPENDIX:

DETAILS OF GROWTH & MORTALITY ESTIMATES FOR 17 ASSESSED SPECIES

FISHERIES CENTRE, UNIVERSITY OF BRITISH COLUMBIA

JANUARY 1998

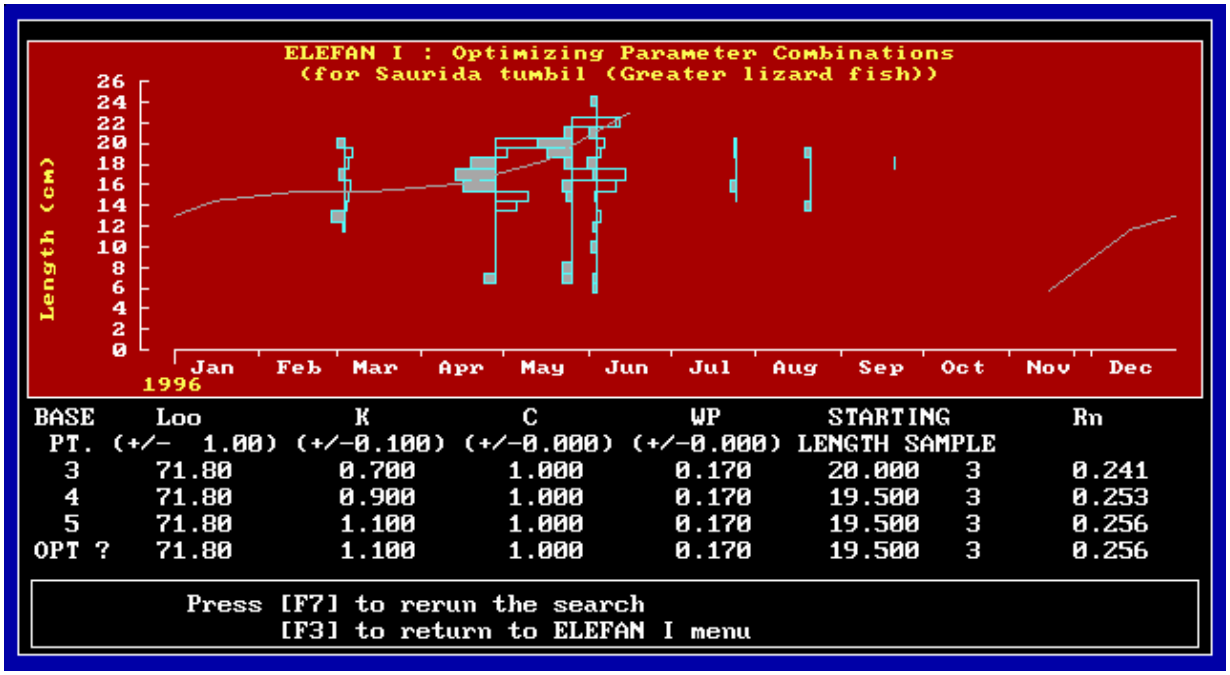

Figure 1. FiSAT Elefan automated scan of K and L infinity for *Saurida tumbil*. Trawl survey data stations 1-18.

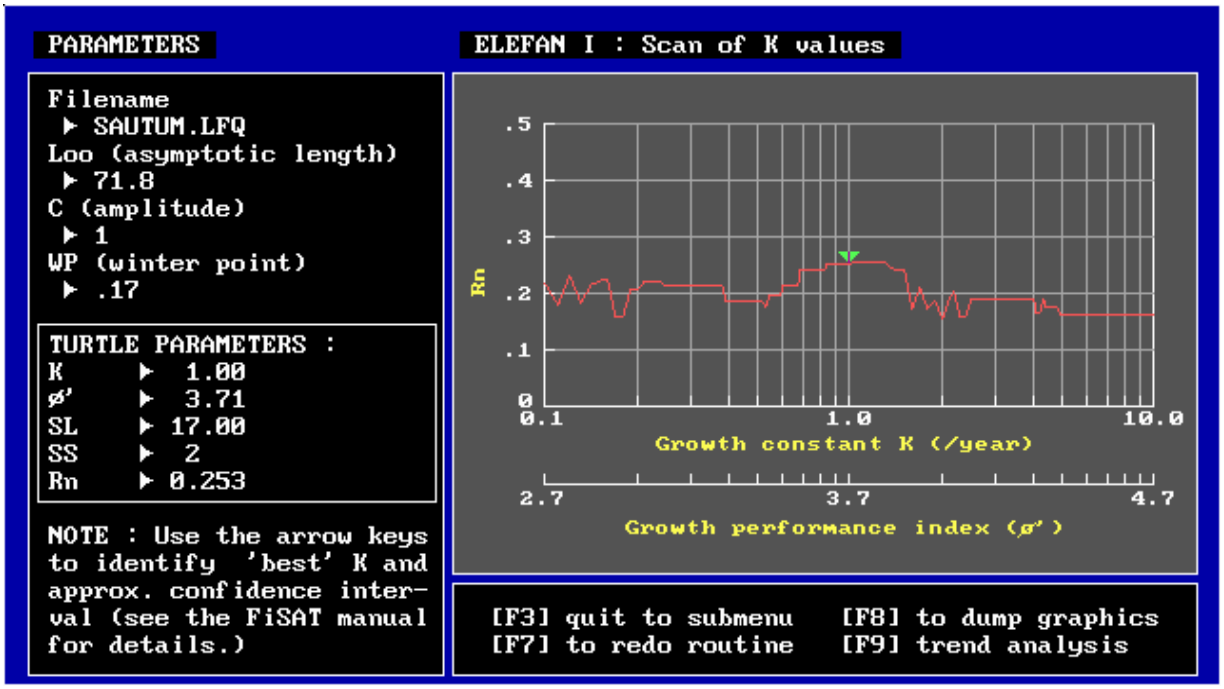

Figure 2. FiSAT Elefan scan of K values for *Saurida tumbil* trawl data. Trawl survey data stations 1-18. (Note: lack of any modal peak in K).

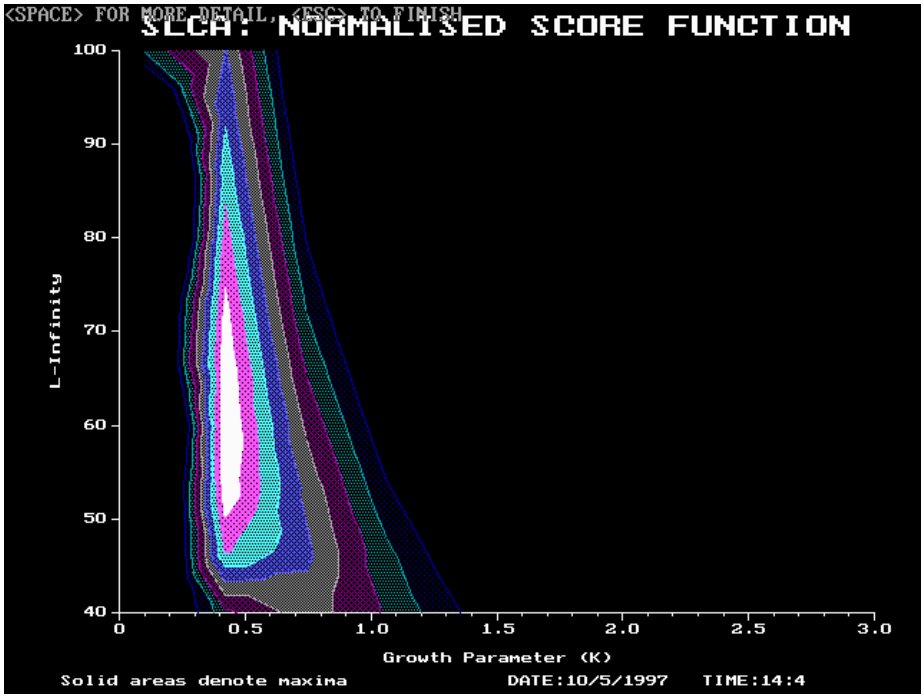

Figure 3. LFDA SLCA scan of K and L infinity for *Saurida tumbil* trawl survey data.

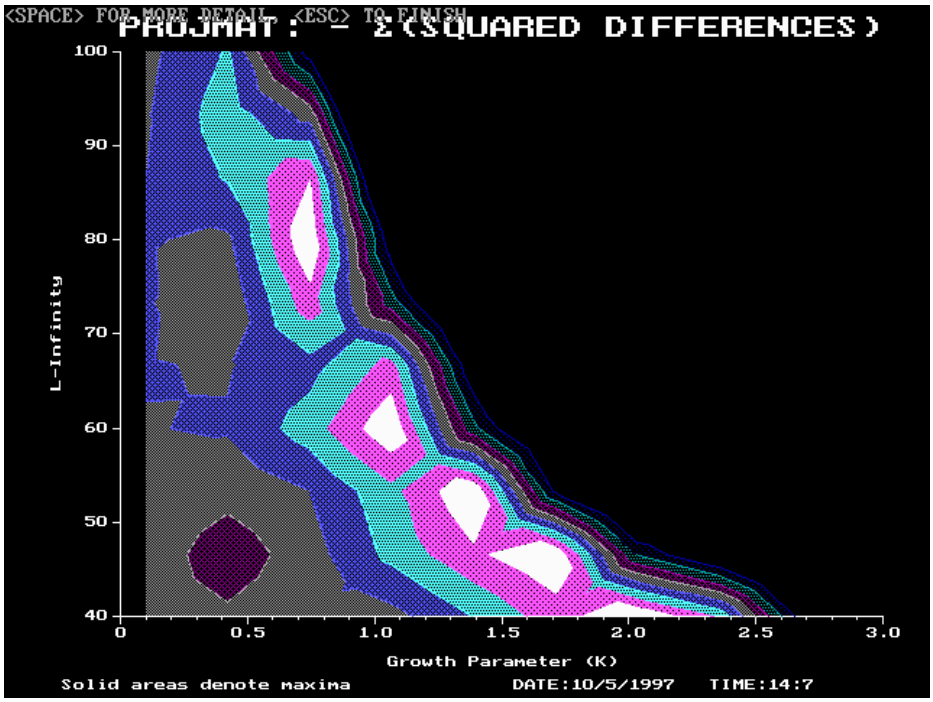

Figure 4. LFDA Projmat scan of K and L infinity for *Saurida tumbil* trawl survey data.

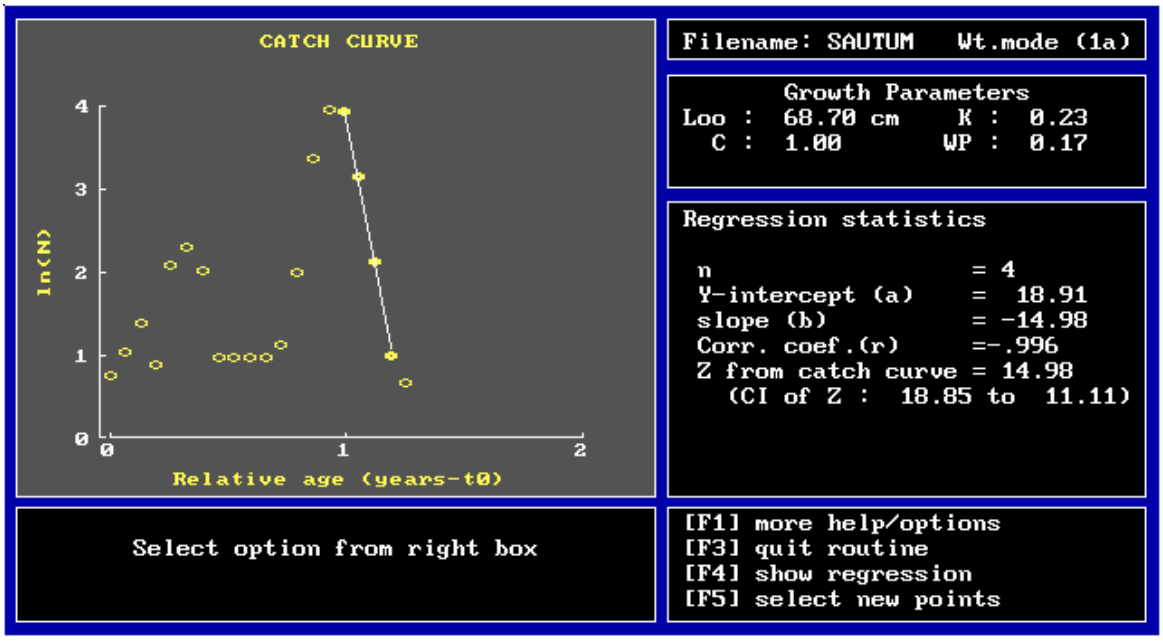

Figure 5. FiSAT Elefan estimate of Z for *Saurida tumbil*. Trawl survey data stations 1-18.

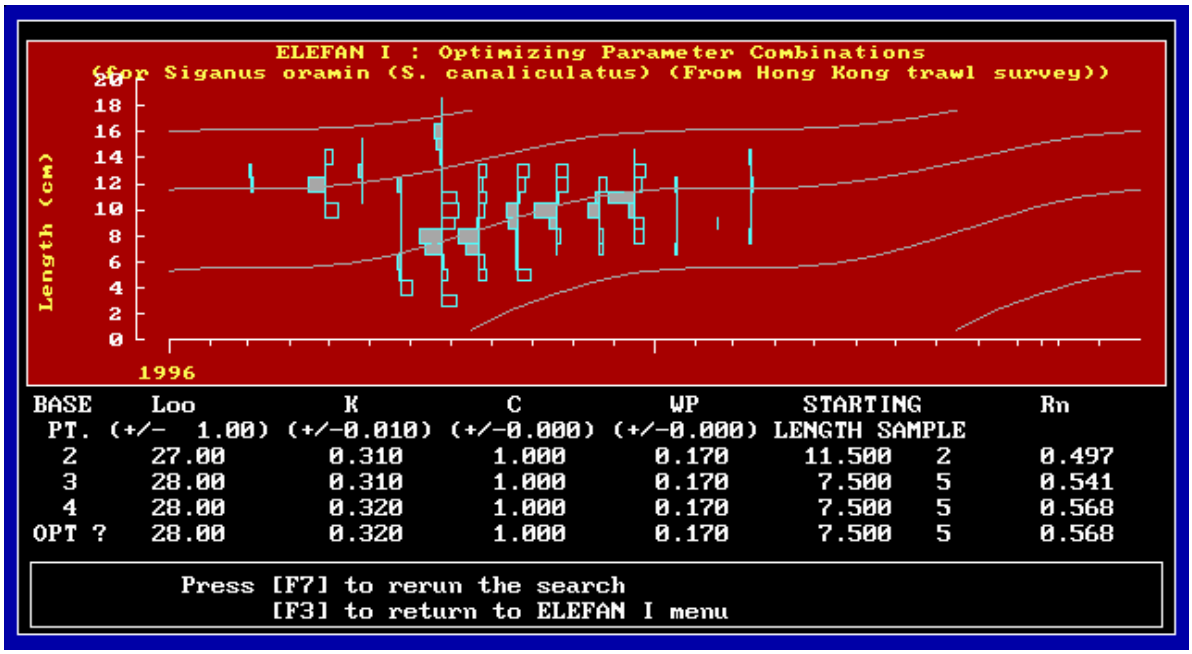

Figure 6. FiSAT Elefan automated search routine of K and L infinity for *Siganus canaliculatus*. Trawl survey data stations 1-8.

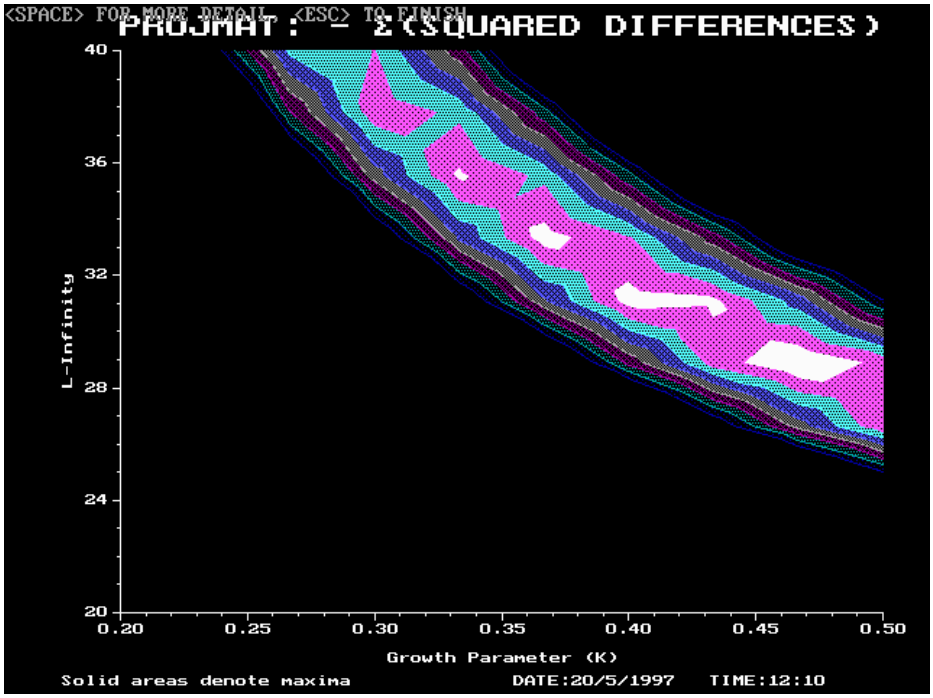

Figure 7. LFDA Projmat scan of K and L infinty for *Siganus canaliculatus*. Trawl survey data stations 1-18.

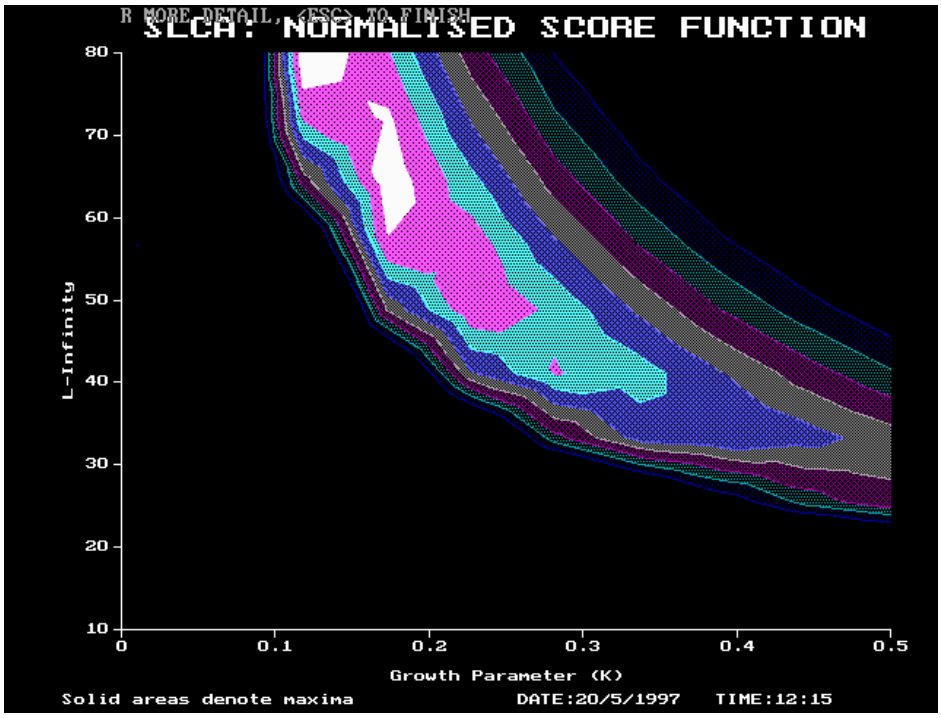

Figure 8. LFDA SLCA scan of K and L infinfity for *Siganus canaliculatus*. Trawl survey data stations 1-18.

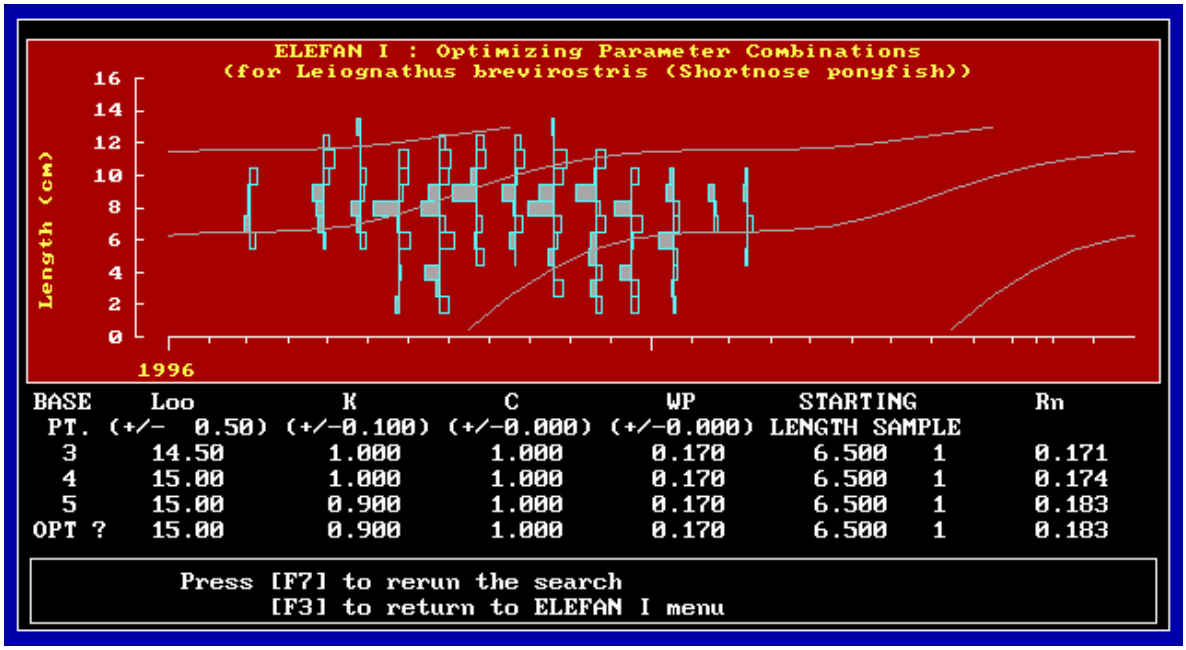

Figure 9. FiSAT Elefan automated search routine of K and L infinity for *Leiognathus brevirostris*. Trawl survey data stations 1-18.

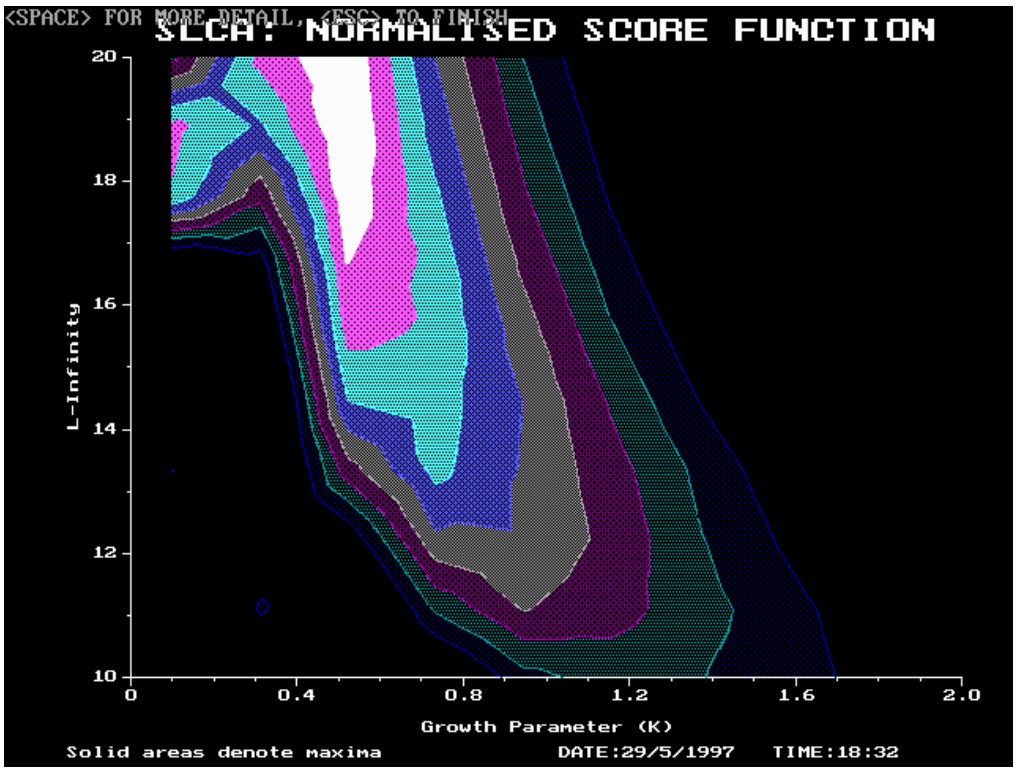

Figure 10. LFDA SLCA scan of K and L infinity for *Leiognathus brevirostris*. Data supplied by S. F. Leung AFD for 1995 and 1996

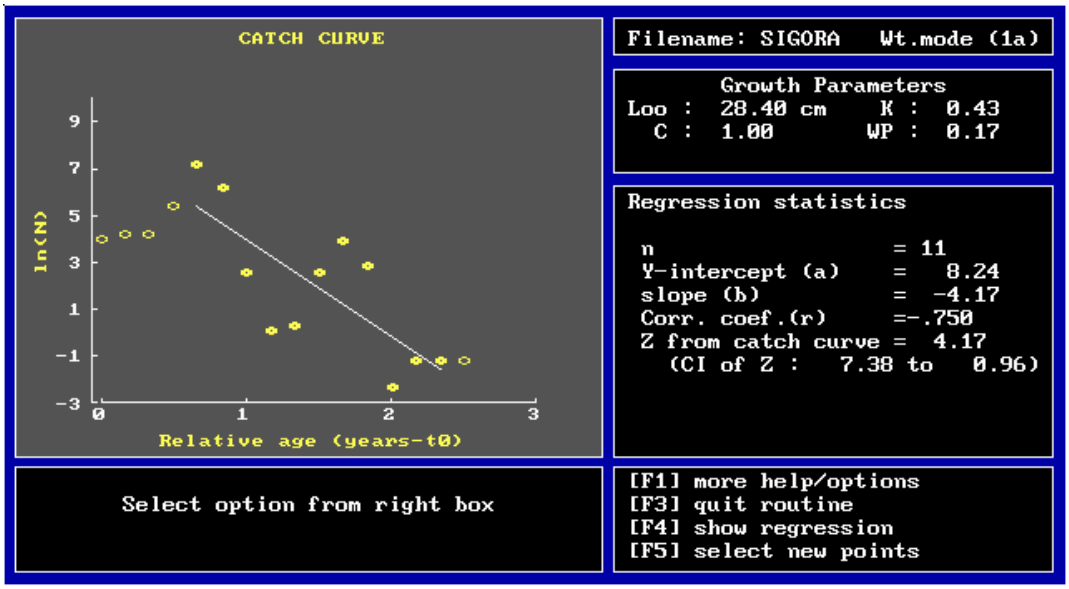

Figure 11. FiSAT output of estimate of Z for *Siganus canaliculatus* based on trawl survey data stations 1-18.

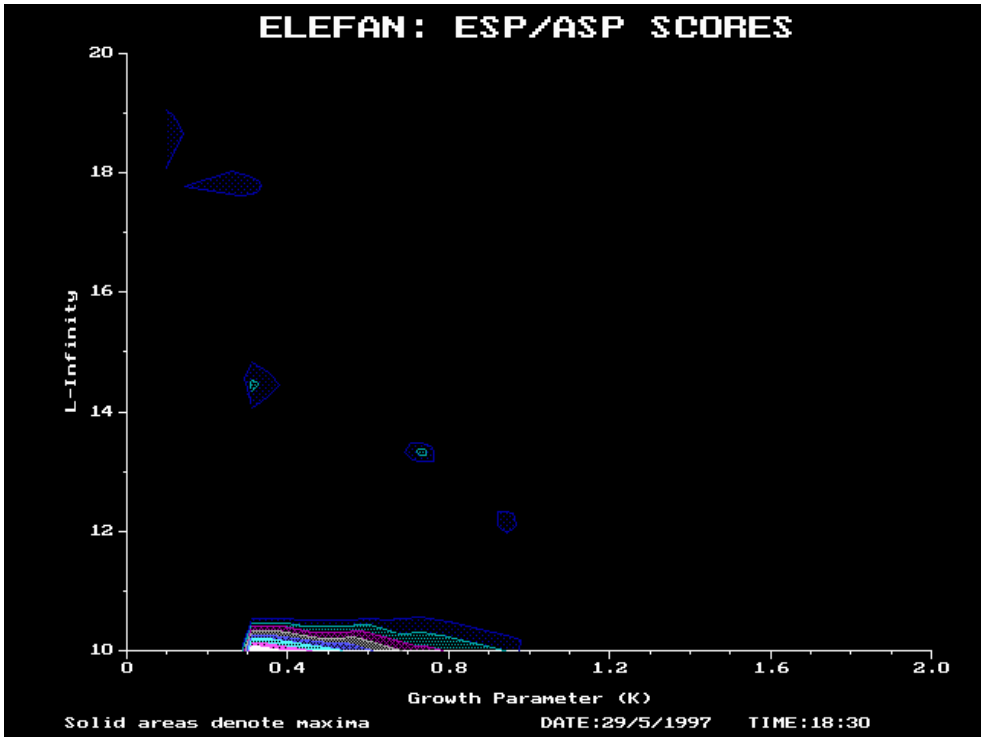

Figure 12. LFDA Elefan scan of K and L infinity for *Leiognathus brevirostris*. Data supplied by S. F. Leung AFD for 1995 and 1996.

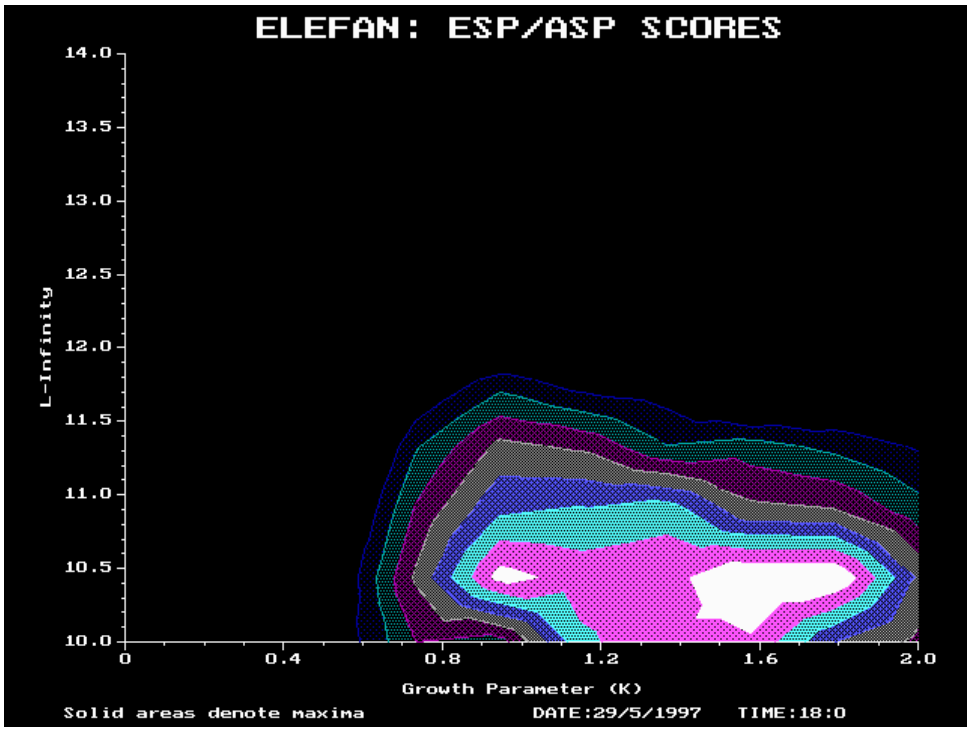

Figure 13. LFDA Elefan scan of K and L infinity for *Leiognathus brevirostris*. Trawl survey data stations 1-18.

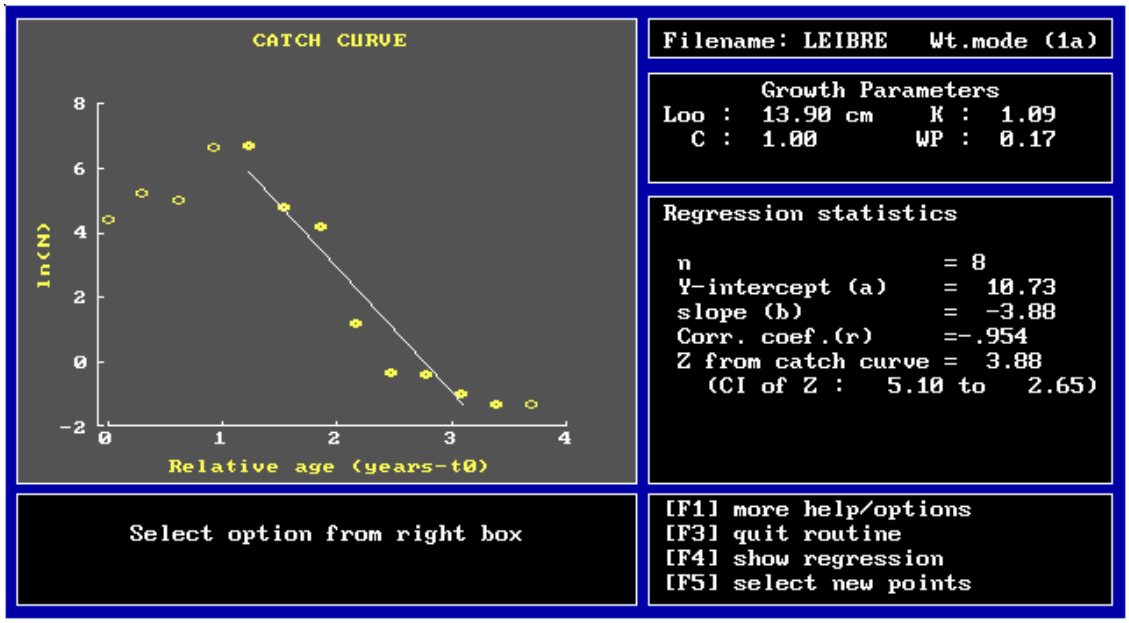

Figure 14. FiSAT estimate of Z for *Leiognathus brevirostris*. Trawl survey data stations 1-18.

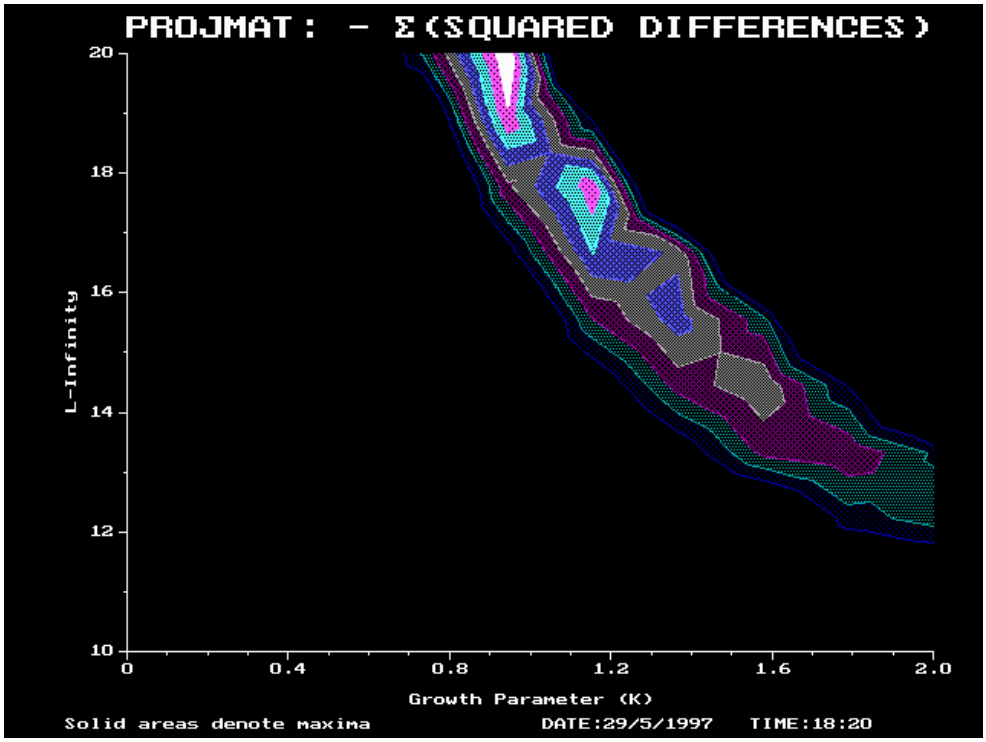

Figure 15. LFDA Projmat scan of K and Linfinity for *Leiognathus brevirostris*. Data supplied by S. F. Leung AFD for 1995 and 1996.

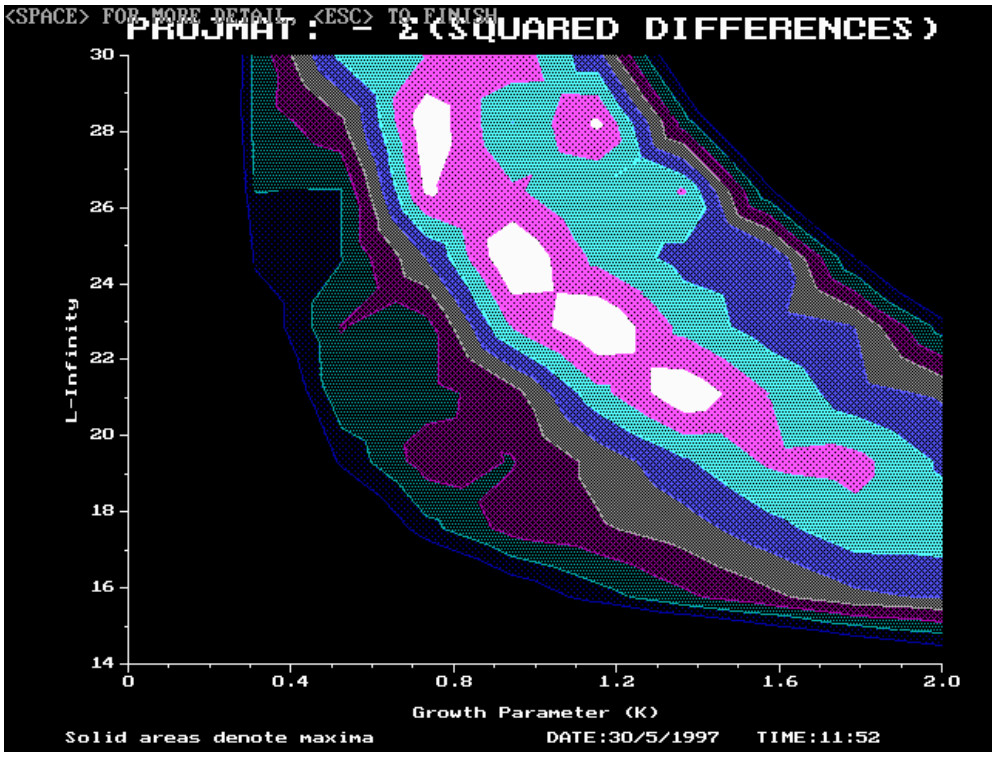

Figure 16. LFDA Projmat scan of K and L infinity for *Collichthys lucidus*. Trawl survey data stations 1-18.

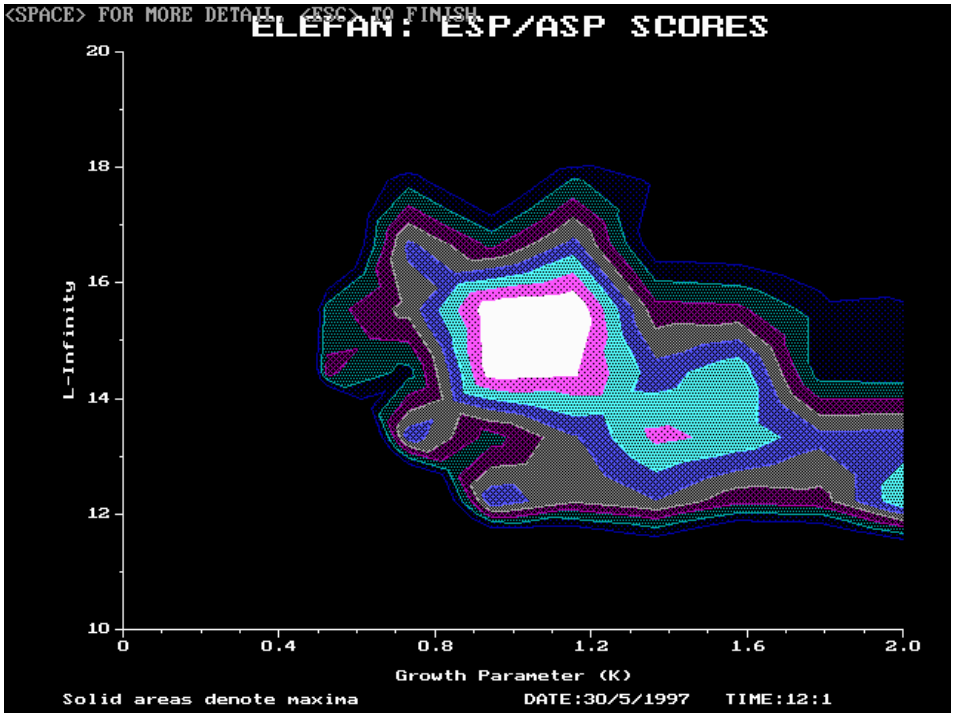

Figure 17. LFDA Elefan scan of K and L infinity for *Collichthys lucidus*. Trawl survey data stations 1-18.

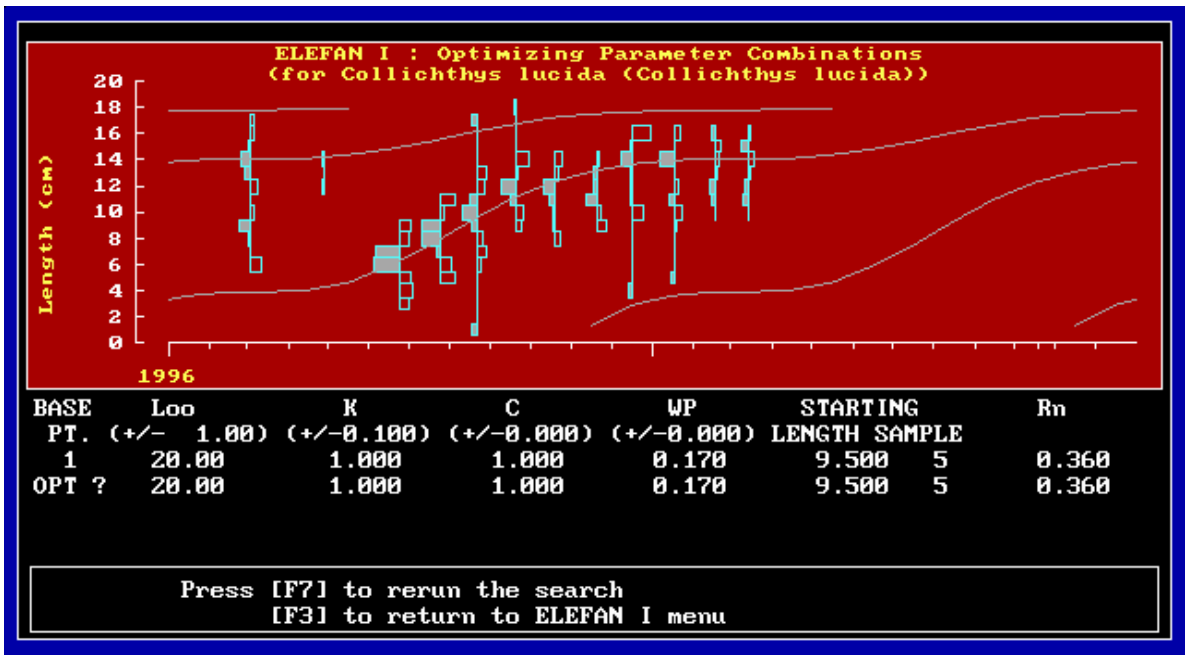

Figure 18. FiSAT Elefan automated search routine for K and L infinity for *Collichthys lucidus*. Trawl survey data stations 1-18.

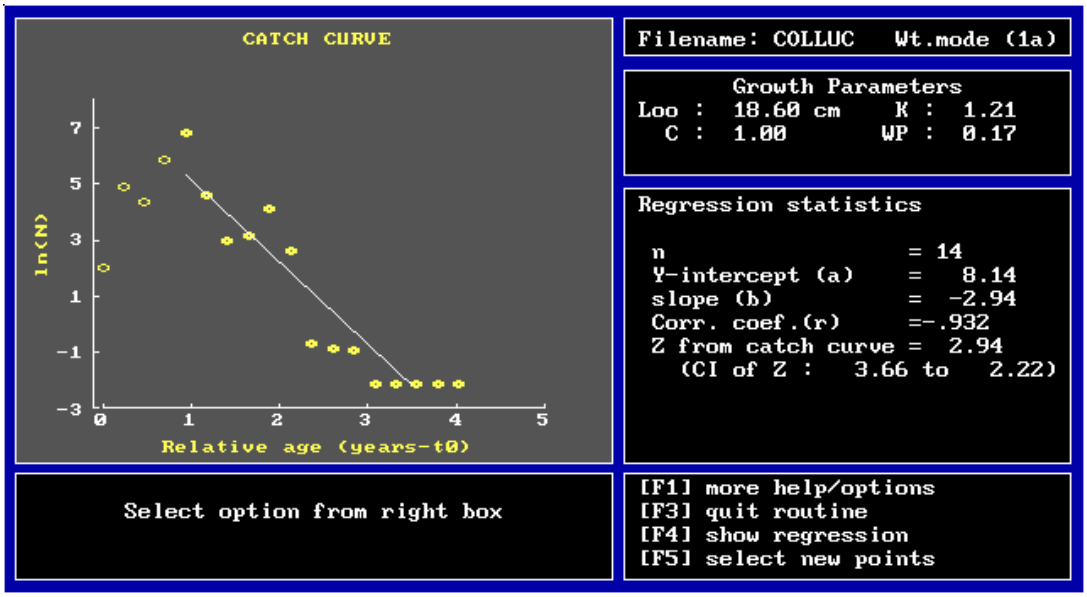

Figure 19. FiSAT length converted catch curve estimate of Z for *Collichthys lucidus*. Trawl survey data stations 1-18.

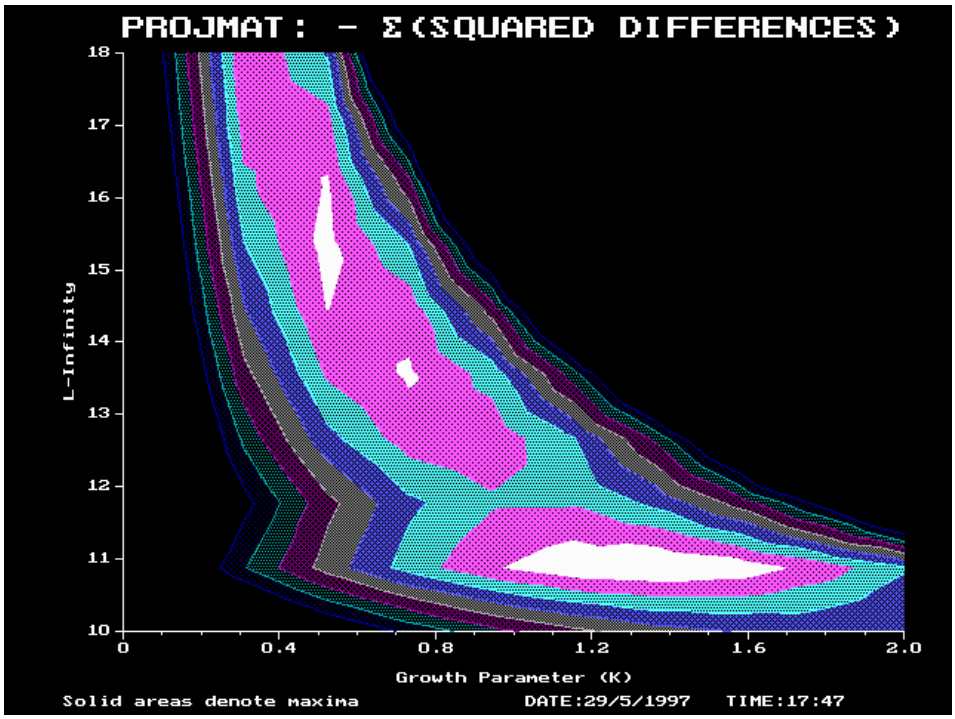

Figure 20. LFDA Projmat scan of K and L infinty for *Leiognathus brevirostris*. Trawl survey data stations 1-18.

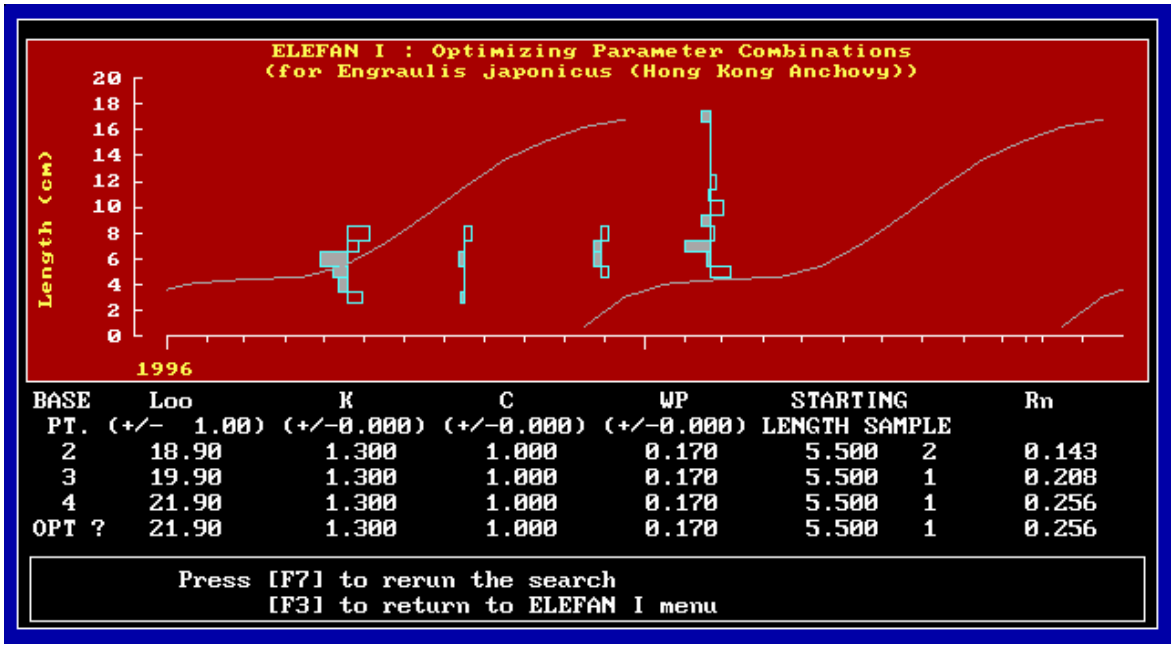

Figure 21. FiSAT Elefan automated search routine of K and L inifinity for *Engraulis japonicus*. Data from purse seine survey.

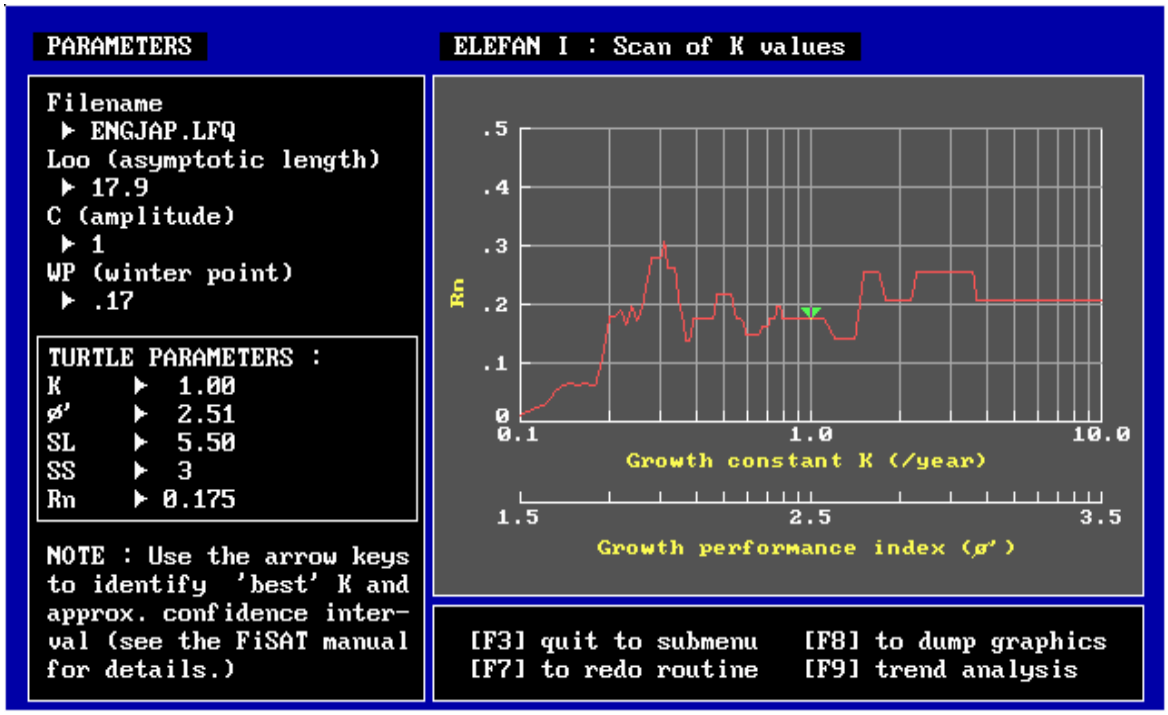

Figure 22. FiSAT automated scan of K values for *Engraulis japonicus*. Purse seine survey data. (Note: lack of any single modal value.

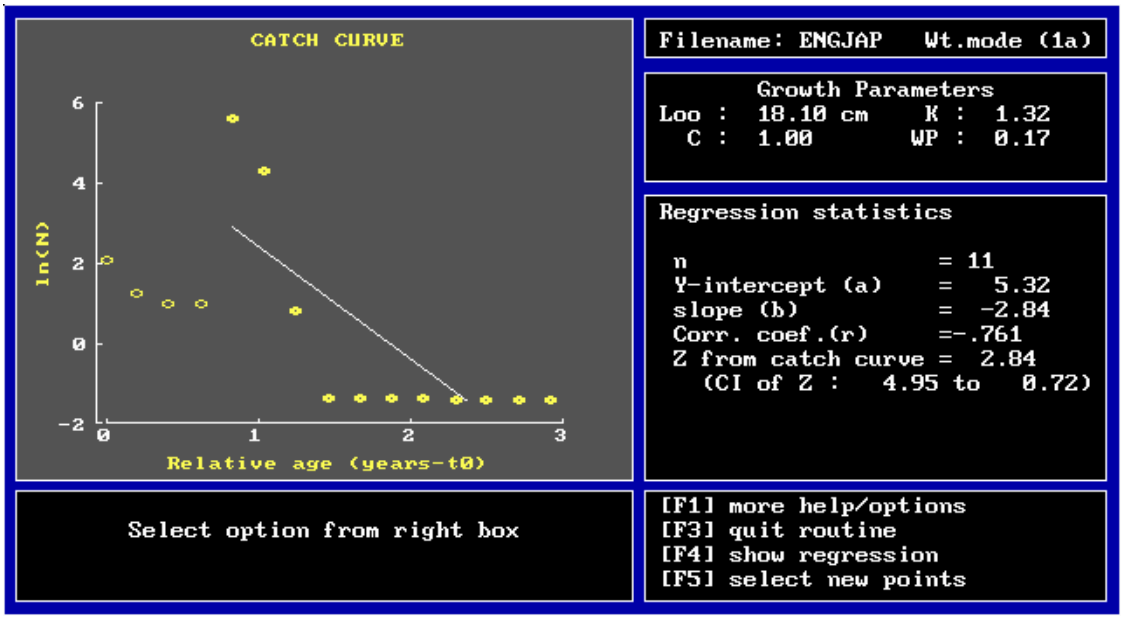

Figure 23. FiSAT estimate of Z for *Engraulis japonicus* using the length converted catch curve method and purse seine survey data.

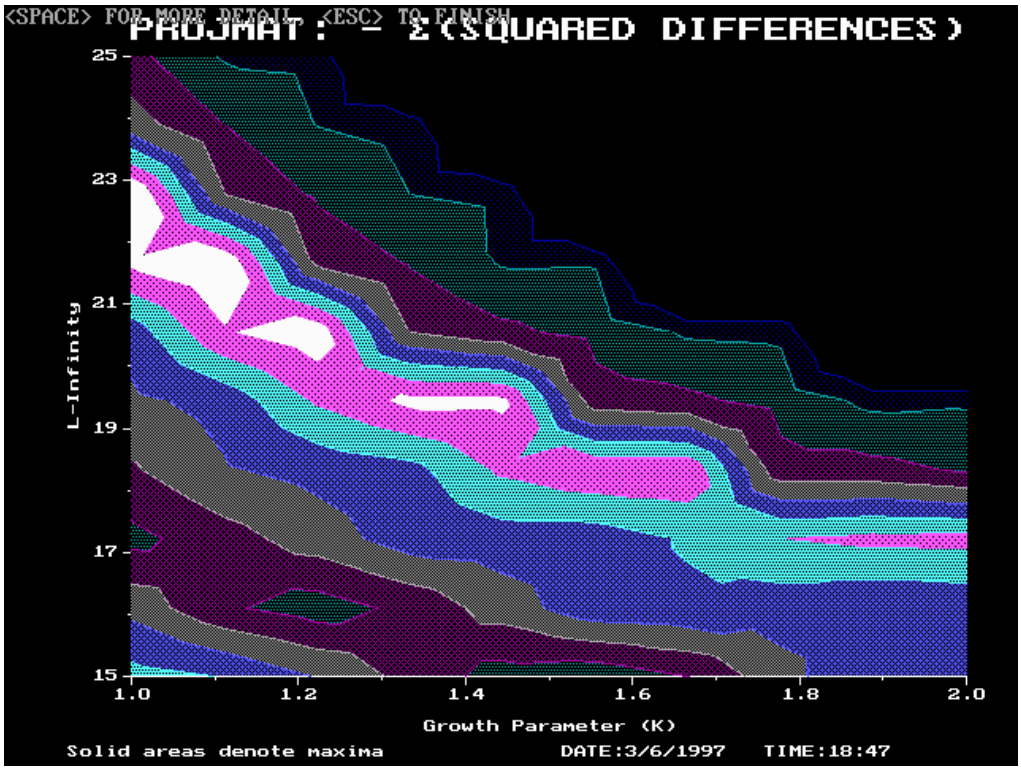

Figure 24. LFDA Projmat scan of K and L infinity for *Engraulis japonicus*. Based on purse seine fishery data for 1995-96, supplied by S. F. Leung, AFD.

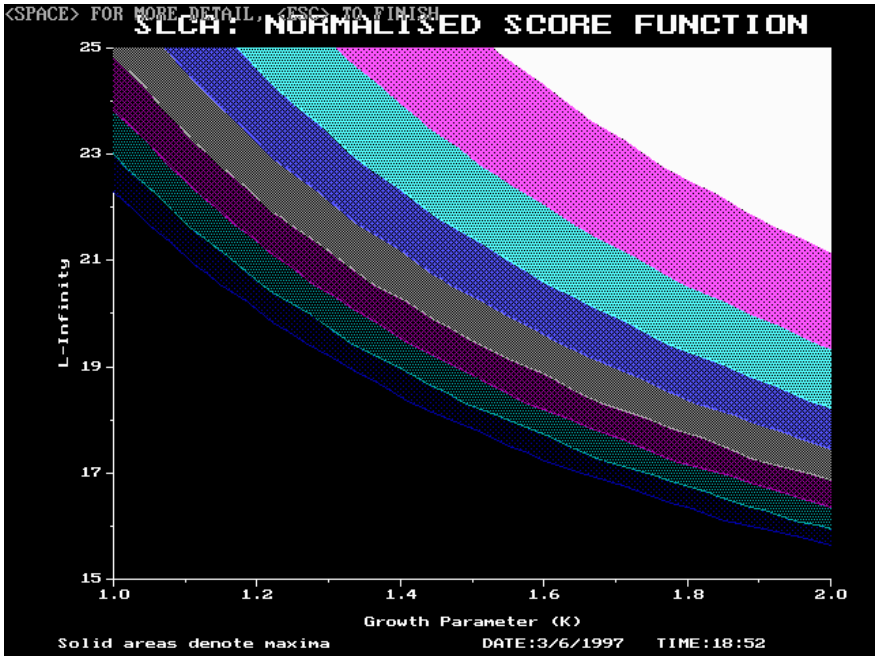

Figure 25. LFDA SLCA scan of K and L infinity for *Engraulis japoncius.* Purse seine fishery data 1995-96 supplied by S. F. Leung.

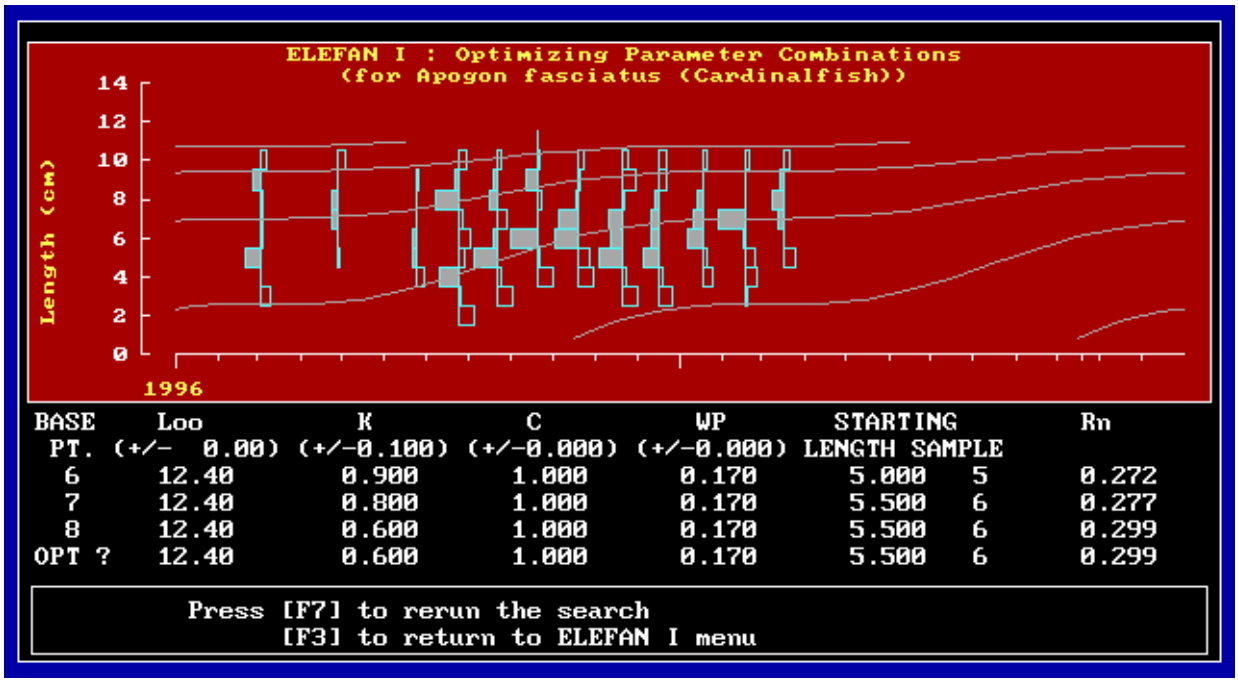

Figure 26. FiSAT automated search routine for K and L infinity for *Apogon fasciatus.* Trawl survey data stations 1-18.

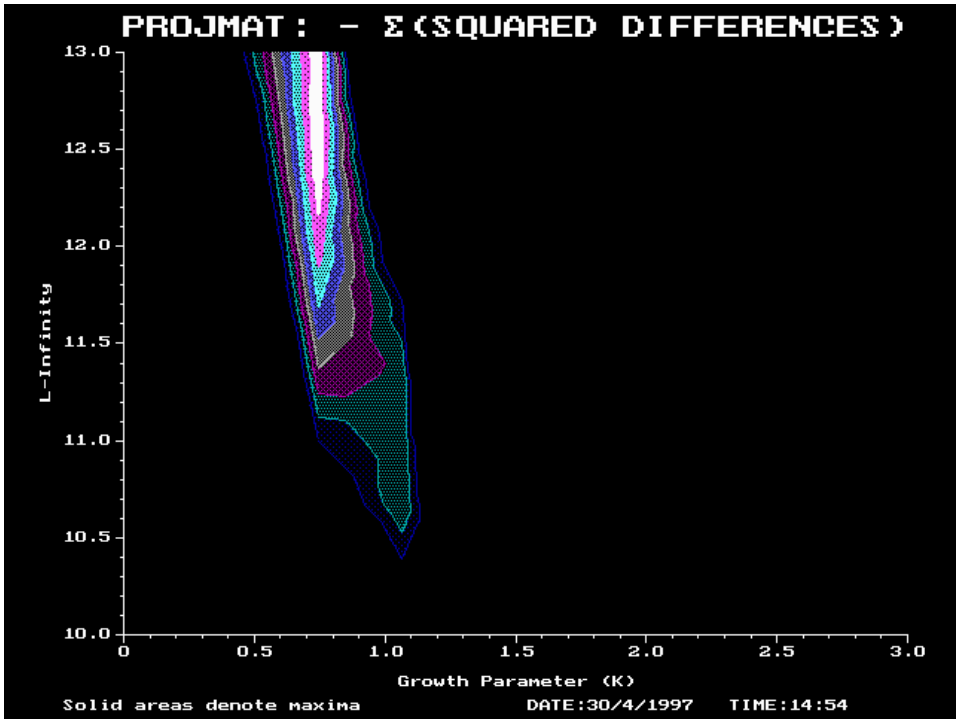

Figure 27. LFDA Projmat scan of K and L infinity for *Apogon fasciatus.* Trawl survey data stations 1-18.

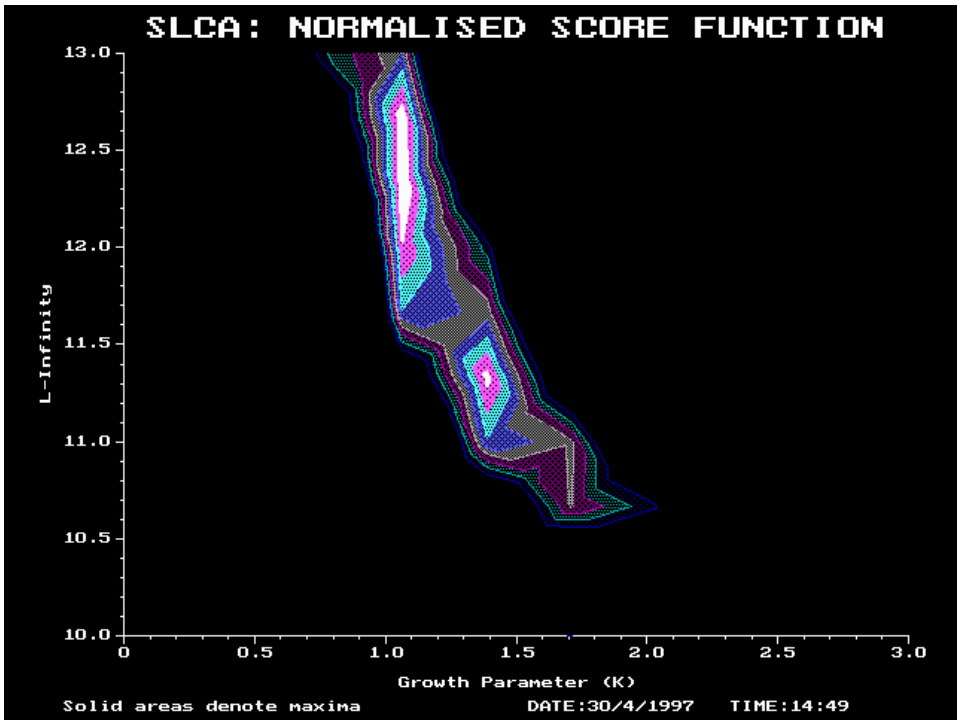

Figure 28. LFDA SLCA scan of K and L infinity for *Apogon fasciatus.* Trawl survey data stations 1-18.

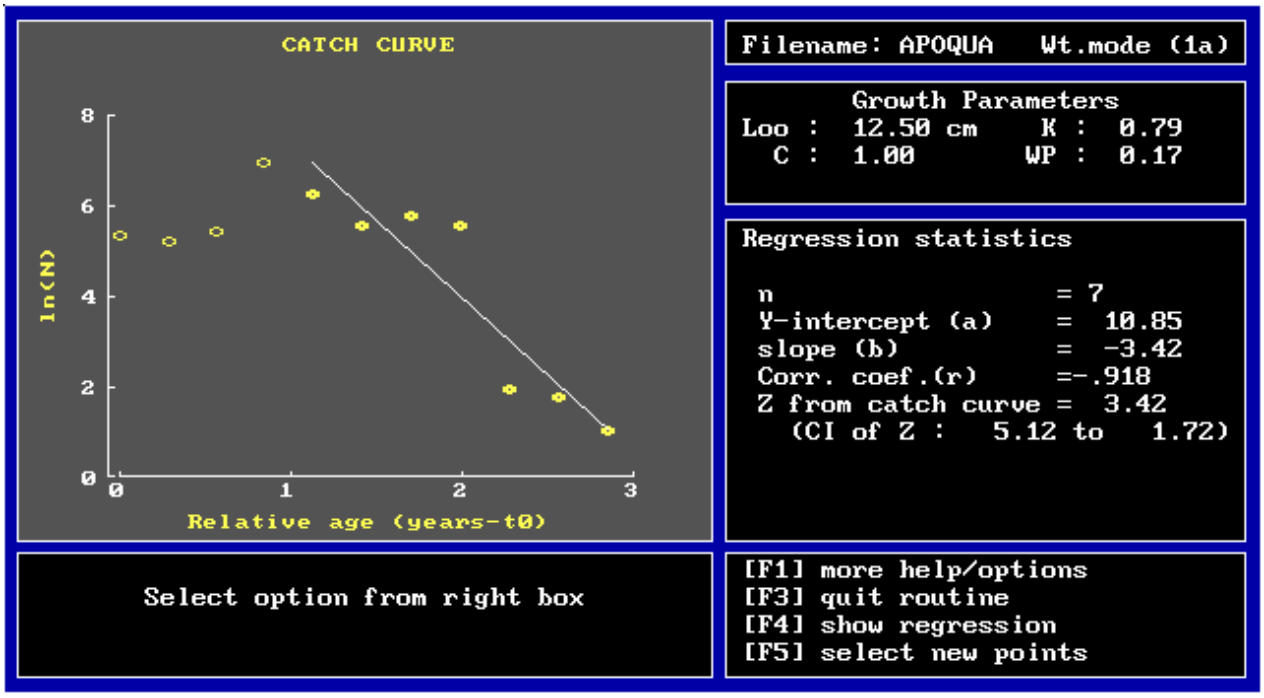

Figure 29. FiSAT estimate of the instantaneous rate of total mortality, Z for *A. fasciatus*. Trawl survey data stations 1-18.

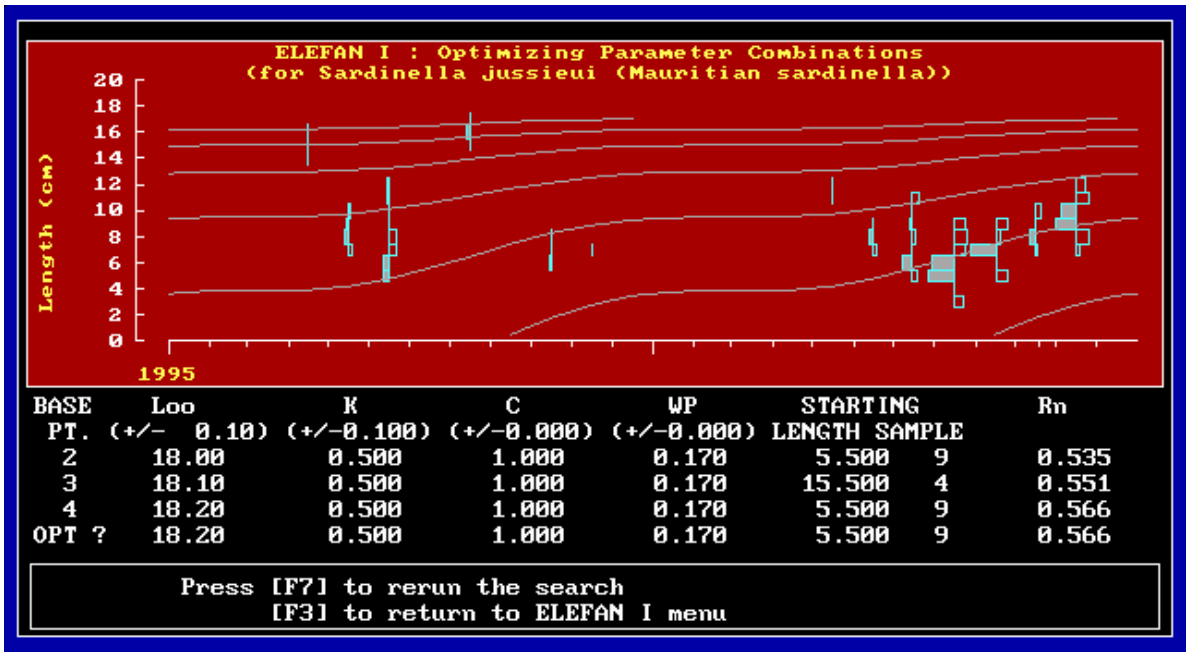

Figure 30. FiSAT Elefan scan of of K and L_∞ for *Sardinella jussieui*. Length frequencies from the purse seine sampling database and additional purse seine fishery data provided by S.F. Leung were included.

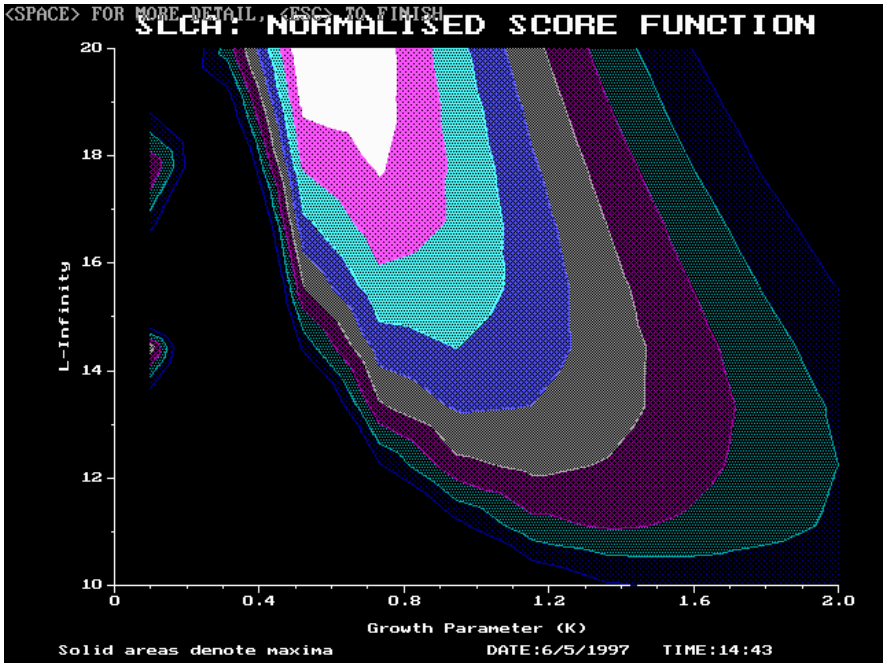

Figure 31. LFDA SLCA scan of K and L_∞ for *Sardinella jussieui*. Length frequencies from the purse seine samples, and additional purse seine fishery data provided by S.F. Leung, were included.

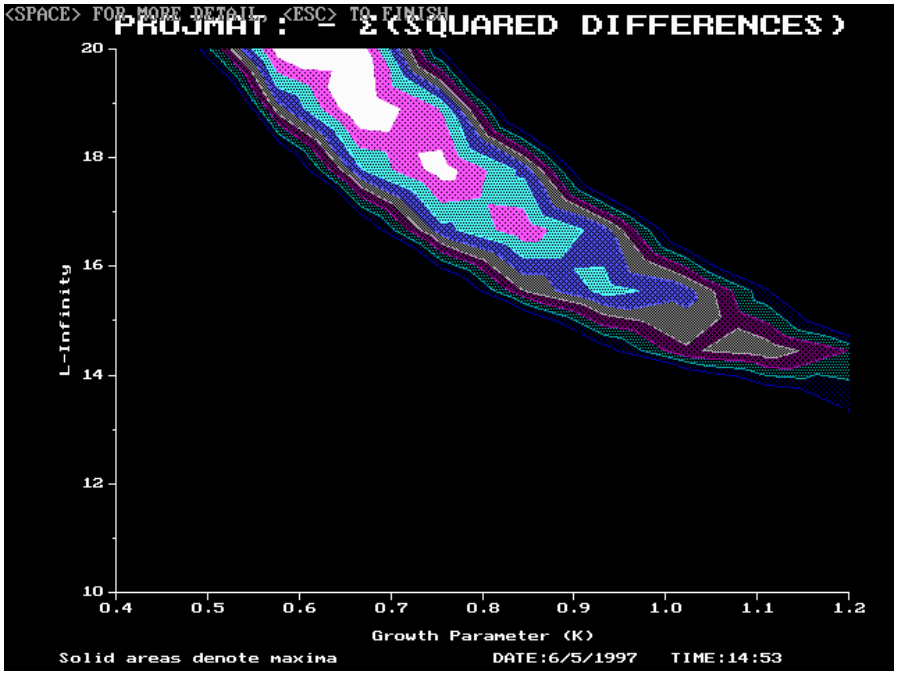

Figure 32. LFDA Projmat scan of K and L_∞ for *Sardinella jussieui*. Length frequencies from the purse seine samples, and additional purse seine fishery data provided by S.F. Leung, were included.

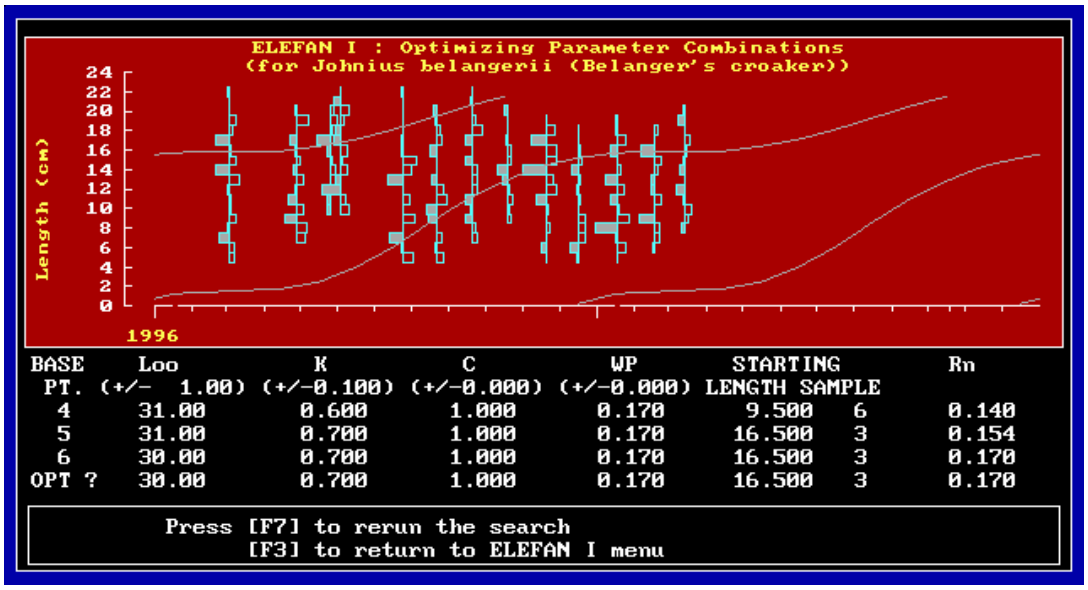

Figure 33. FiSAT Elefan automated search routine for estimates of K and L_∞ for *Johnius belangerii* based on can trawl sampling data stations 1=18.

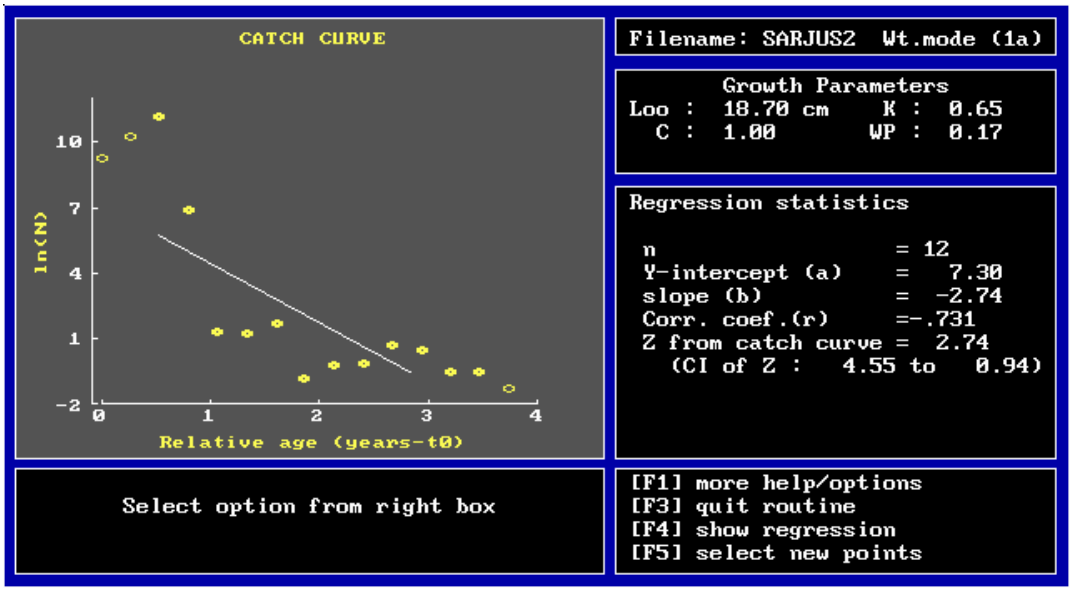

Figure 34. FiSAT estimate of the instantaneous rate of total mortality, Z for *S. jussieui*, based on purse seine sampling data and the commercial fishery.

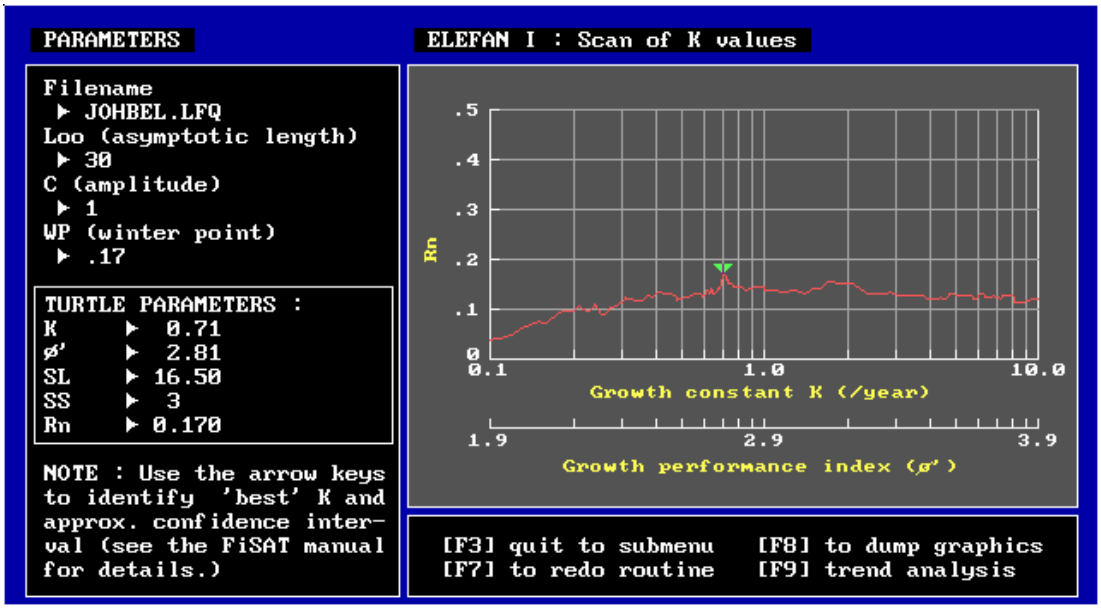

Figure 35. FiSAT Elefan scan of *K* for *Johnius belangerii*. Note the absence of any mode or peak in *K*.

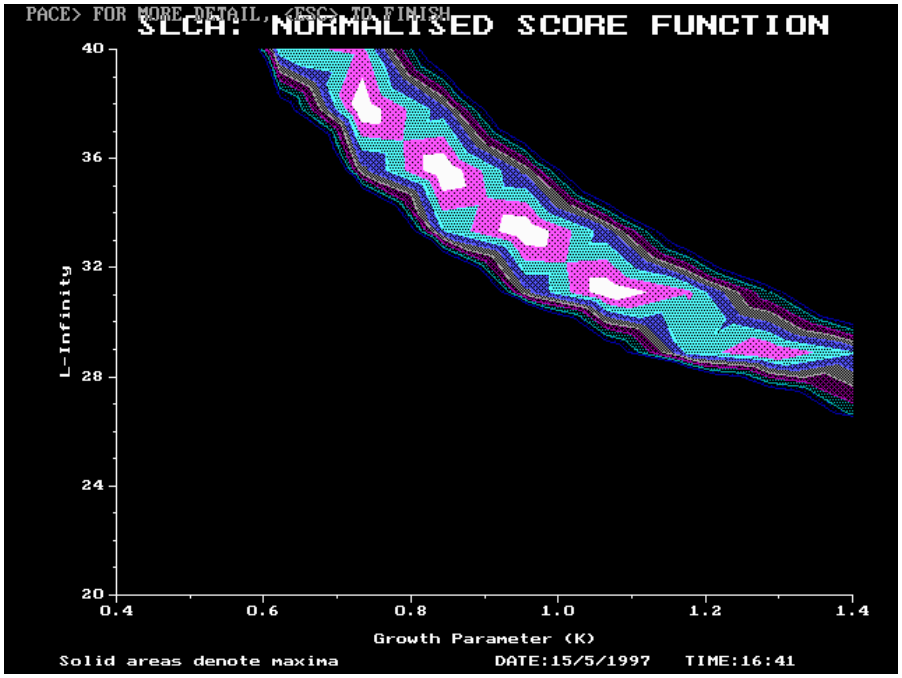

Figure 36. LFDA SLCA scan of *K* and $L\infty$ for *Johnius belangerii*, based on trawl sampling data stations 1-18.

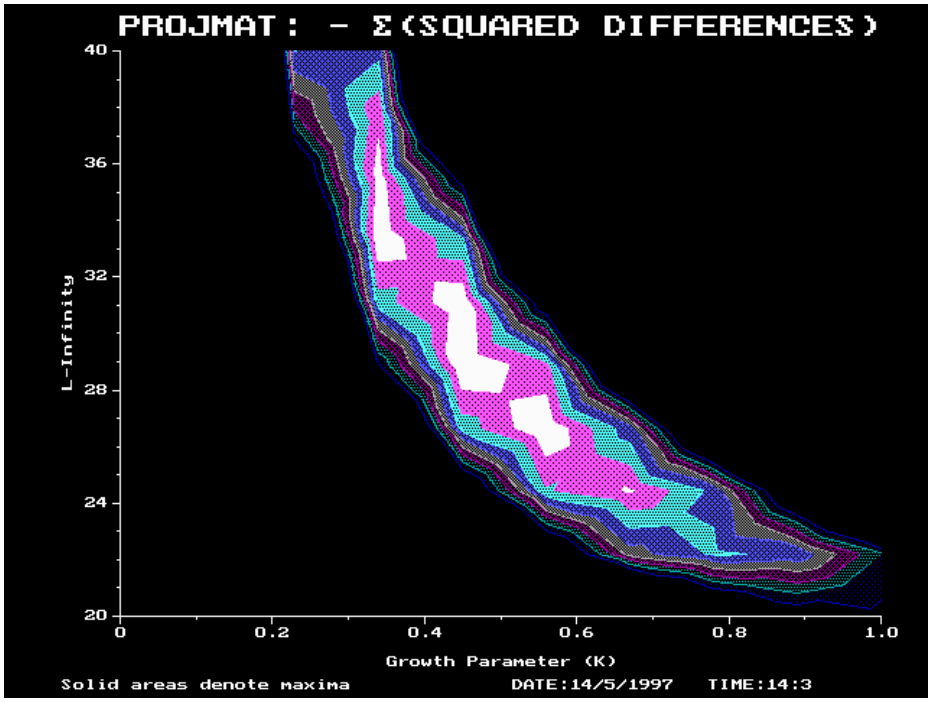

Figure 37. LFDA Projmat scan of K and $L\infty$ for *Johnius belangerii*, based on trawl sampling data stations 1-18.

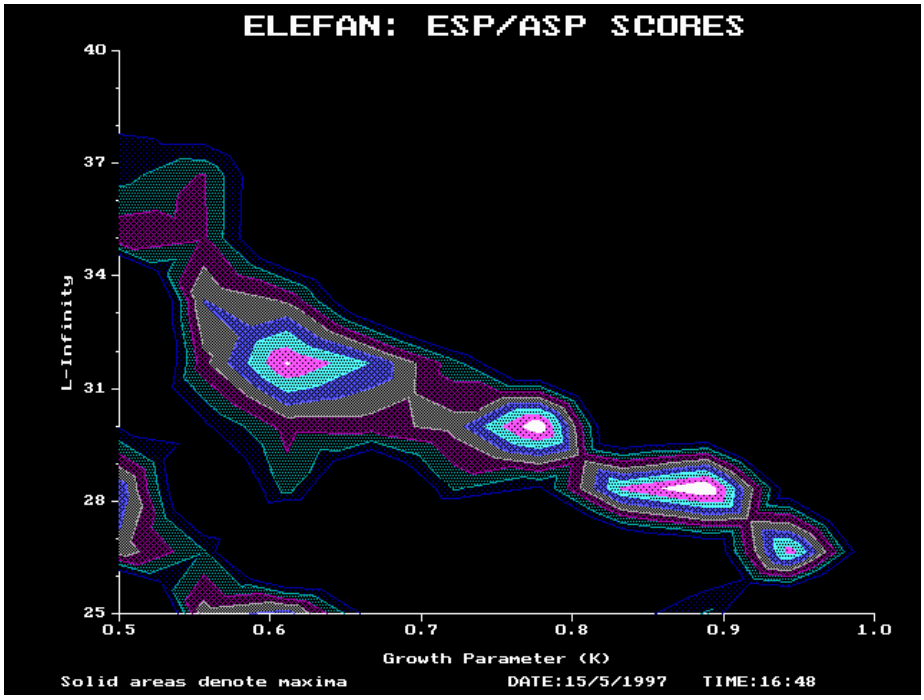

Figure 38. LFDA Elefan scan of K and L_∞ for *Johnius belangerii*, based on trawl sampling data stations 1-18.

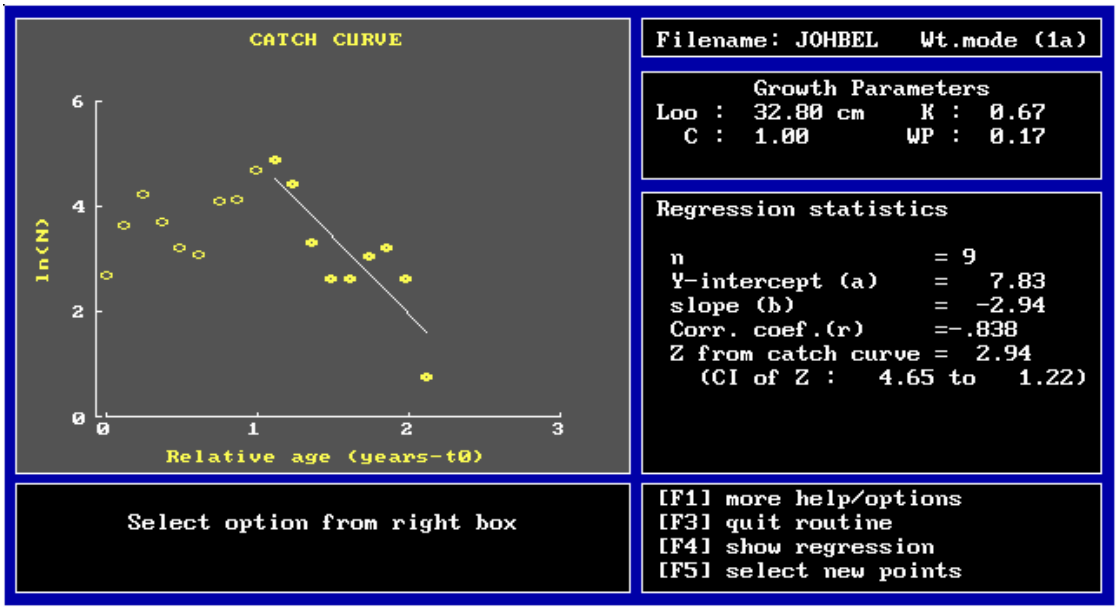

Figure 39. FiSAT Elefan estimate of *Z* for *Johnius belangerii*, based on trawl sampling data stations 1-18.

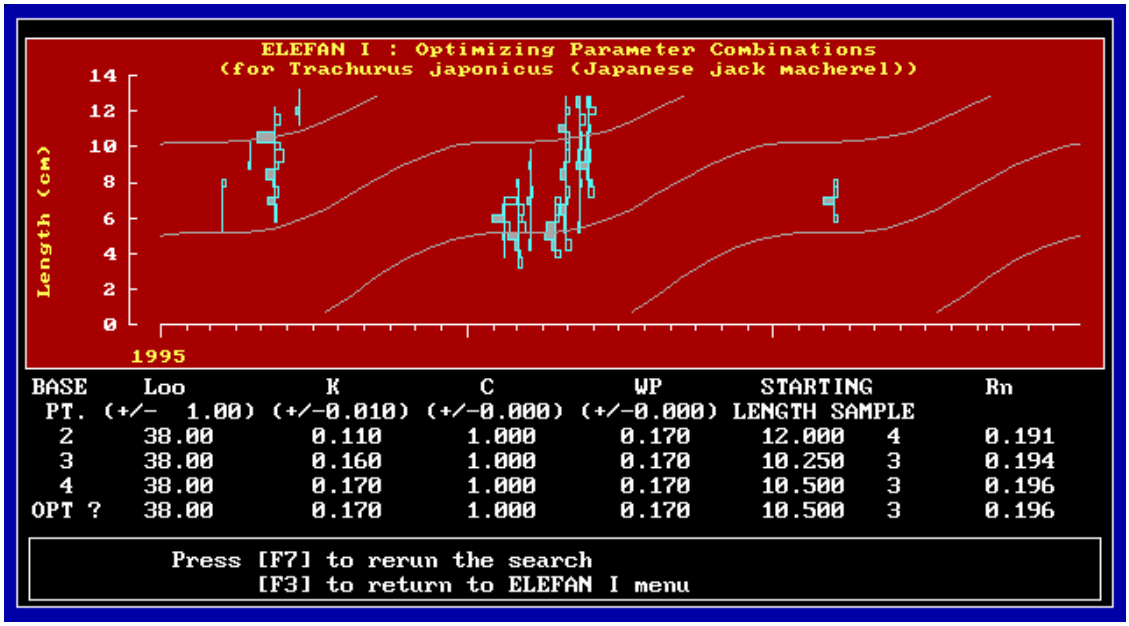

Figure 40. FiSAT Elefan scan of *K* and L_∞ for *Trachurus japonicus*, based on combination of length frequency distributions obtained from the purse seine samples and the commercial purse seine data provided by S. F. Leung.

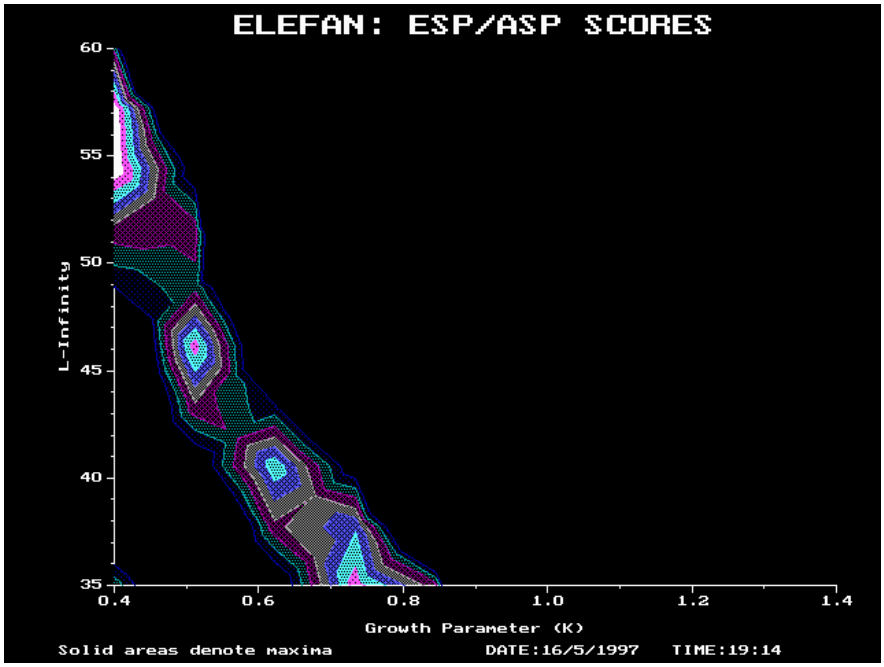

Figure 41. LFDA Elefan scan of K and L_∞ for *Trachurus japonicus*, based on combination of length frequency distributions obtained from the purse seine samples and the commercial purse seine data provided by S. F. Leung.

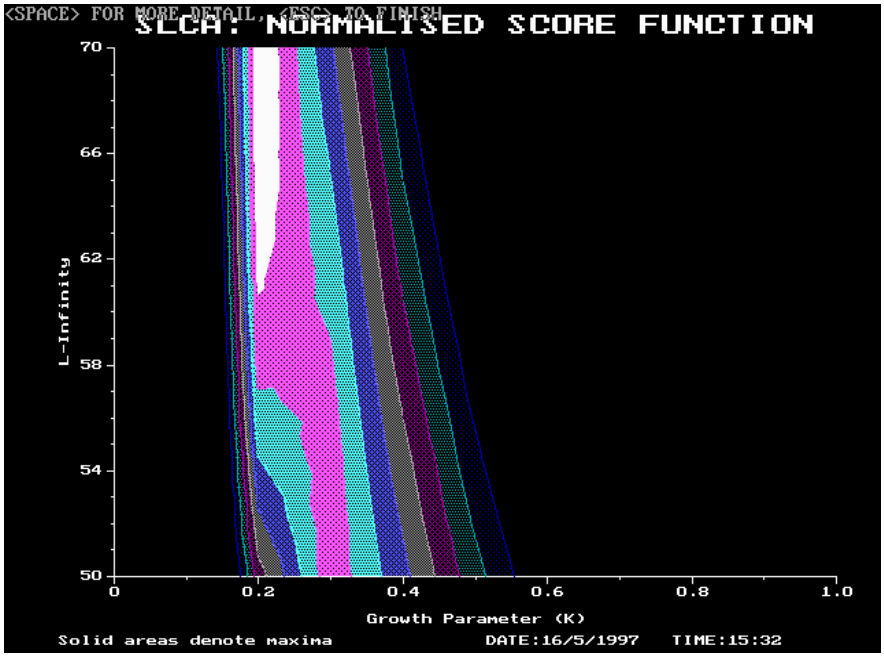

Figure 42. LFDA FiSAT Elefan scan of K and L_∞ for *Trachurus japonicus*, based on combination of length frequency distributions obtained from the purse seine samples and the commercial purse seine data provided by S. F. Leung.

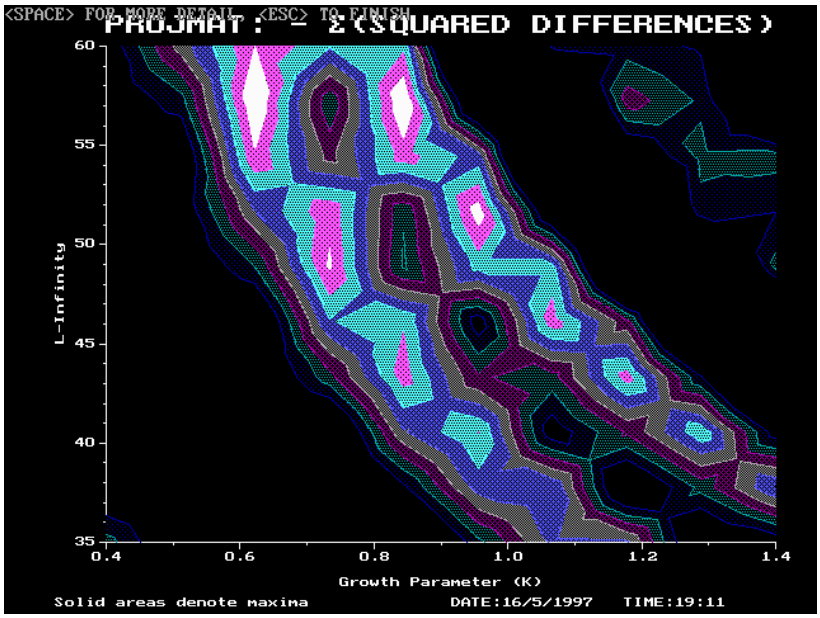

Figure 43. LFDA Projmat scan of K and L_∞ for *Trachurus japonicus*, based on combination of length frequency distributions obtained from the purse seine samples and the commercial purse seine data provided by S. F. Leung.

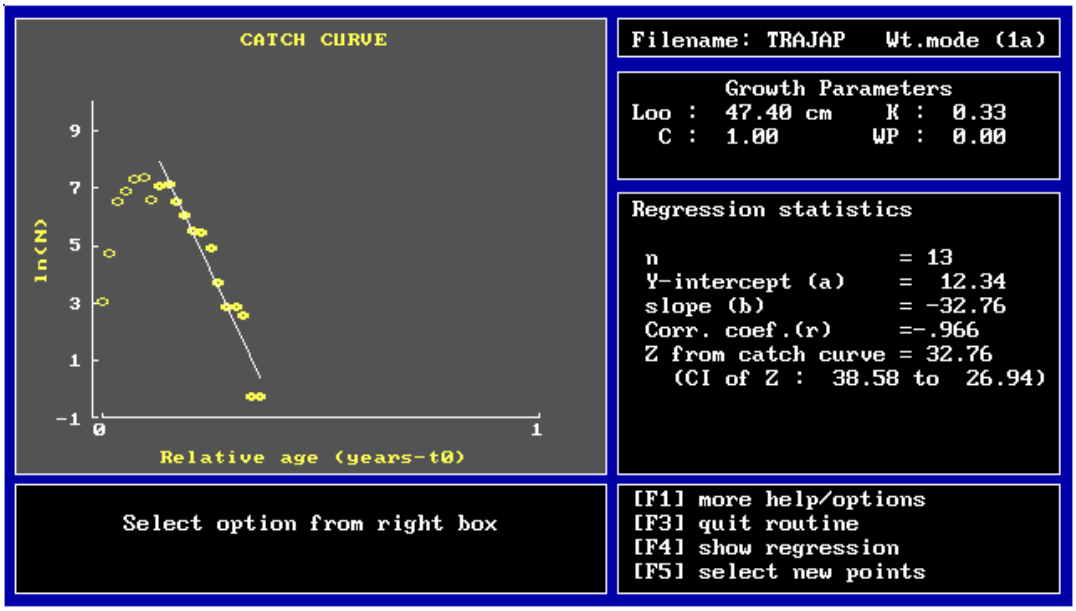

Figure 44. FiSAT Elefan estimate of Z for *Trachurus japonicus*, based on combination of length frequency distributions obtained from the purse seine samples and the commercial purse seine data provided by S. F. Leung.

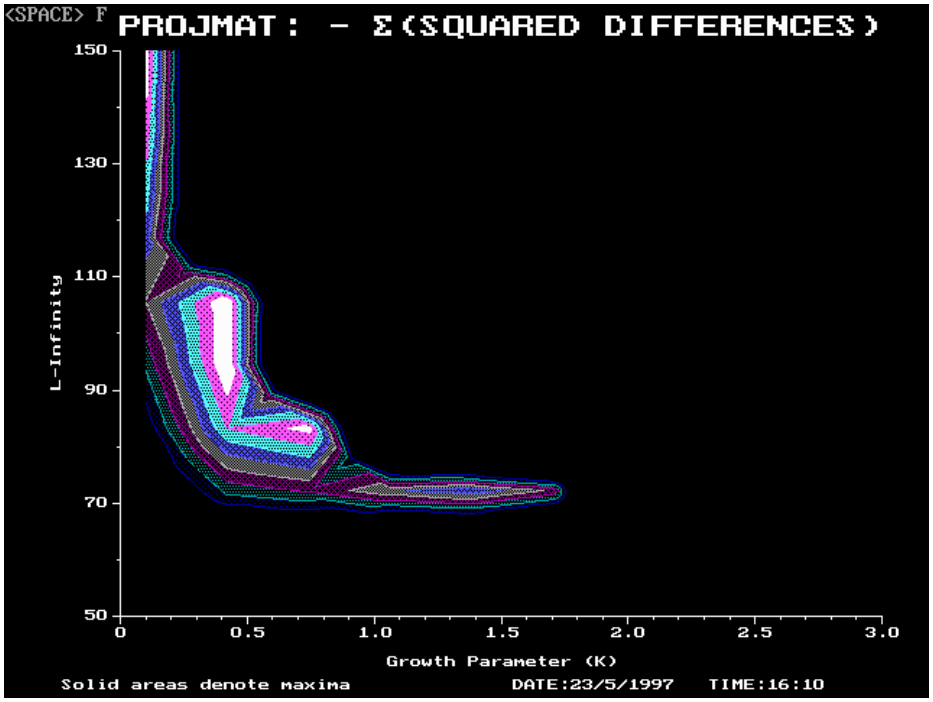

Figure 45. LFDA Projmat scan of K and L_∞ for *Trichiurus lepterus*, based on the purse seine fishery data provided by S. F. Leung

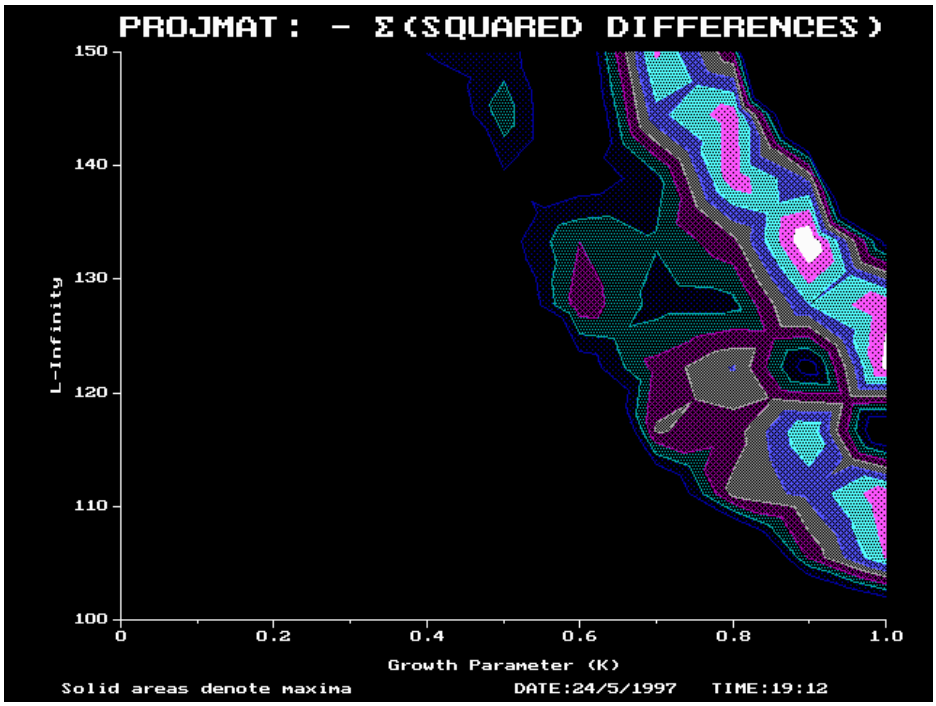

Figure 46. LFDA Projmat scan of K and L_∞ for *Trichiurus lepterus*, based on the benthic trawl sampling data, stations 1-18.

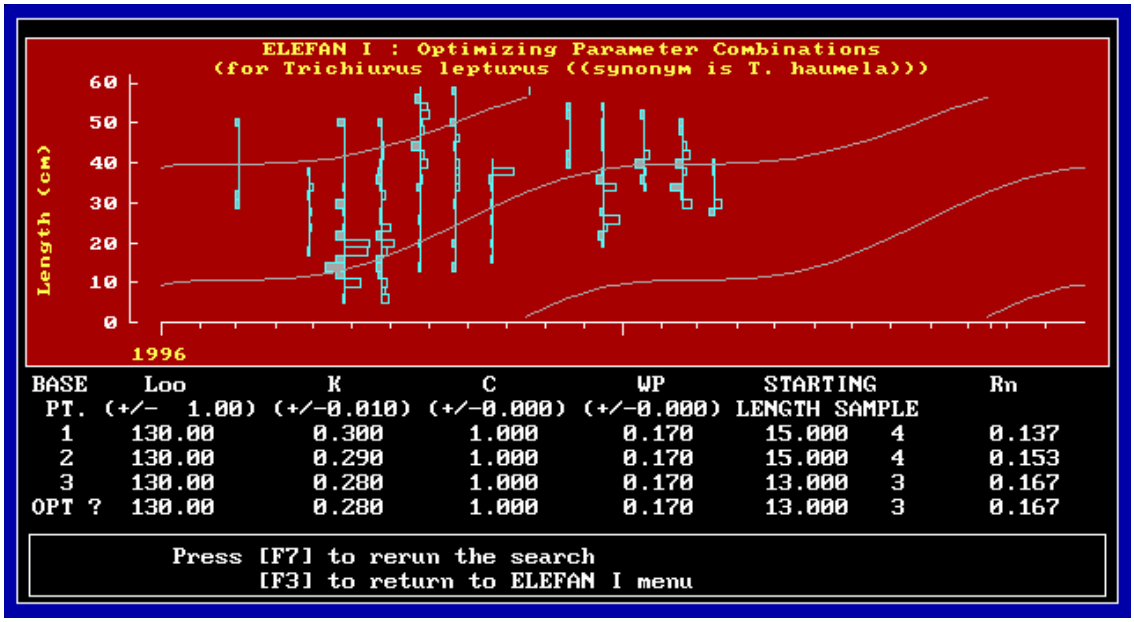

Figure 47. FiSAT Elefan automated search routine for K and L_∞ for *Trichiurus lepterus*, based on the purse seine fishery data provided by S. F. Leung

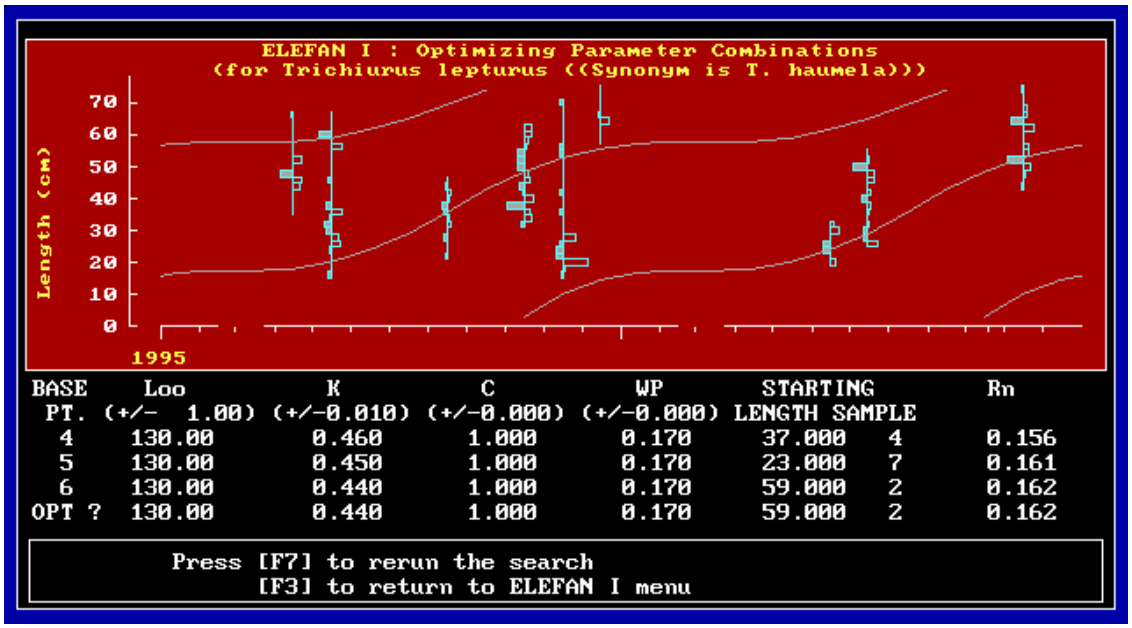

Figure 48. FiSAT Elefan automated search routine for K and L_∞ for *Trichiurus lepterus*, based on benthic trawl sampling data stations 1-18.

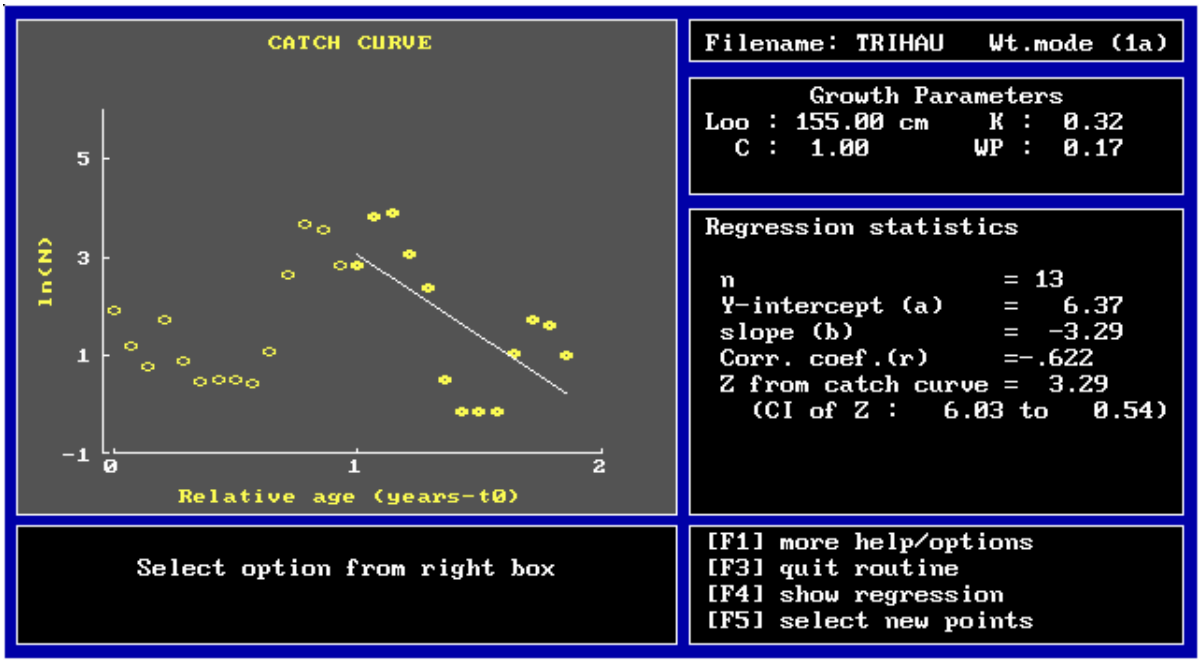

Figure 49. FiSAT Elefan estimate of Z for *Trichiurus lepterus*, based on trawl sampling data from stations 1-18.

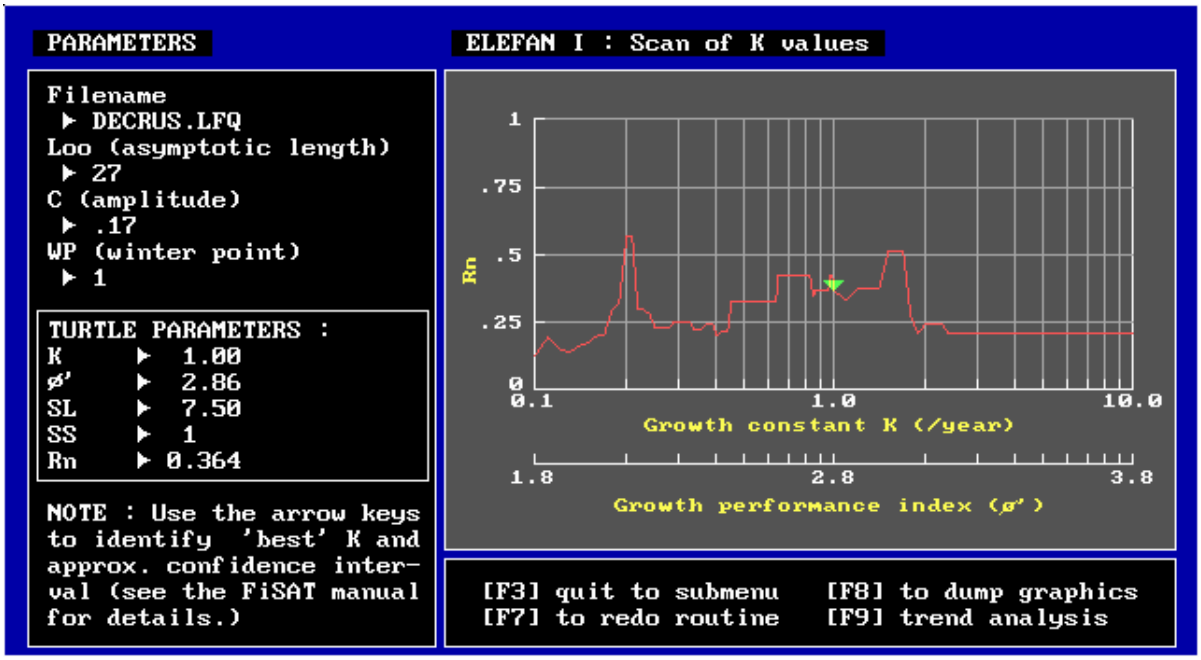

Figure 50. FiSAT Elefan scan of K values for a given estimate of L_∞ for *Decapterus russelli*. Length frequency distributions are from the trawl sampling survey stations 1-18.

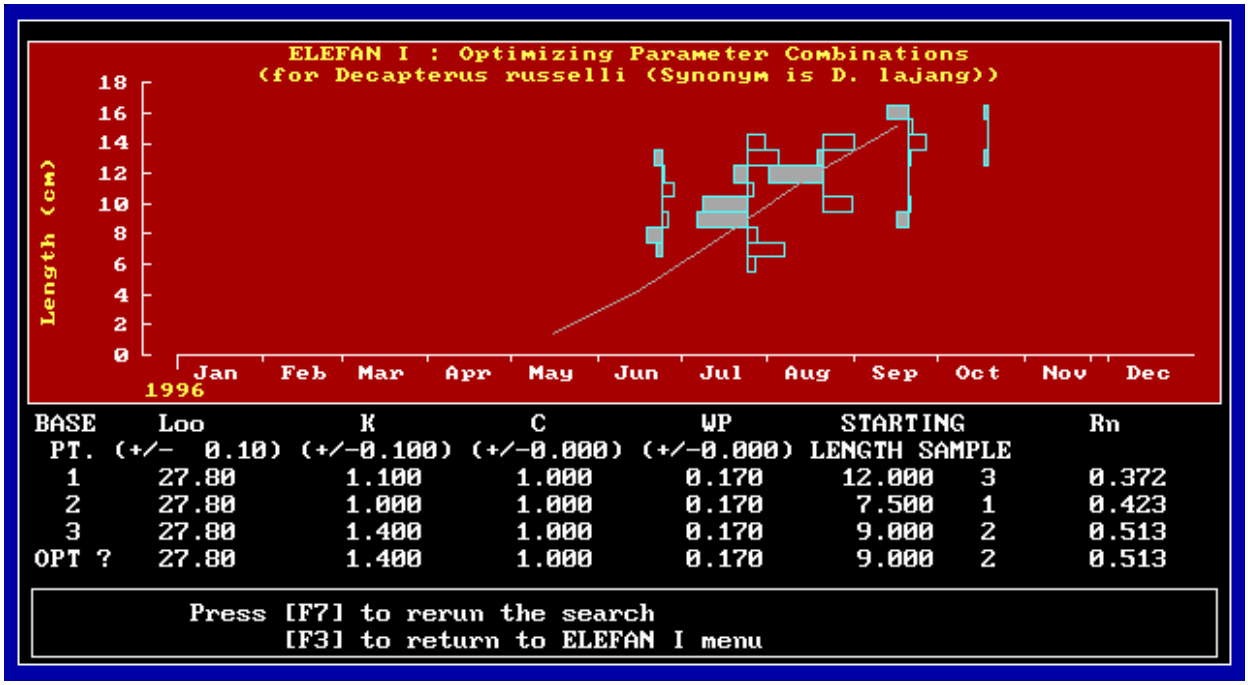

Figure 51. FiSAT Elefan automated search routine for K and L_∞ for *D. russelli*, based on trawl sample stations 1-18.

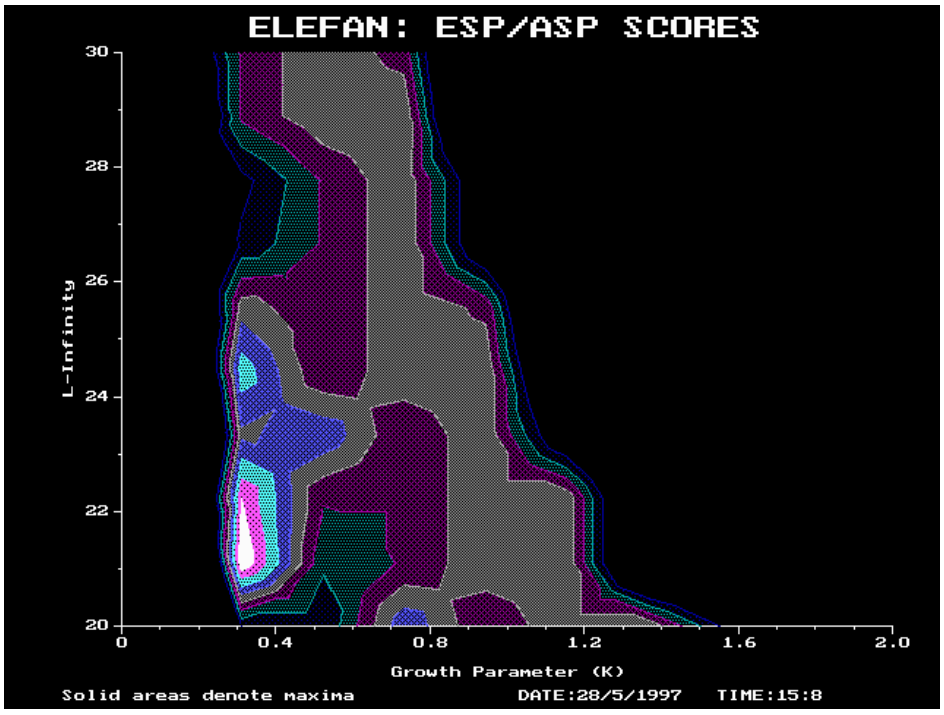

Figure 52. LFDA Elefan scan of K and L_∞ for *D. russelli*, based on trawl sample stations 1-18.

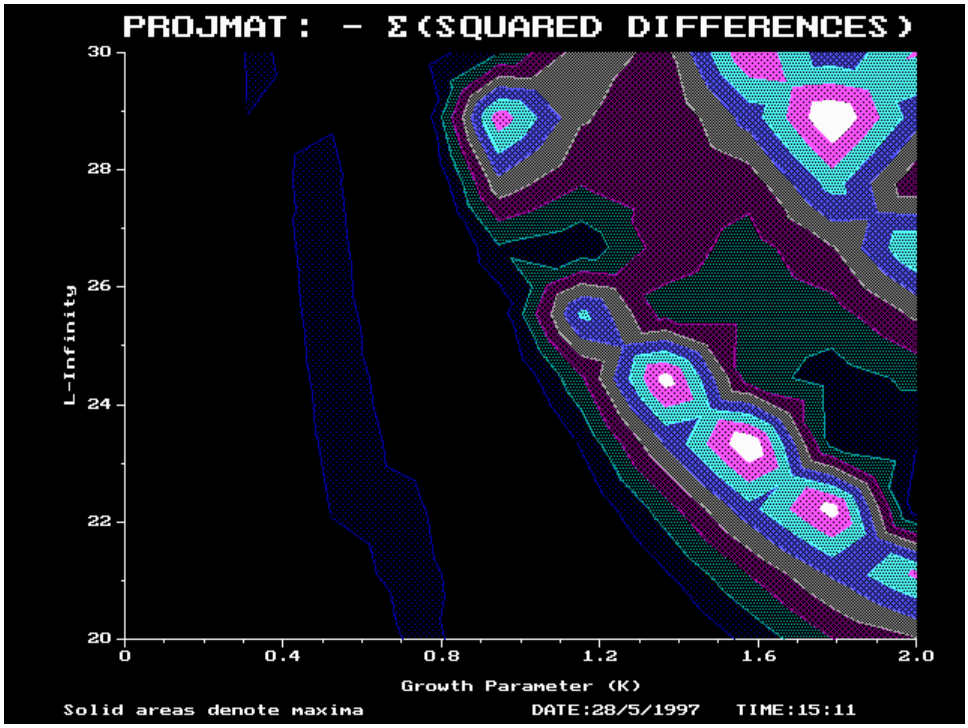

Figure 53. LFDA Projmat scan of K and L_∞ for *D. russelli*, based on trawl sample stations 1-18.

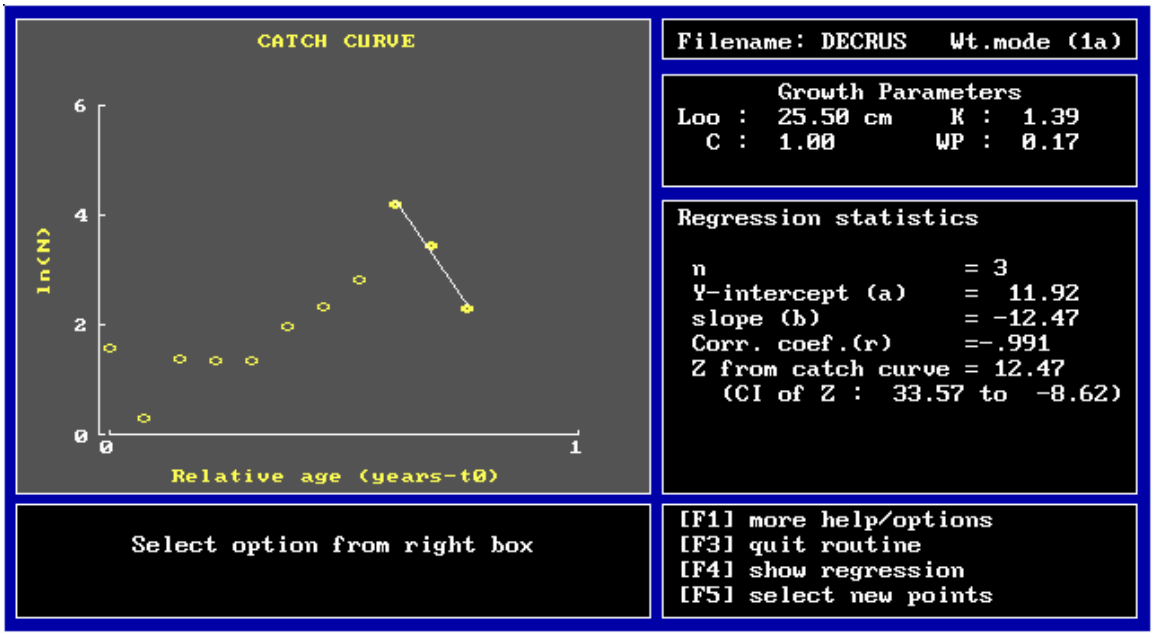

Figure 54. FiSAT Elefan estimate of Z for *Decapterus russelli*, based on length frequency distributions obtained from trawl sampling stations 1-18.

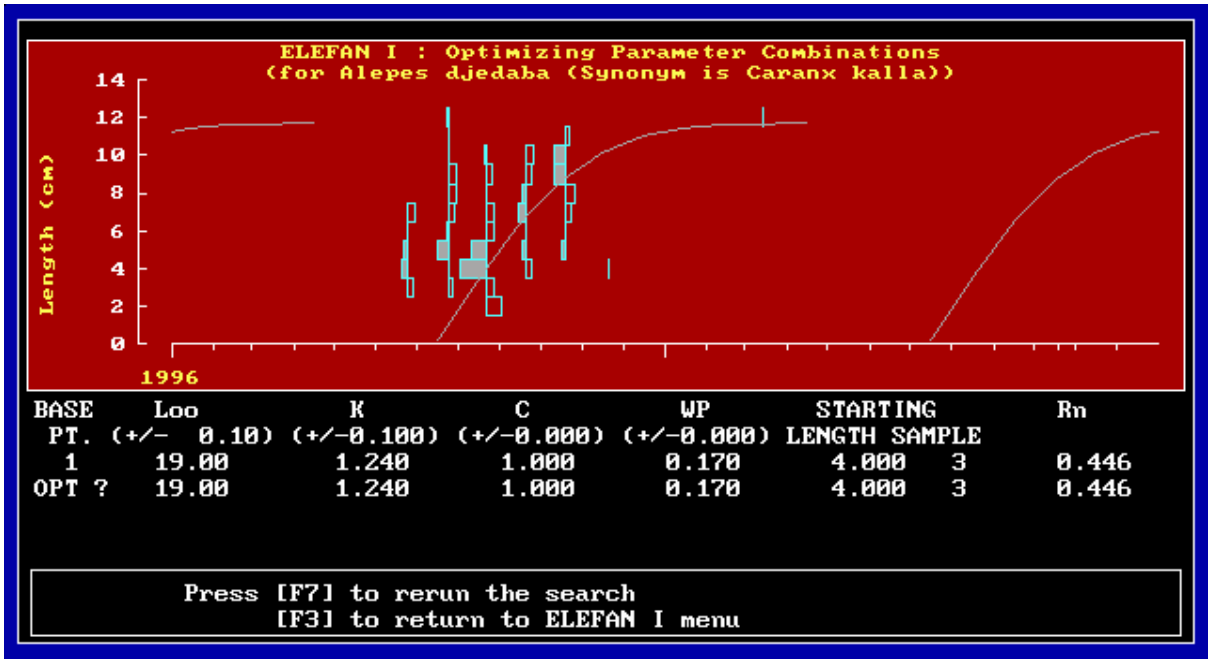

Figure 55. FiSAT Elefan automated scan of K and L_∞ for *Alepes djedaba* based on trawl sampling data stations 1-18.

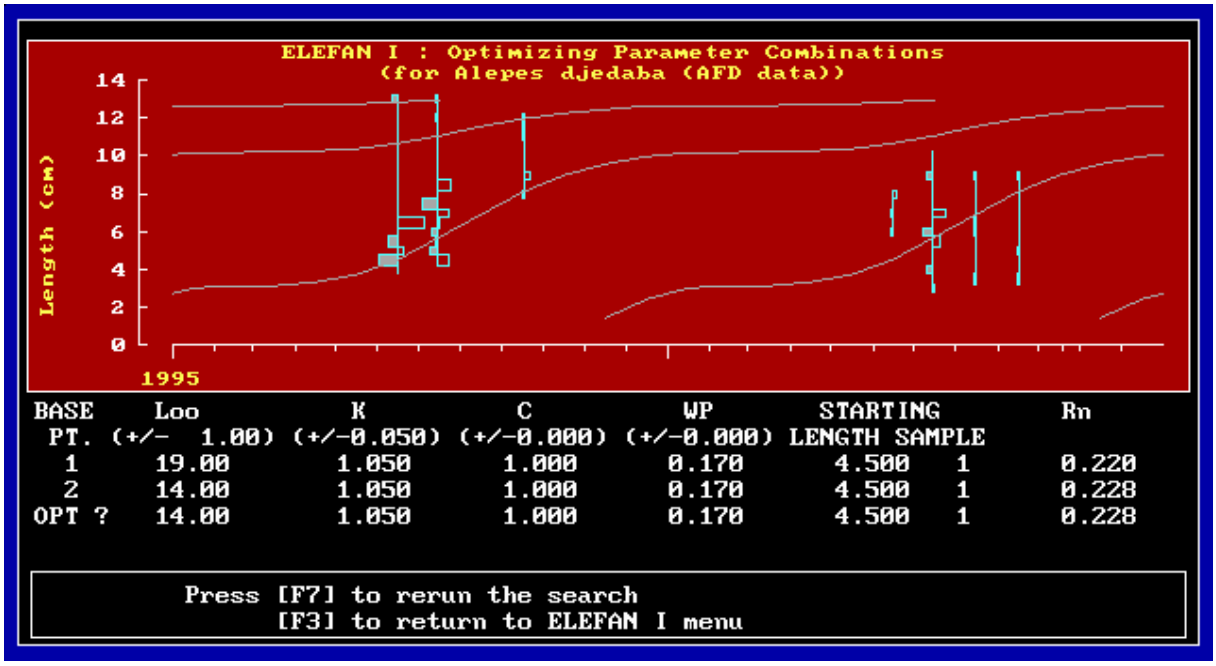

Figure 56. FiSAT Elefan automated scan of K and L_∞ for *Alepes djedaba* based commercial purse seine samples for 1995-1996 provided by S.F. Leung.

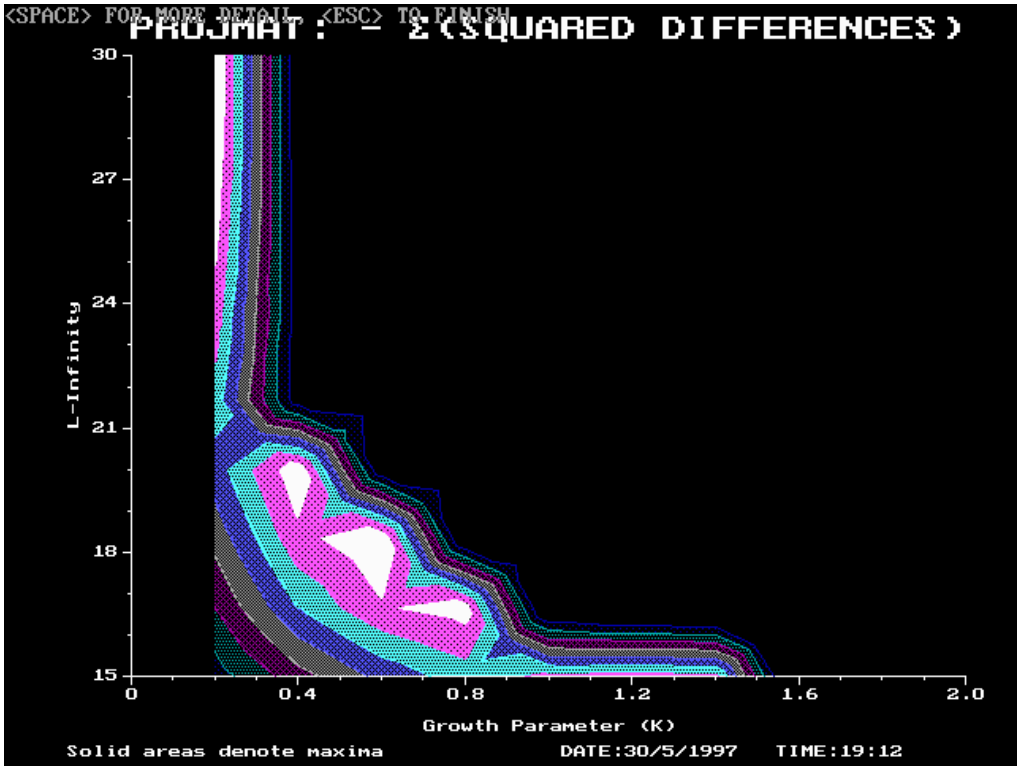

Figure 57. LFDA Projmat search of K and L_∞ for *Alepes djedaba* based on trawl sampling data stations 1-18.

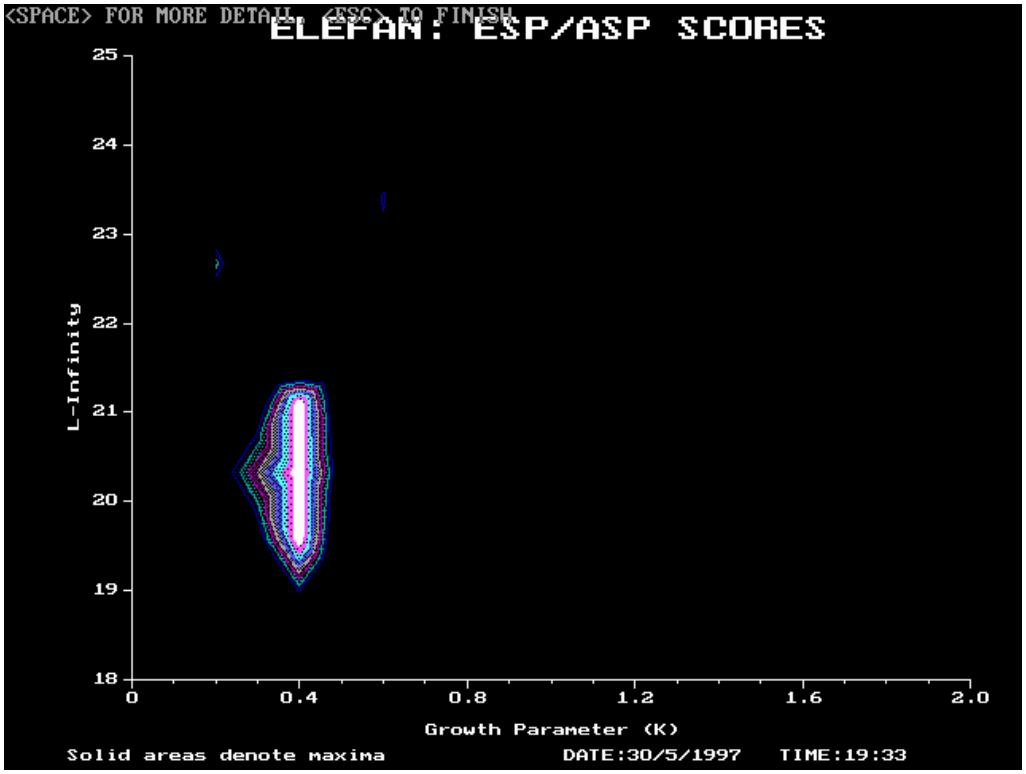

Figure 58. LFDA Elefan search of K and L_∞ for *Alepes djedaba* based on trawl sampling data stations 1-18.

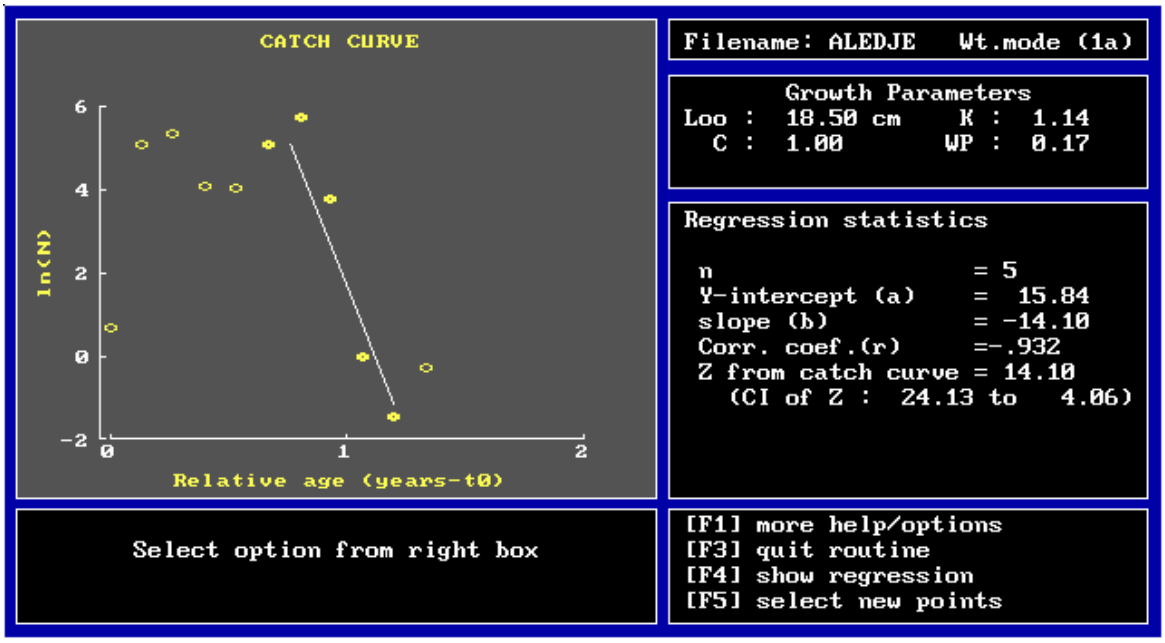

Figure 59. FiSAT estimate of *Z* for *Alepes djedaba* using the length converted catch curve method and trawl sampling data from stations 1-18.

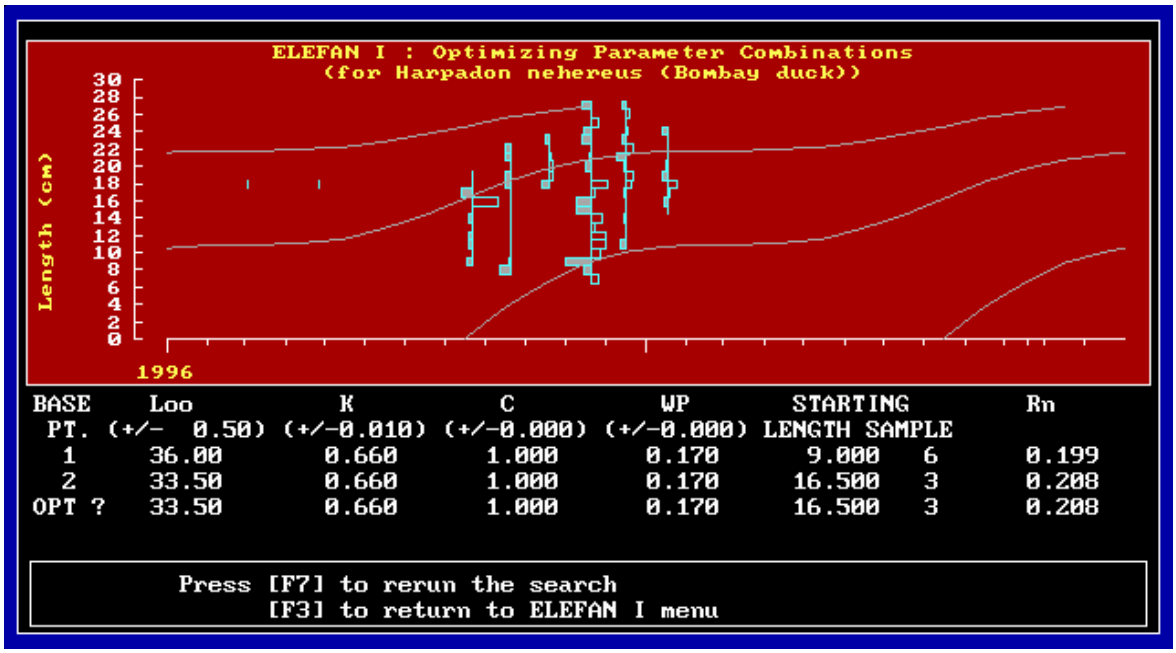

Figure 60. FiSAT Elefan automated search routine for K and L_∞ for *Harpadon nehereus* based on trawl sampling data stations 1-18.

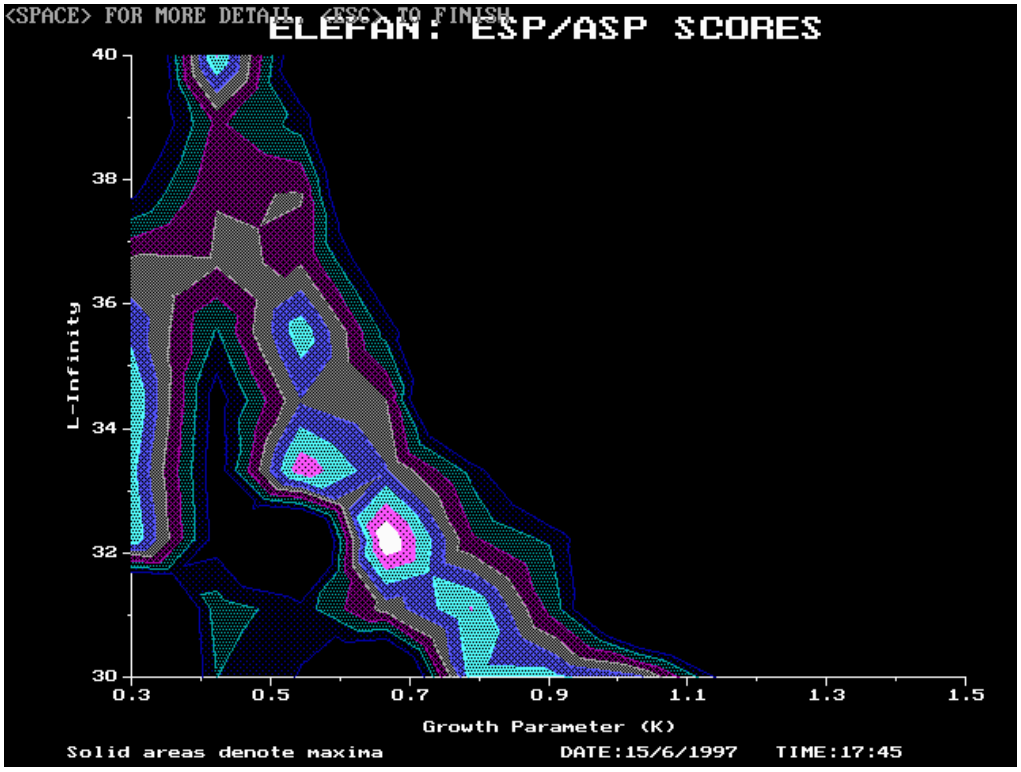

Figure 61. LFDA Elefan scan of K and L_∞ values for *Harpadon nehereus* based on trawl sampling data stations 1-18

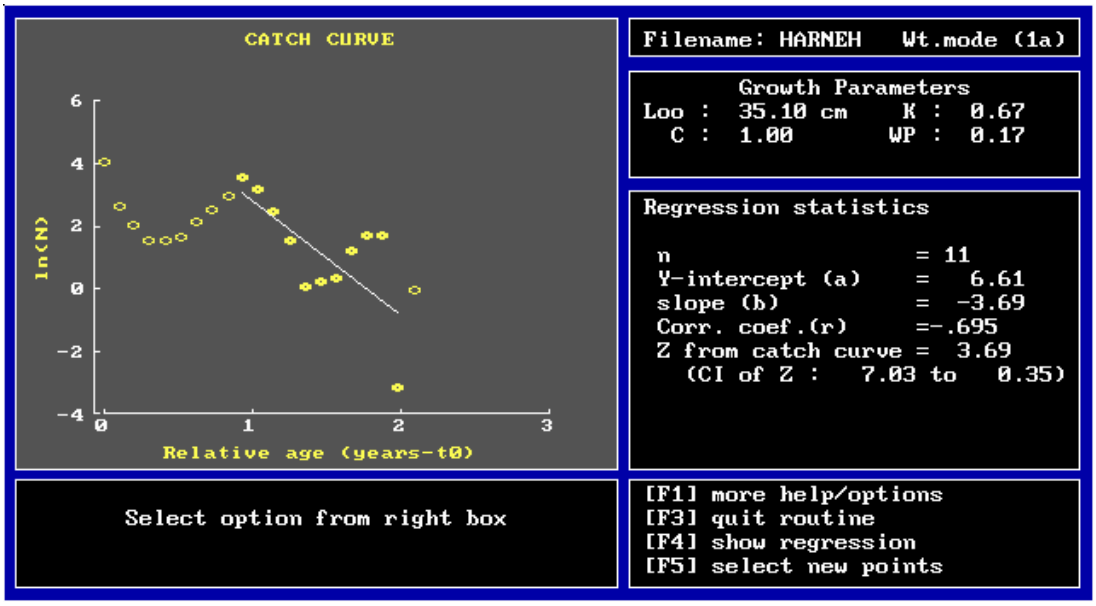

Figure 62. FiSAT Elefan length converted catch curve estimate of Z for *Harpadon nehereus* based on trawl sampling data stations 1-18.

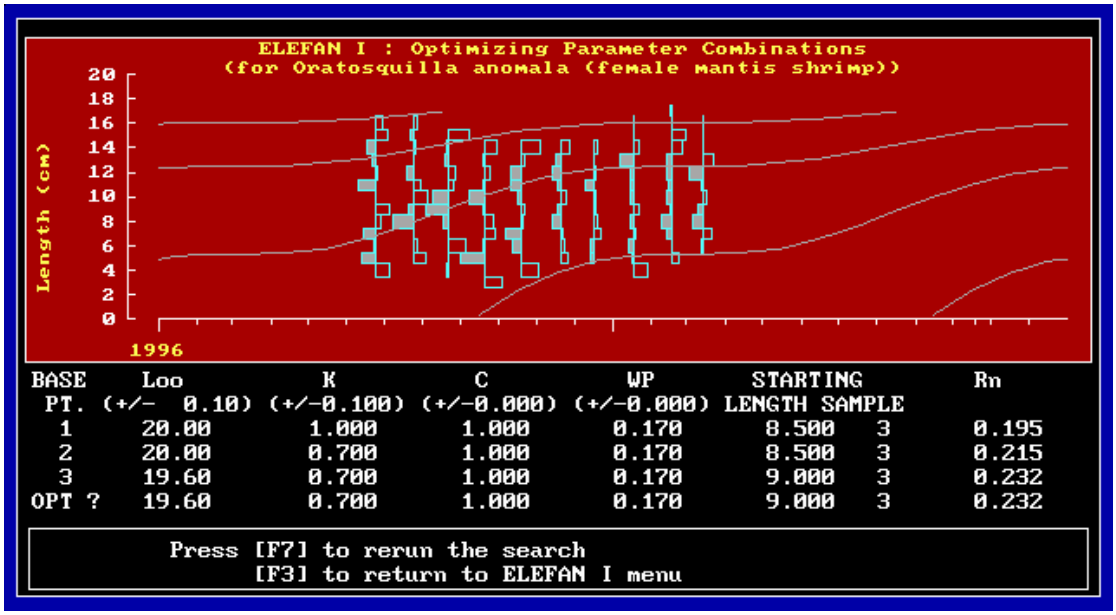

Figure 63. Elefan FiSAT automated scan of K and L_∞ for female *Oratosquilla anomala*, based on trawl sampling data stations 1-18.

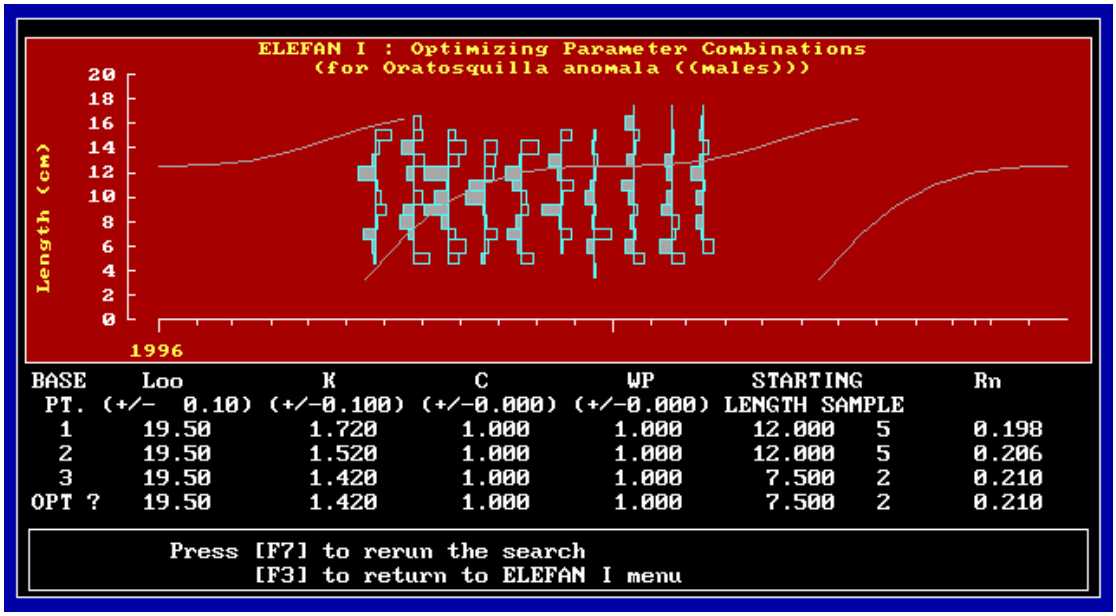

Figure 64. Elefan FiSAT automated scan of K and L_∞ for male *Oratosquilla anomala*, based on trawl sampling data stations 1-18.

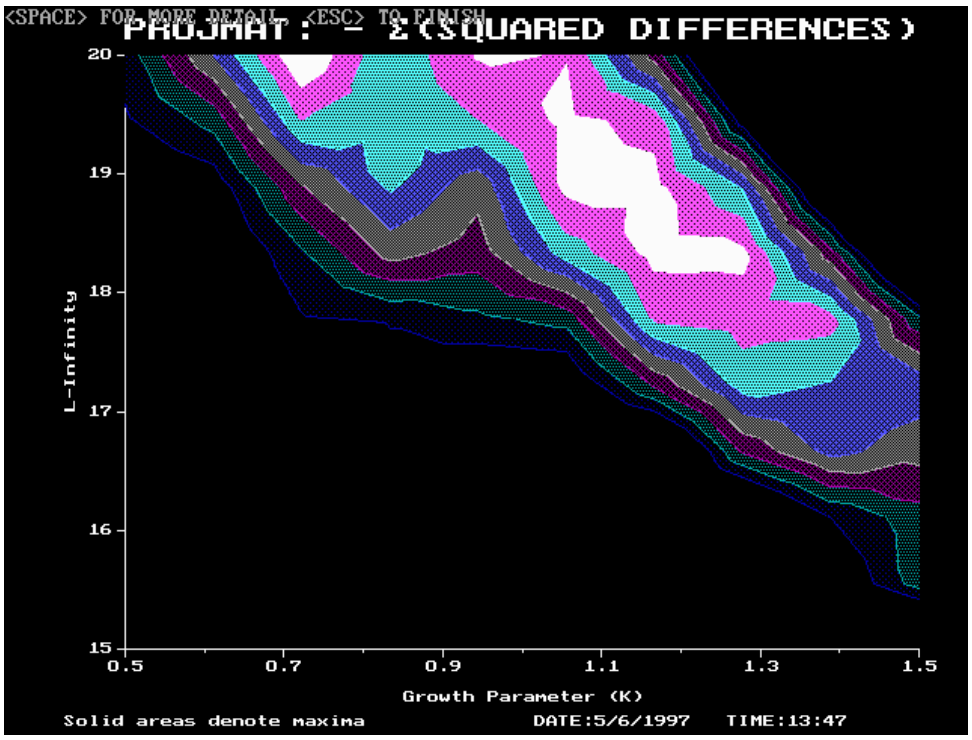

Figure 65. LFDA Projmat scan of K and L_∞ for female *Oratosquilla anomala*, based on trawl sampling data stations 1-18.

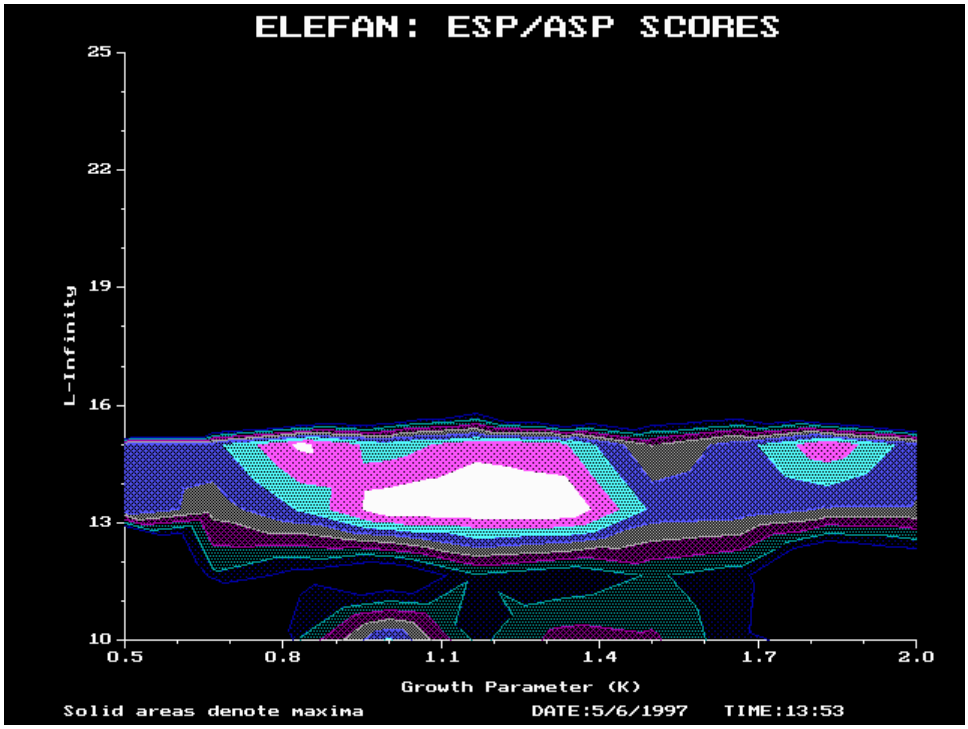

Figure 66. LFDA Elefan scan of K and L_∞ for female *Oratosquilla anomala*, based on trawl sampling data stations 1-18

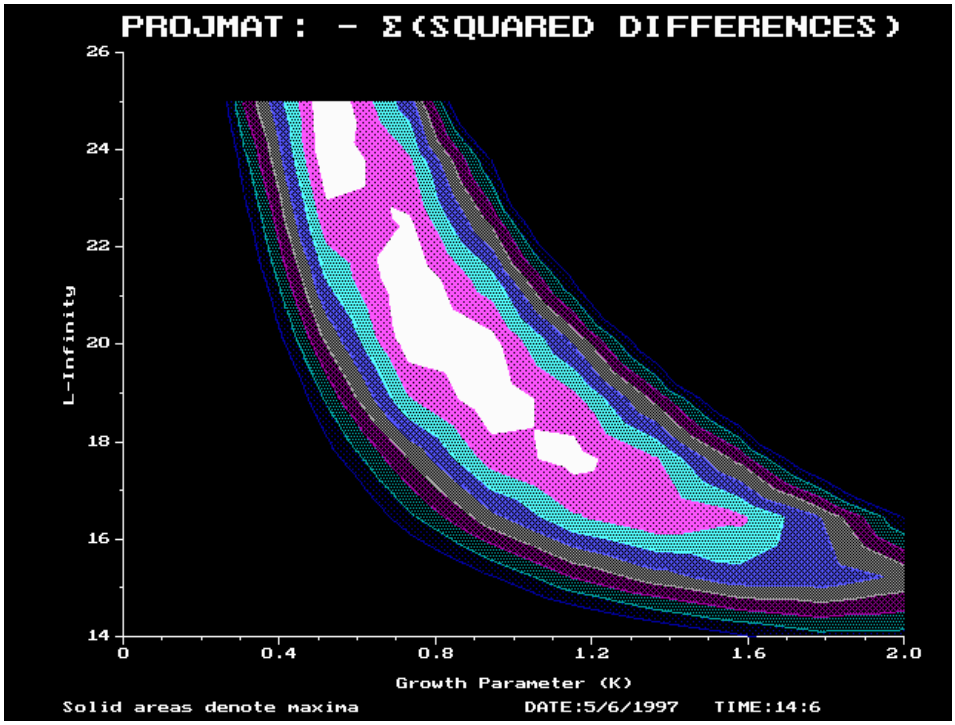

Figure 67. LFDA Projmat scan of K and L_∞ for male *Oratosquilla anomala*, based on trawl sampling data stations 1-18.

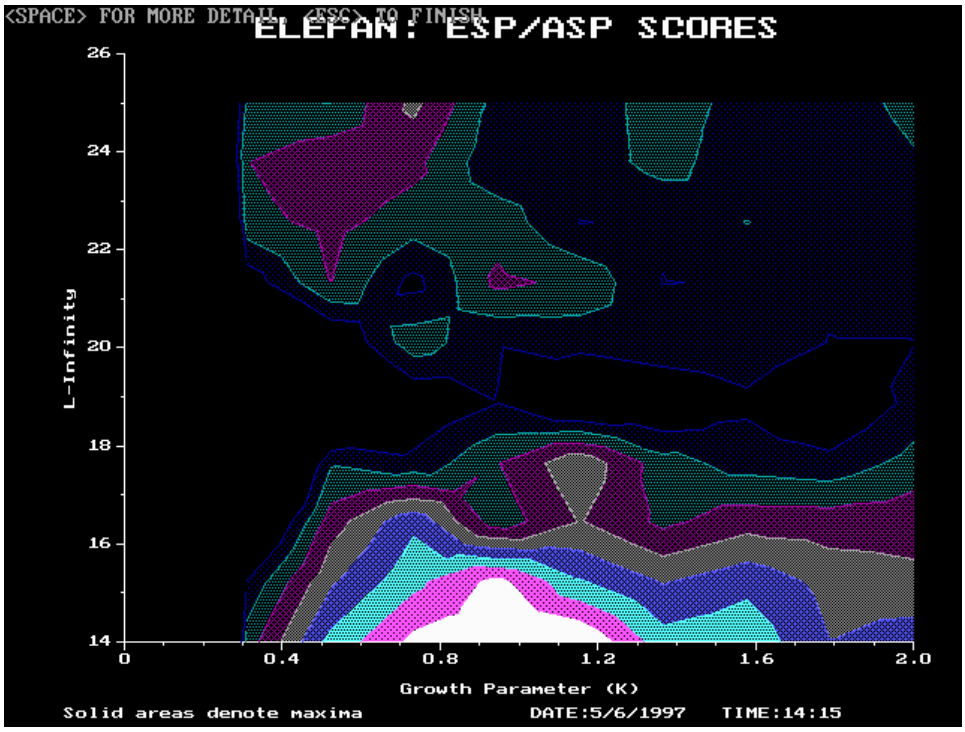

Figure 68. LFDA Elefan scan of K and L_∞ for male *Oratosquilla anomala*, based on trawl sampling data stations 1-18.

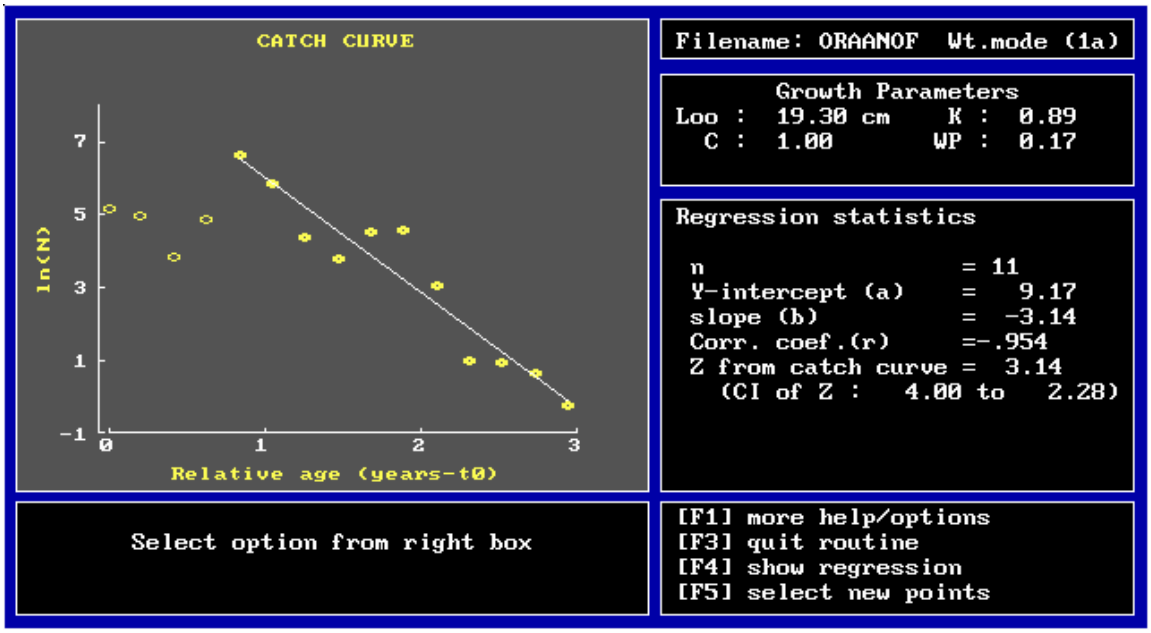

Figure 69. FiSAT Elefan length converted catch method estimation of *Z* for female *Oratosquilla anomala*, based on trawl sampling data stations 1-18.

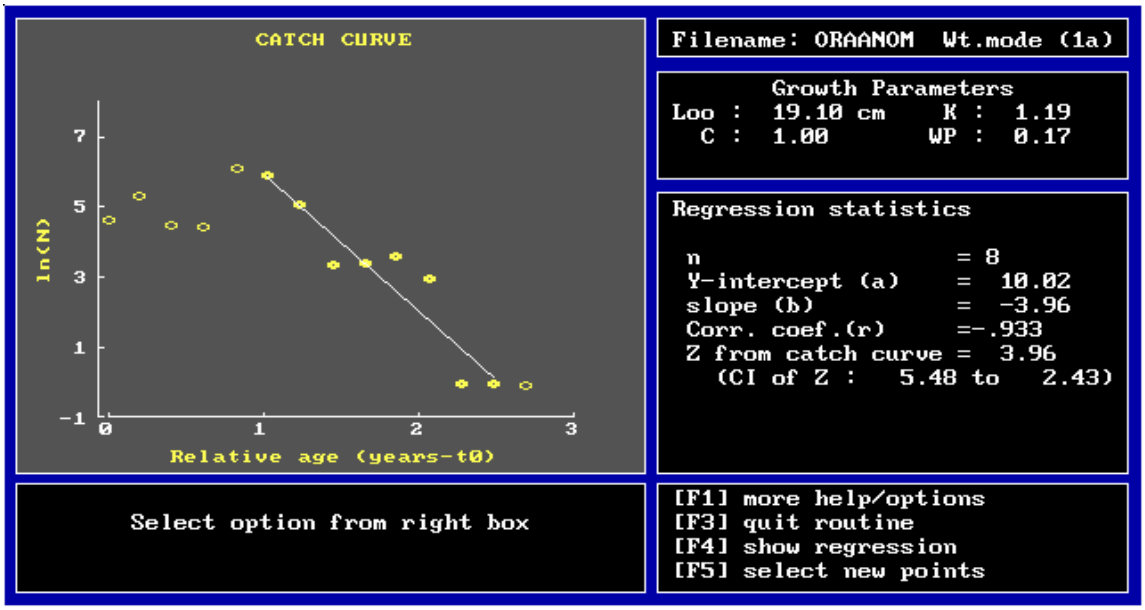

Figure 70. FiSAT Elefan length converted catch method estimation of *Z* for male *Oratosquilla anomala*, based on trawl sampling data stations 1-18.

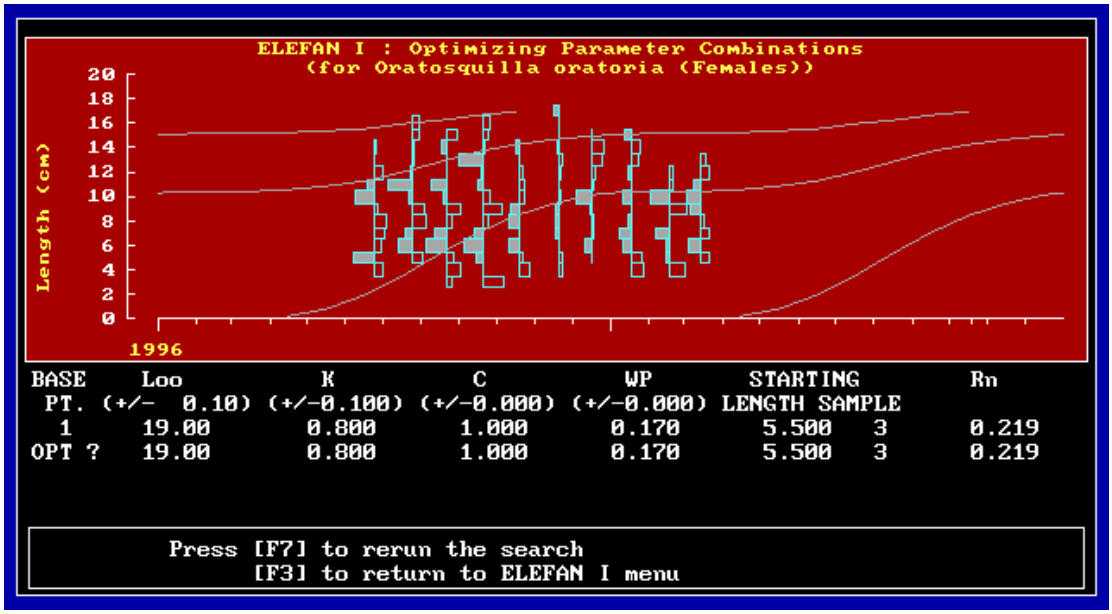

Figure 71. FiSAT Elefan automated scan of K and L_∞ for female *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

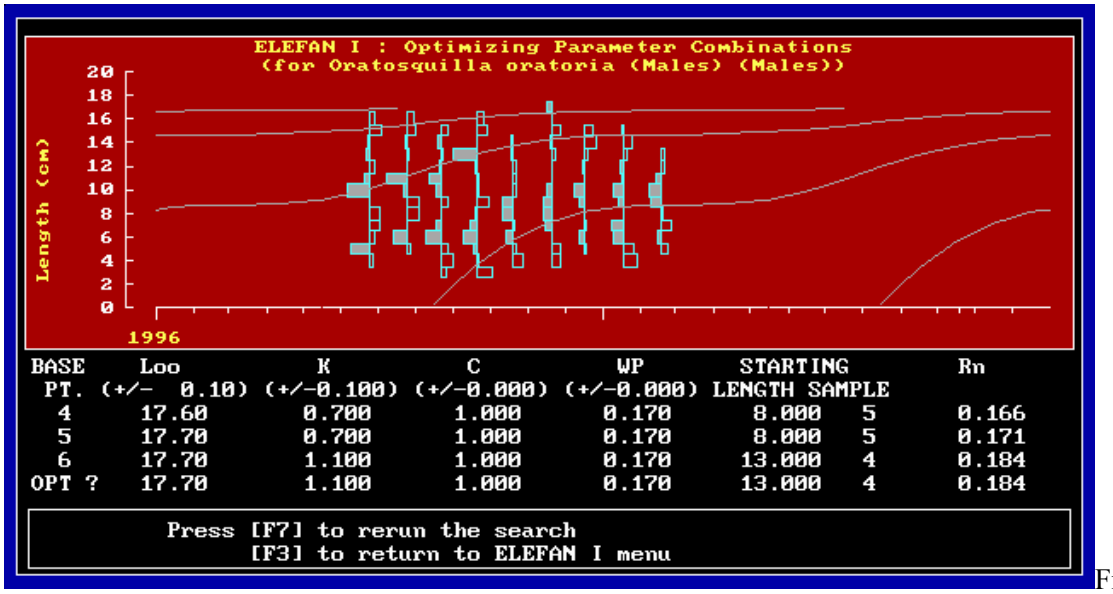

Figure 72. FiSAT Elefan automated scan of K and L_∞ for male *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

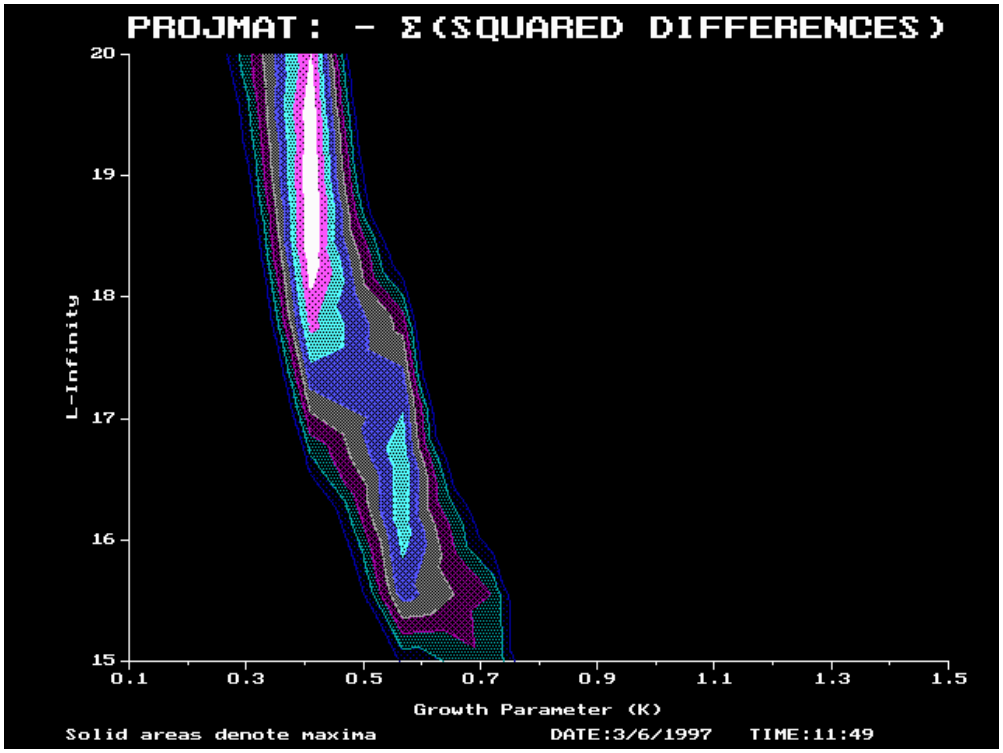

Figure 73. LFDA Projmat scan of K and L_∞ for female *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

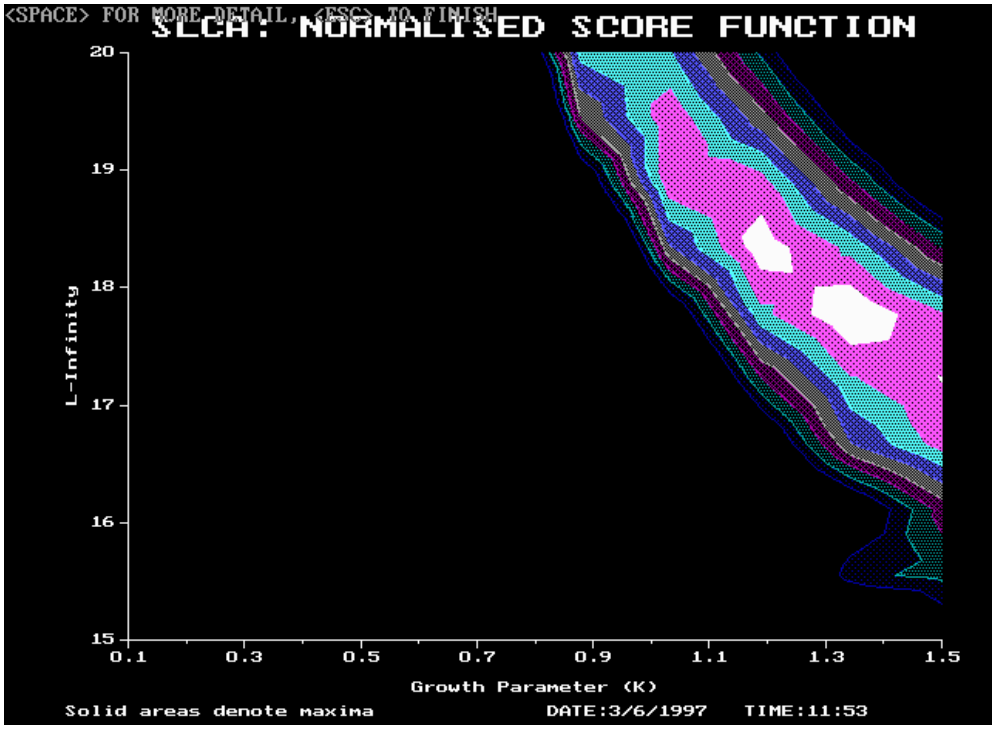

Figure 74. LFDA SLCA scan of K and L_∞ for female *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

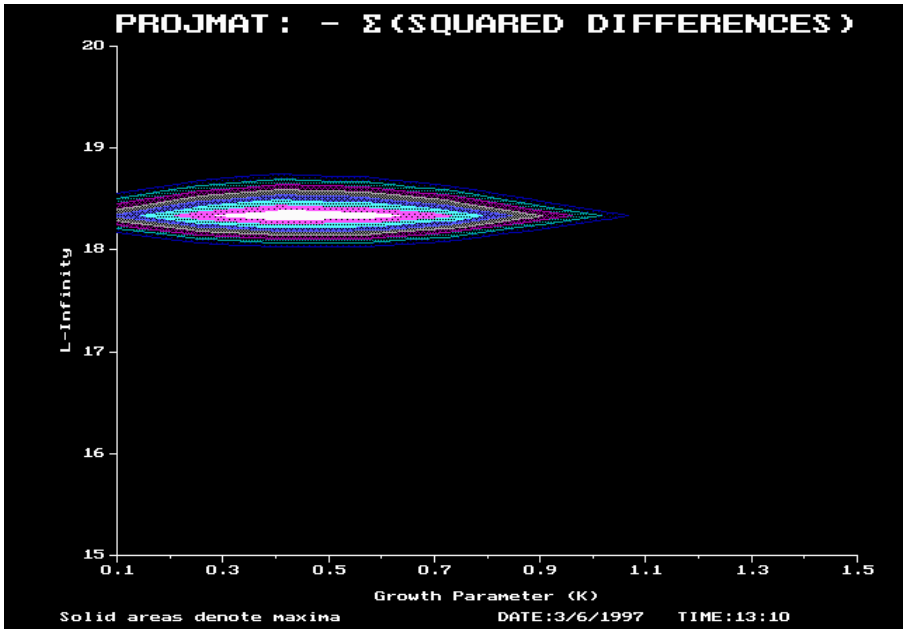

Figure 75 LFDA Projmat scan of K and L_∞ for male *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

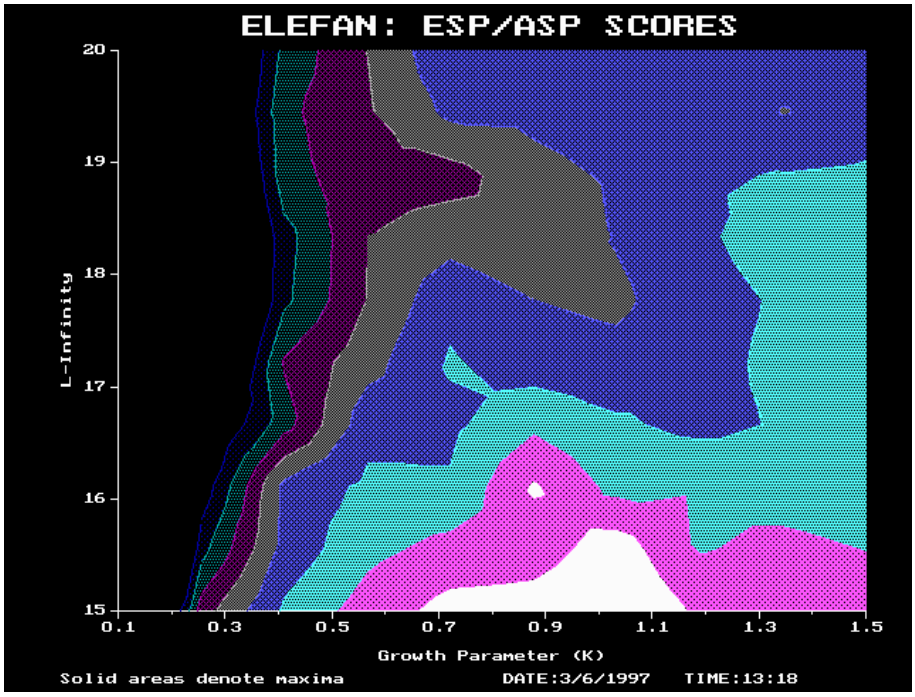

Figure 76. LFDA Elefan scan of K and L_∞ for male *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

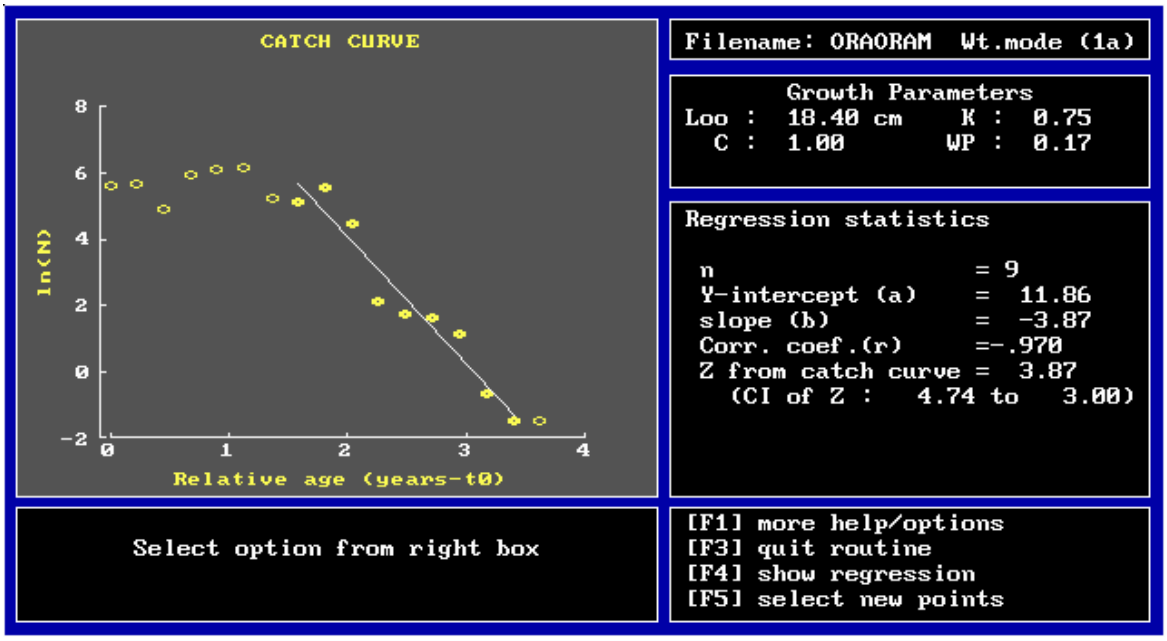

Figure 77. FiSAT Elefan estimate of *Z* for male *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

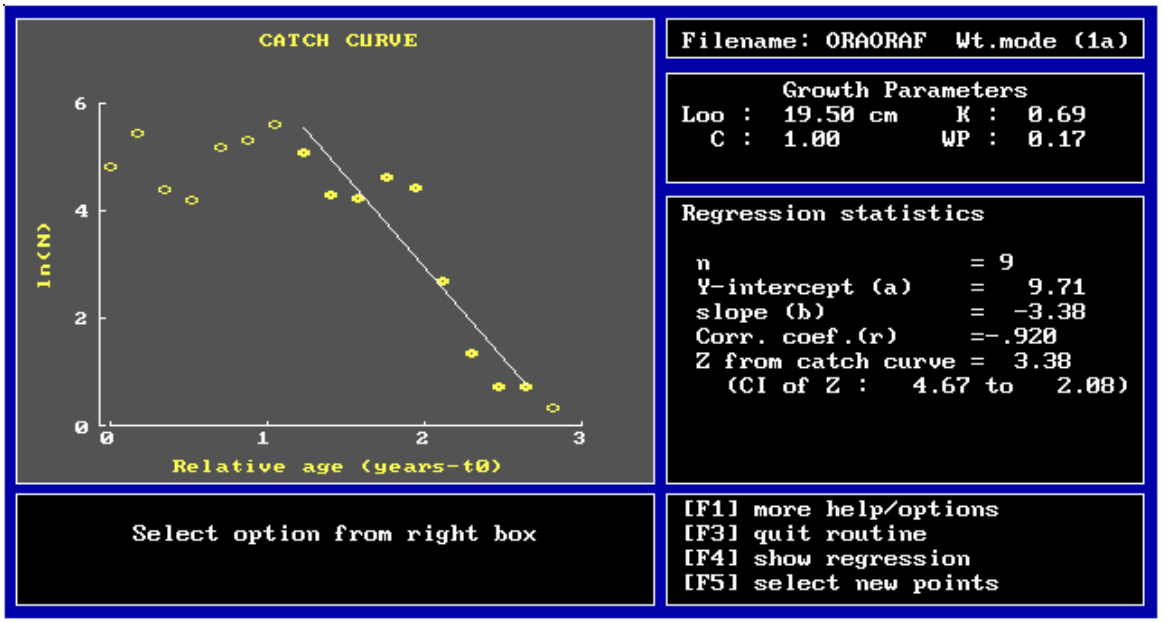

Figure 78. FiSAT Elefan estimate of *Z* for female *Oratosquilla oratoria*, based on trawl sampling data stations 1-18.

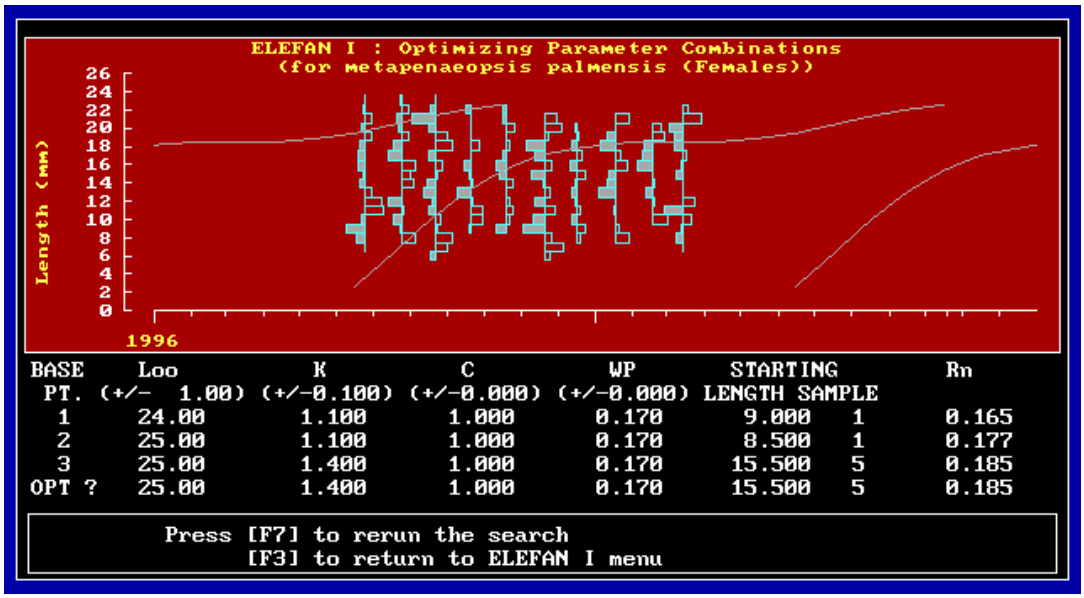

Figure 79. FiSAT Elefan automated scan of K and L_∞ for female *Metapenaeopsis palmensis*, based on trawl sampling stations 1-18.

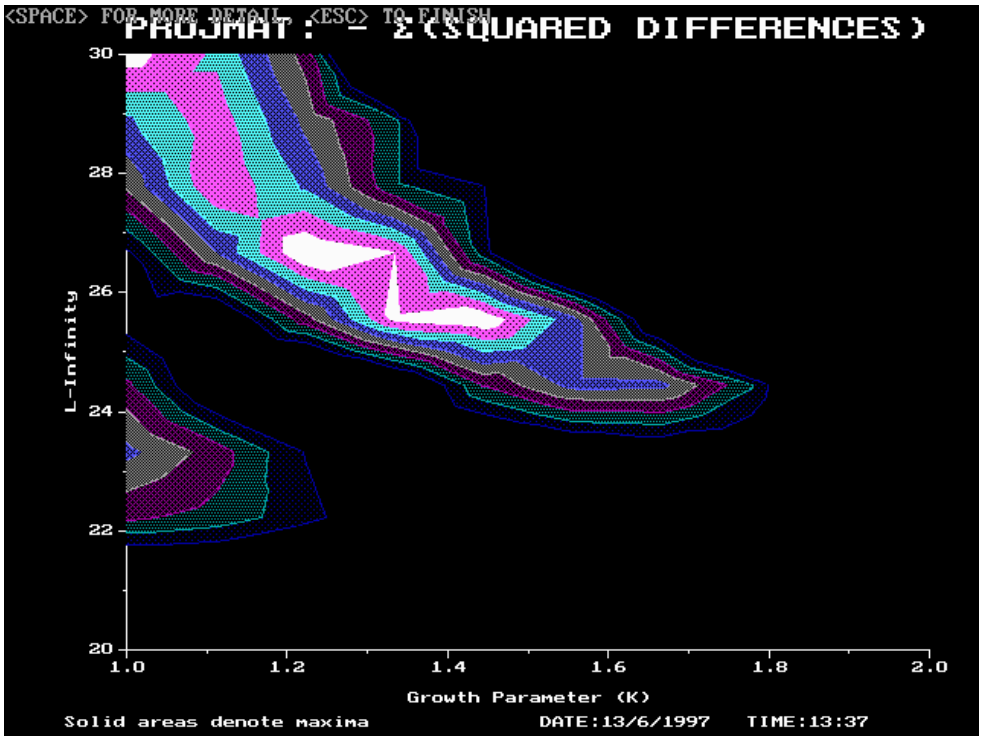

Figure 80. LFDA Projmat scan of K and L_∞ for female *Metapenaeopsis palmensis*, based on trawl sampling stations 1-18.

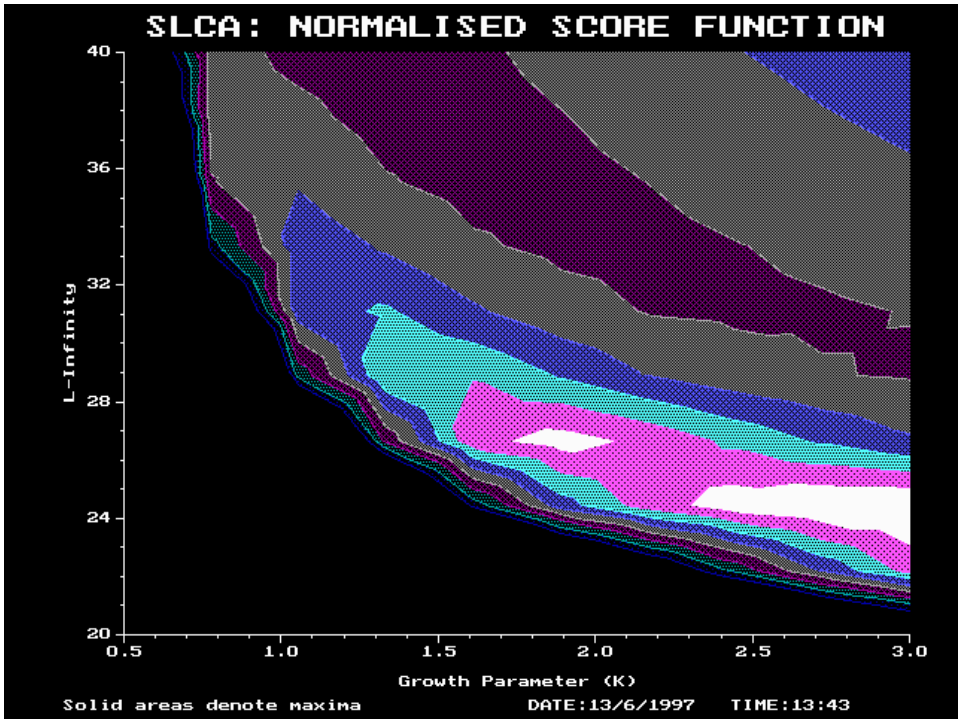

Figure 81. LFDA SLCA scan of K and L_∞ for female *Metapenaeopsis palmensis*, based on trawl sampling stations 1-18

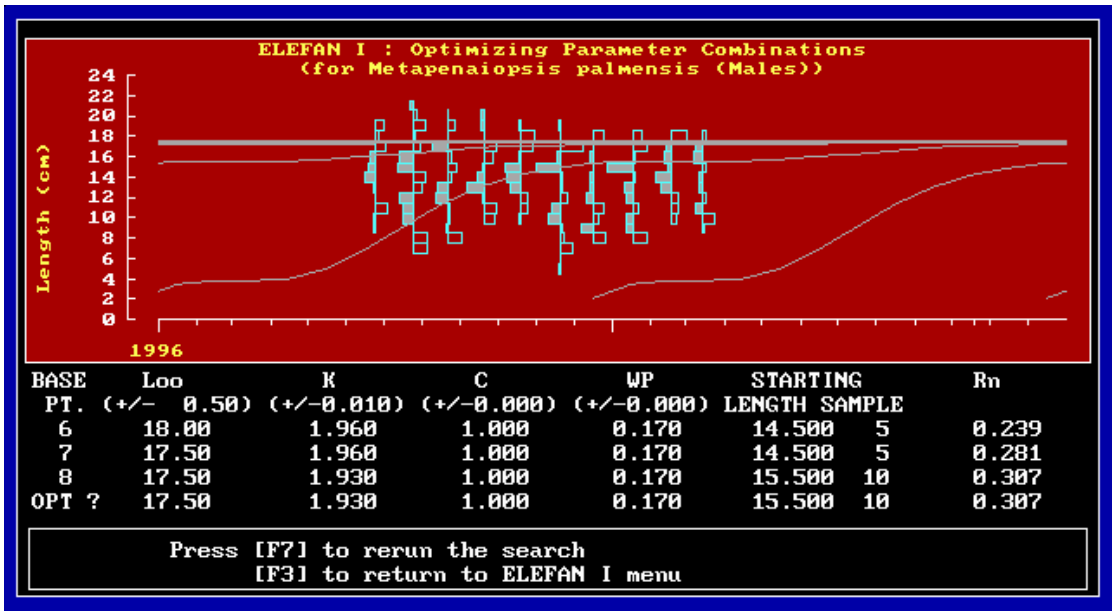

Figure 82. FiSAT automated scan of scan of K and L_∞ for male *Metapenaeopsis palmensis*, based on trawl sampling stations 1-18.

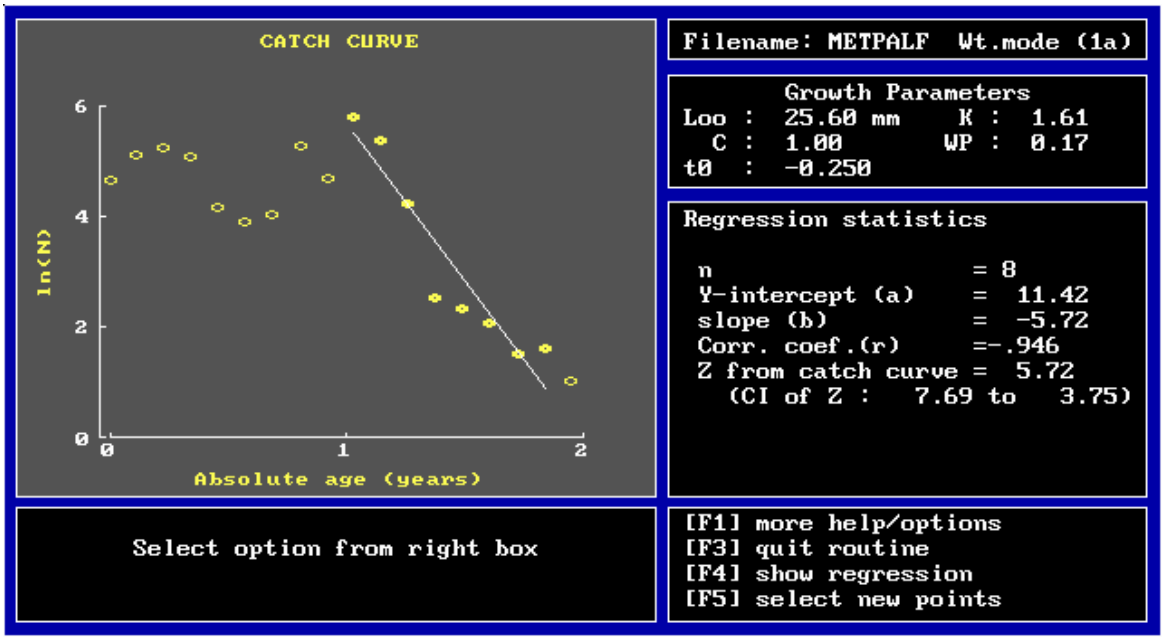

Figure 83. FiSAT Elefan estimate of *Z* for female *Metapenaeopsis palmensis*, based on trawl sampling stations 1-18.

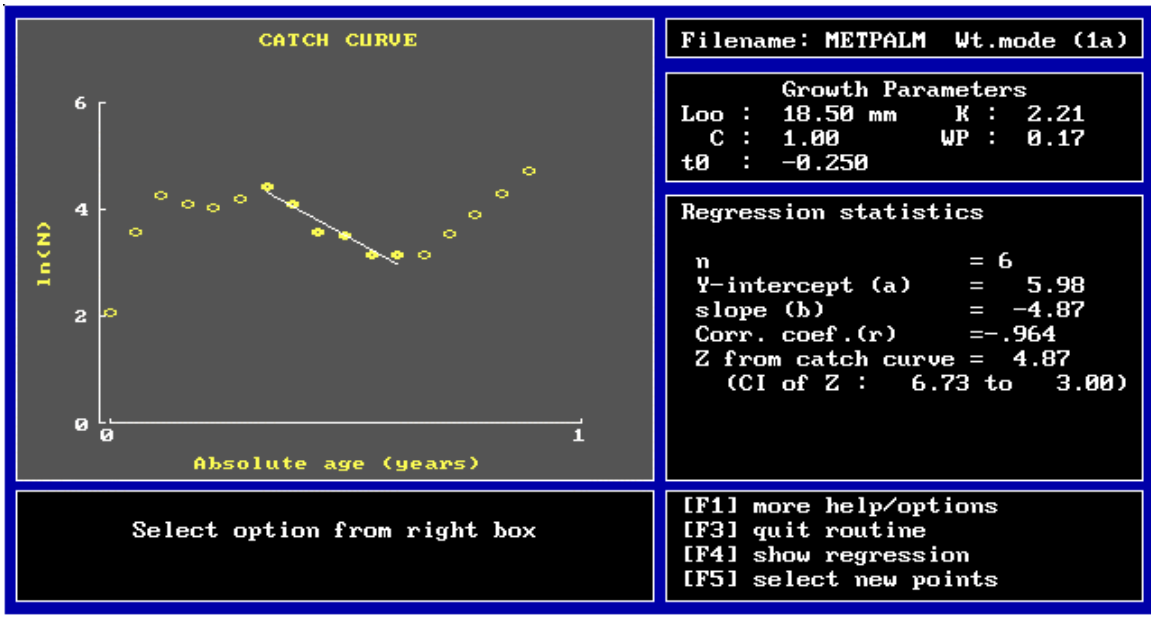

Figure 84. FiSAT Elefan estimate of *Z* for male *Metapenaeopsis palmensis*, based on trawl sampling stations 1-18.

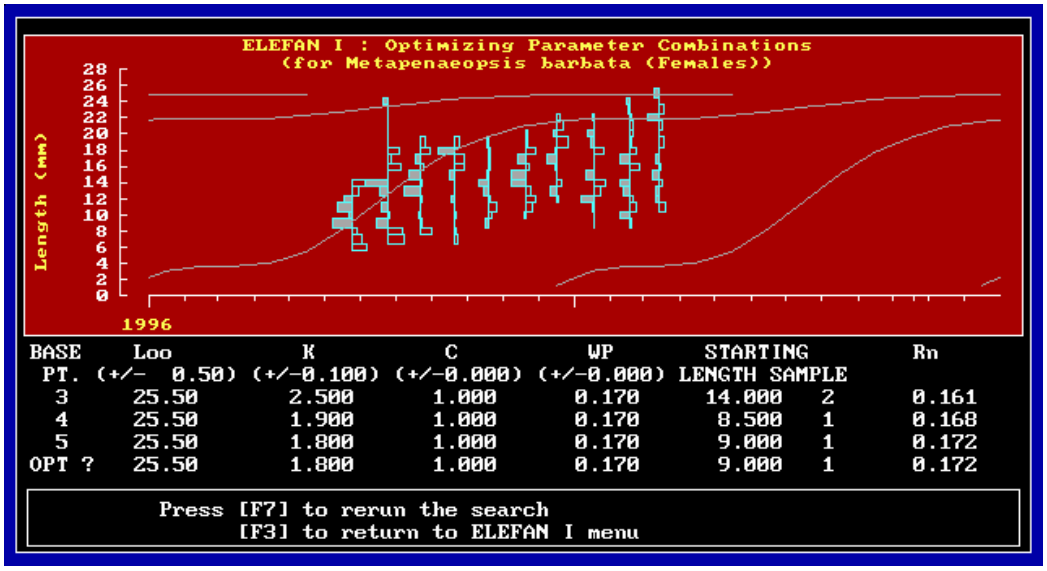

Figure 85. FiSAT Elefan automated scan of K and L_∞ for female *Metapenaeopsis barbata* using length-frequency data obtained from trawl sampling stations 1-18.

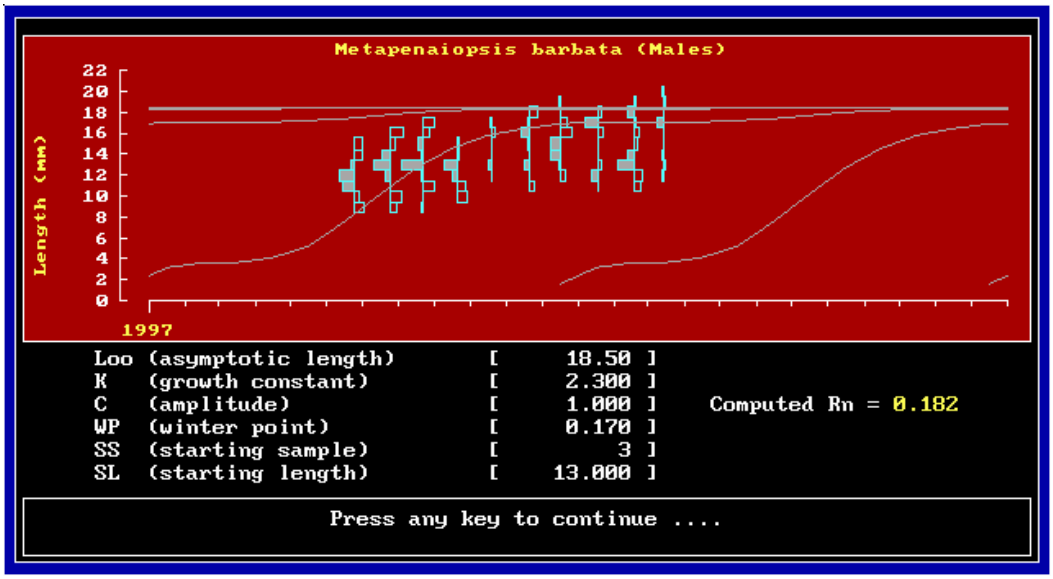

Figure 86. FiSAT Elefan automated scan of K and L_∞ for male *Metapenaeopsis barbata* using length-frequency data obtained from trawl sampling stations 1-18.

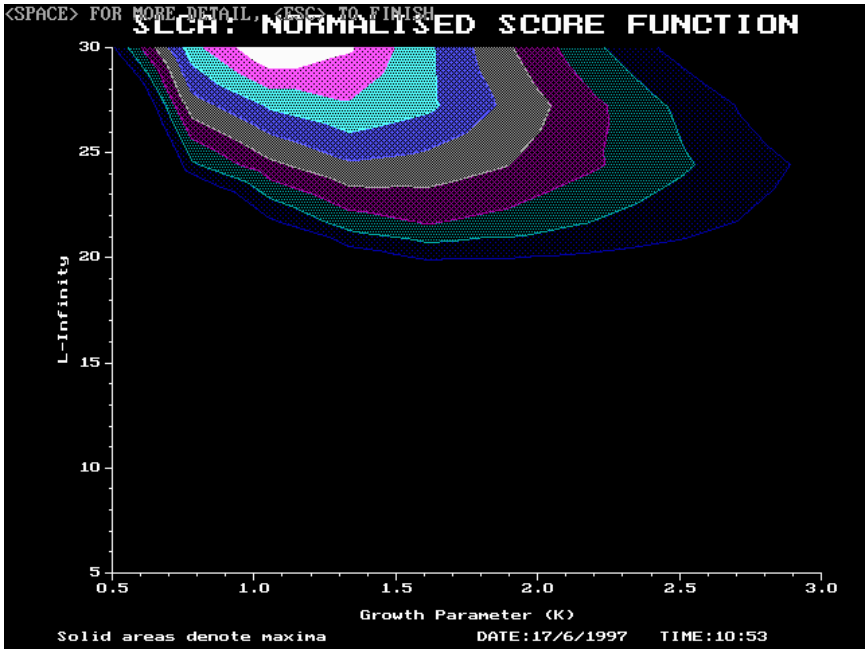

Figure 87. LFDA SLCA scan of K and L_∞ for female *Metapenaeopsis barbata* using length-frequency data obtained from trawl sampling stations 1-18.

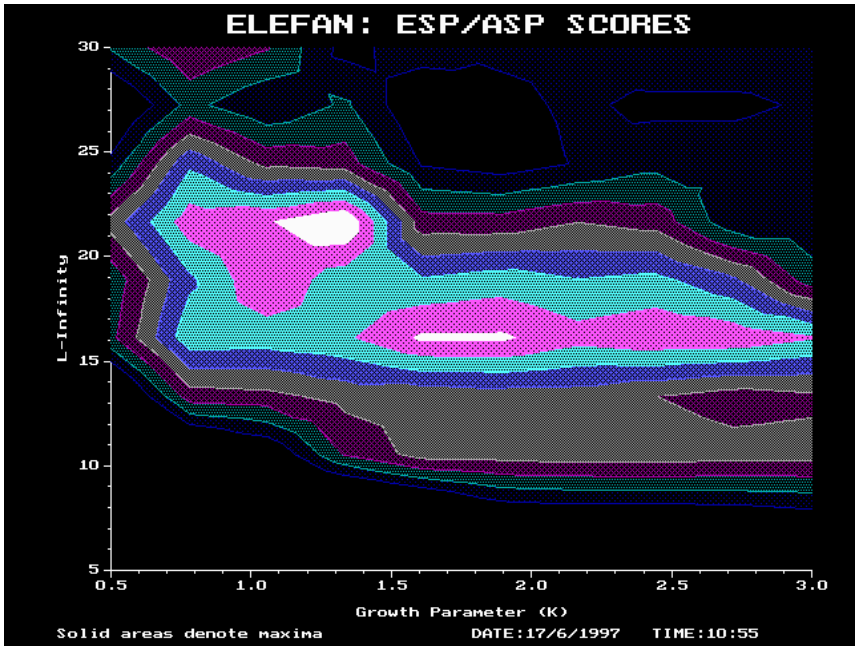

Figure 88. LFDA Elefan scan of K and L_∞ for female *Metapenaeopsis barbata* using length-frequency data obtained from trawl sampling stations 1-18.

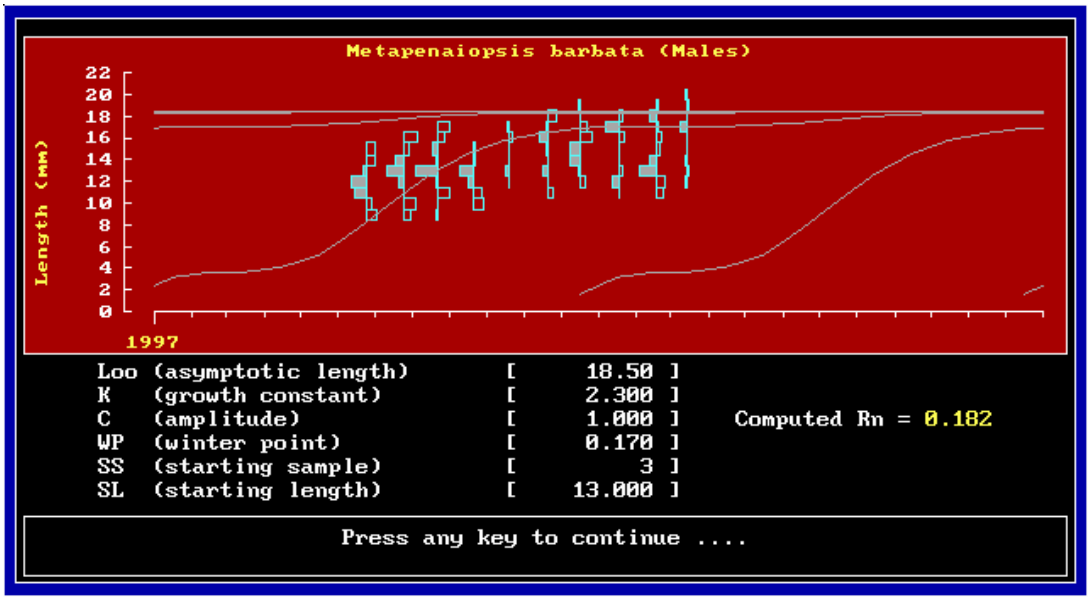

Figure 89. FiSAT Elefan automated scan of K and L_∞ for male *Metapenaeopsis barbata* using length-frequency data obtained from trawl sampling stations 1-18.

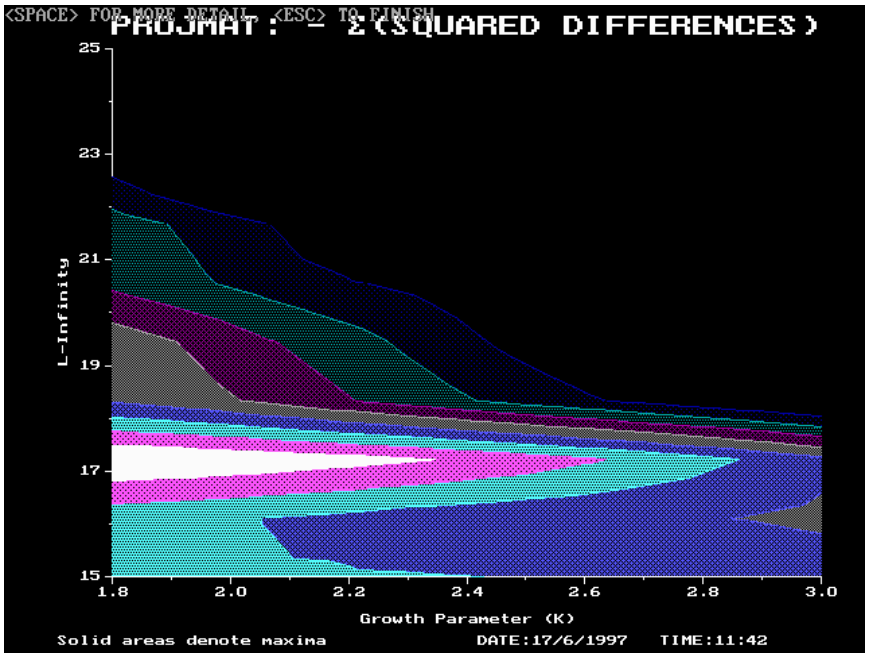

Figure 90. LFDA Projmat scan of K and L_∞ for male *Metapenaeopsis barbata* using length-frequency data obtained from trawl sampling stations 1-18.

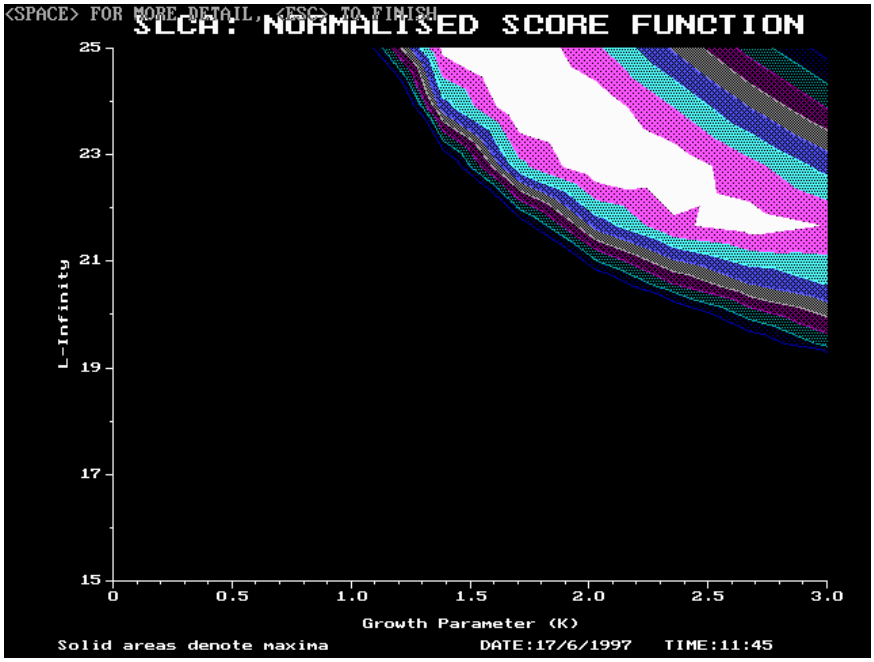

Figure 91. LFDA SLCA scan of K and L_∞ for male *Metapenaeopsis barbata* using length-frequency data obtained from trawl sampling stations 1-18.

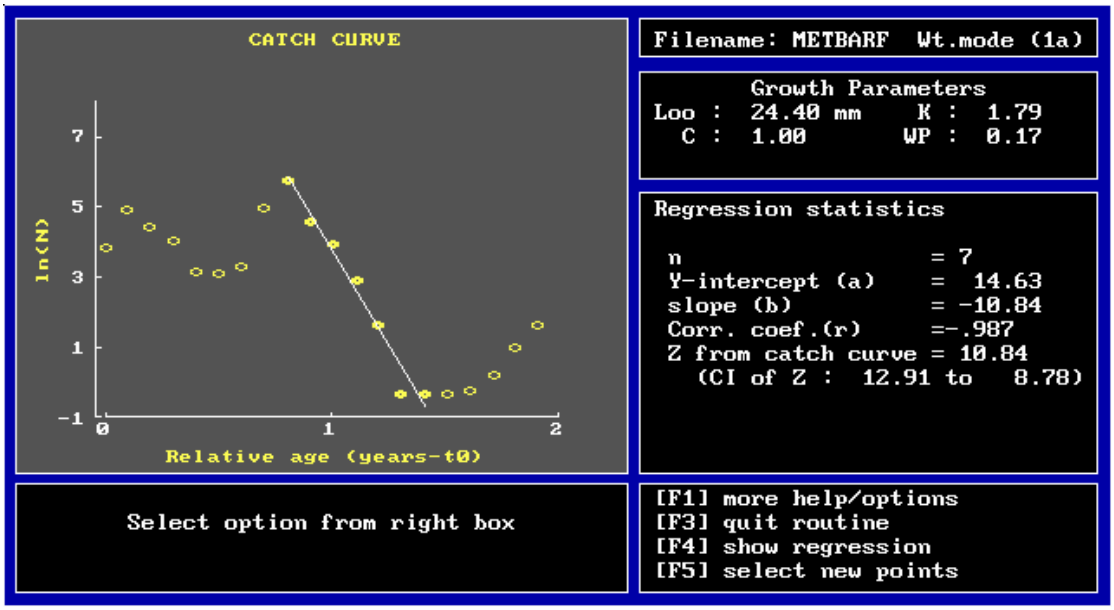

Figure 92. FiSAT Elefan estimate of Z for female *Metapenaeopsis barbata*, based on length-frequency data from trawl sampling stations 1-18.

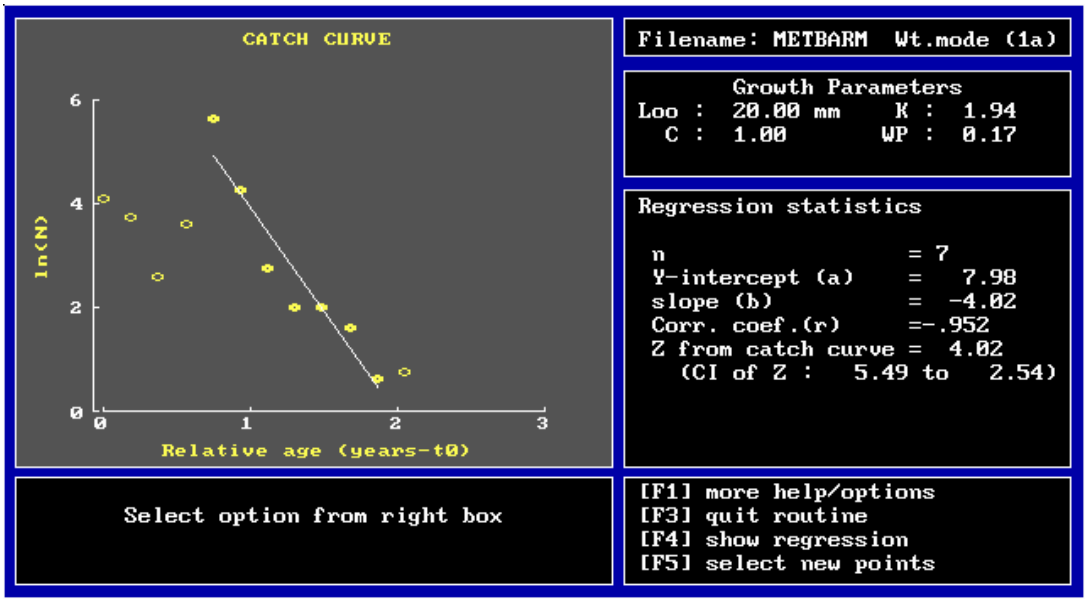

Figure 93. FiSAT Elefan estimate of *Z* for male *Metapenaeopsis barbata*, based on length-frequency data from trawl sampling stations 1-18.