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# LAMPIRAN

Lampiran 1. Analisis struktur ukuran ikan tongkol, *Euthynnus affinis* di perairan Kabupaten Polewali Mandar

| Interval Kelas | Frekuensi | TK |
|----------------|-----------|----|
| 12 – 16        | 5         | 14 |
| 16- 20         | 8         | 18 |
| 20 – 24        | 218       | 22 |
| 24 – 28        | 156       | 26 |
| 28 – 32        | 188       | 30 |
| 32 – 36        | 137       | 34 |
| 36 – 40        | 276       | 38 |
| 40 – 44        | 193       | 42 |
| 44 – 48        | 31        | 46 |
| 48 – 52        | 7         | 50 |
| 52 – 56        | 4         | 54 |
| 56 – 60        | 5         | 58 |

✓ Menentukan panjang interval kelas menggunakan persamaan :

✓  $K = 1 + (3.3) \log n$

$$= 11.19$$

$P = \frac{\text{rentang (data terbesar - data terkecil)}}{\text{Banyak kelas}}$

$$P = \frac{(60 - 12)}{11.19}$$

$$= 4.29$$

$$= 4.29$$

$$P = 4$$

✓ Menentukan tengah kelas menggunakan persamaan :

$TK = \frac{\text{Interval kelas}}{2}$

$$= \frac{12+16}{2}$$

$$= \frac{12+16}{2}$$

$$= 14$$

$$= 14$$

Dst sesuai pada tabel di atas

✓ Frekuensi = jumlah ikan dari setiap interval kelas

Lampiran 2. Frekuensi panjang ikan Tongkol, Fc, Frekuensi kumulatif dan logaritma natural kelompok umur 1 dan 2

Kohort 1

| Interval Kelas | Frekuensi | TK    | tk x f      | tk - x      | f (tk-x)^2  | Fc          | ln fc       | d ln fc     |
|----------------|-----------|-------|-------------|-------------|-------------|-------------|-------------|-------------|
| 12 - 16        | 5         | 14    | 70          | 11.62020906 | 675.1462929 | 0.00016138  | -8.73175137 | 2.896558698 |
| 16- 20         | 8         | 18    | 144         | 7.620209059 | 464.5406889 | 0.00292286  | 5.835192672 | 1.69219456  |
| 20 - 24        | 218       | 22    | 4796        | 3.620209059 | 2857.089172 | 0.015875185 | 4.142998112 | 0.487830422 |
| 24 - 28        | 156       | 26    | 4056        | 0.379790941 | 22.50162076 | 0.025857161 | -3.65516769 | 0.716533716 |
| 28 - 32        | 188       | 30    | 5640        | 4.379790941 | 3606.322913 | 0.012629734 | 4.371701406 |             |
| 575            |           | 14706 |             | 7625.600687 |             |             |             |             |
| x              | 25.62021  | s2    | 13.28501862 | A           | 7.111833182 |             |             |             |
| dl             | 1.666667  | s     | 3.644861948 | B           | 0.301091035 |             |             |             |
|                |           |       |             | L1          | 23.62       |             |             |             |

Kohort 2

| interval kelas | frekuensi | Tk    | tk x f      | tk -x       | f(tk - x)^2 | Fc          | ln fc       | d ln fc     |
|----------------|-----------|-------|-------------|-------------|-------------|-------------|-------------|-------------|
| 32 - 36        | 137       | 34    | 4658        | 5.162576687 | 3651.351133 | 0.003903901 | 5.545779058 | 0.785189223 |
| 36 - 40        | 276       | 38    | 10488       | 1.162576687 | 373.0373367 | 0.008560559 | 4.760589835 | 0.207911404 |
| 40 - 44        | 193       | 42    | 8106        | 2.837423313 | 1553.837414 | 0.006953562 | 4.968501239 | 1.201012032 |
| 44 - 48        | 31        | 46    | 1426        | 6.837423313 | 1449.261084 | 0.002092254 | 6.169513271 | 2.194112659 |
| 48 - 52        | 7         | 50    | 350         | 10.83742331 | 822.1482084 | 0.000233197 | 8.363625929 | 3.187213286 |
| 52 - 56        | 4         | 54    | 216         | 14.83742331 | 880.5965223 | 9.62796E-06 | 11.55083922 | 4.180313913 |
| 56 - 60        | 5         | 58    | 290         | 18.83742331 | 1774.242585 | 1.47247E-07 | 15.73115313 |             |
| 653            |           | 25534 |             | 10504.47428 |             |             |             |             |
| X              | 39.16258  | s2    | 16.11115688 | A           | 9.226544554 |             |             |             |
| DI             | 0.875     | s     | 4.013870561 | B           | 0.248275157 |             |             |             |
|                |           |       |             | L1          | 37.16       |             |             |             |

Lampiran 3. Penentuan nilai (K), ( $L_{\infty}$ ) dan perhitungan ikan tongkol, *Euthynnus affinis* di perairan Kabupaten Polewali Mandar

General | **K Scan** | Response Surface | Automatic Search

**Parameters for Response Surface**

Enter the lower and upper limit of any two parameters. To make a parameter constant, enter the same value for lower and upper limit.

- Starting Point

Starting sample: 1

Starting length: 40.00

| Parameters | From  | To     |
|------------|-------|--------|
| Loo:       | 60.00 | 100.00 |
| K:         | 0.1   | 1.1    |
| C:         | 0.00  | 0.00   |
| WP:        | 0.00  | 0.00   |

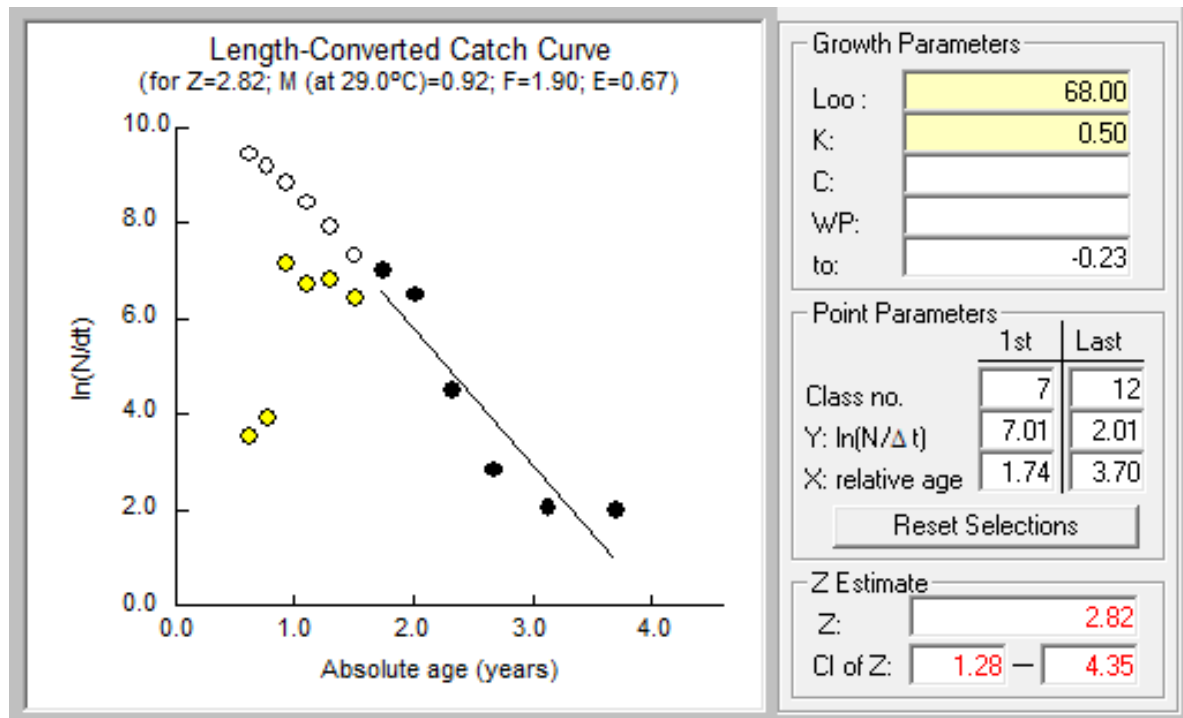
Scores: ELEFAN I Method

| K\Loo | 60.00 | 62.00 | 64.00 | 66.00 | 68.00 | 70.00 | 72.00 |  |
|-------|-------|-------|-------|-------|-------|-------|-------|--|
| 0.35  | 0.257 | 0.040 | 0.051 | 0.052 | 0.064 | 0.136 | 0.136 |  |
| 0.40  | 0.032 | 0.052 | 0.052 | 0.136 | 0.136 | 0.160 | 0.262 |  |
| 0.45  | 0.052 | 0.109 | 0.136 | 0.160 | 0.262 | 0.262 | 0.537 |  |
| 0.50  | 0.109 | 0.128 | 0.160 | 0.262 | 0.656 | 0.537 | 0.537 |  |
| 0.55  | 0.128 | 0.160 | 0.262 | 0.656 | 0.537 | 0.537 | 0.078 |  |
| 0.60  | 0.128 | 0.399 | 0.656 | 0.537 | 0.078 | 0.078 | 0.118 |  |
| 0.65  | 0.399 | 0.656 | 0.656 | 0.078 | 0.078 | 0.118 | 0.118 |  |
| 0.70  | 0.656 | 0.095 | 0.078 | 0.078 | 0.118 | 0.251 | 0.251 |  |
| 0.75  | 0.095 | 0.095 | 0.078 | 0.078 | 0.251 | 0.251 | 0.251 |  |
| 0.80  | 0.095 | 0.095 | 0.078 | 0.251 | 0.251 | 0.251 | 0.251 |  |
| 0.85  | 0.095 | 0.095 | 0.165 | 0.251 | 0.251 | 0.251 | 0.251 |  |

Lampiran 4. Hubungan antara panjang dan tingkat umur ikan tongkol, *Euthynnus affinis* di perairan Kabupaten Polewali Mandar

| <b>L<sub>oo</sub></b> | <b>K</b> | <b>T<sub>o</sub></b> | <b>T</b> | <b>L<sub>t</sub></b> |
|-----------------------|----------|----------------------|----------|----------------------|
| 68.00                 | 0.5      | -0.23                | -0.23    | 0                    |
| 68.00                 | 0.5      | -0.23                | 0        | 7.39                 |
| 68.00                 | 0.5      | -0.23                | 1        | 31.24                |
| 68.00                 | 0.5      | -0.23                | 2        | 45.70                |
| 68.00                 | 0.5      | -0.23                | 3        | 54.48                |
| 68.00                 | 0.5      | -0.23                | 4        | 59.80                |
| 68.00                 | 0.5      | -0.23                | 5        | 63.02                |
| 68.00                 | 0.5      | -0.23                | 6        | 64.98                |
| 68.00                 | 0.5      | -0.23                | 7        | 66.17                |
| 68.00                 | 0.5      | -0.23                | 8        | 66.89                |
| 68.00                 | 0.5      | -0.23                | 9        | 67.33                |
| 68.00                 | 0.5      | -0.23                | 10       | 67.59                |
| 68.00                 | 0.5      | -0.23                | 11       | 67.75                |
| 68.00                 | 0.5      | -0.23                | 12       | 67.85                |
| 68.00                 | 0.5      | -0.23                | 13       | 67.91                |
| 68.00                 | 0.5      | -0.23                | 14       | 67.94                |
| 68.00                 | 0.5      | -0.23                | 15       | 67.97                |
| 68.00                 | 0.5      | -0.23                | 16       | 67.98                |
| 68.00                 | 0.5      | -0.23                | 17       | 67.99                |
| 68.00                 | 0.5      | -0.23                | 18       | 67.99                |
| 68.00                 | 0.5      | -0.23                | 19       | 68.00                |

Lampiran 5. Perhitungan laju mortalitas dan laju eksploitasi ikan tongkol, *Euthynnus affinis* di perairan Kabupaten Polewali Mandar





| E    | M    | K   | M/K  | E.U^M/K | m      | 1+m    | 1+2 m  | 1+3 m  | E    | Y/R      |
|------|------|-----|------|---------|--------|--------|--------|--------|------|----------|
| 0.00 | 0.92 | 0.5 | 1.84 | 0.0000  | 0.5435 | 1.5435 | 2.0870 | 2.6304 | 0.00 | 0.000000 |
| 0.05 | 0.92 | 0.5 | 1.84 | 0.0125  | 0.5163 | 1.5163 | 2.0326 | 2.5489 | 0.05 | 0.004434 |
| 0.10 | 0.92 | 0.5 | 1.84 | 0.0250  | 0.4891 | 1.4891 | 1.9783 | 2.4674 | 0.10 | 0.008633 |
| 0.15 | 0.92 | 0.5 | 1.84 | 0.0375  | 0.4620 | 1.4620 | 1.9239 | 2.3859 | 0.15 | 0.012591 |
| 0.20 | 0.92 | 0.5 | 1.84 | 0.0500  | 0.4348 | 1.4348 | 1.8696 | 2.3043 | 0.20 | 0.016298 |
| 0.25 | 0.92 | 0.5 | 1.84 | 0.0625  | 0.4076 | 1.4076 | 1.8152 | 2.2228 | 0.25 | 0.019747 |
| 0.30 | 0.92 | 0.5 | 1.84 | 0.0750  | 0.3804 | 1.3804 | 1.7609 | 2.1413 | 0.30 | 0.022930 |
| 0.35 | 0.92 | 0.5 | 1.84 | 0.0874  | 0.3533 | 1.3533 | 1.7065 | 2.0598 | 0.35 | 0.025838 |
| 0.40 | 0.92 | 0.5 | 1.84 | 0.0999  | 0.3261 | 1.3261 | 1.6522 | 1.9783 | 0.40 | 0.028464 |
| 0.45 | 0.92 | 0.5 | 1.84 | 0.1124  | 0.2989 | 1.2989 | 1.5978 | 1.8967 | 0.45 | 0.030801 |
| 0.50 | 0.92 | 0.5 | 1.84 | 0.1249  | 0.2717 | 1.2717 | 1.5435 | 1.8152 | 0.50 | 0.032843 |
| 0.55 | 0.92 | 0.5 | 1.84 | 0.1374  | 0.2446 | 1.2446 | 1.4891 | 1.7337 | 0.55 | 0.034585 |
| 0.60 | 0.92 | 0.5 | 1.84 | 0.1499  | 0.2174 | 1.2174 | 1.4348 | 1.6522 | 0.60 | 0.036022 |
| 0.67 | 0.92 | 0.5 | 1.84 | 0.1674  | 0.1793 | 1.1793 | 1.3587 | 1.5380 | 0.67 | 0.037519 |
| 0.70 | 0.92 | 0.5 | 1.84 | 0.1749  | 0.1630 | 1.1630 | 1.3261 | 1.4891 | 0.70 | 0.037978 |
| 0.75 | 0.92 | 0.5 | 1.84 | 0.1874  | 0.1359 | 1.1359 | 1.2717 | 1.4076 | 0.75 | 0.038502 |
| 0.80 | 0.92 | 0.5 | 1.84 | 0.1999  | 0.1087 | 1.1087 | 1.2174 | 1.3261 | 0.80 | 0.038731 |
| 0.85 | 0.92 | 0.5 | 1.84 | 0.2124  | 0.0815 | 1.0815 | 1.1630 | 1.2446 | 0.85 | 0.038680 |
| 0.90 | 0.92 | 0.5 | 1.84 | 0.2249  | 0.0543 | 1.0543 | 1.1087 | 1.1630 | 0.90 | 0.038367 |
| 0.95 | 0.92 | 0.5 | 1.84 | 0.2373  | 0.0272 | 1.0272 | 1.0543 | 1.0815 | 0.95 | 0.037819 |
| 1.00 | 0.92 | 0.5 | 1.84 | 0.2498  | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 1.00 | 0.037072 |
| E    | M    | K   | M/K  | E.U^M/K | m      | 1+m    | 1+2 m  | 1+3 m  | E    | Y/R      |
| 0.00 | 0.92 | 0.5 | 1.84 | 0.0000  | 0.5435 | 1.5435 | 2.0870 | 2.6304 | 0.00 | 0.000000 |
| 0.05 | 0.92 | 0.5 | 1.84 | 0.0125  | 0.5163 | 1.5163 | 2.0326 | 2.5489 | 0.05 | 0.004434 |
| 0.10 | 0.92 | 0.5 | 1.84 | 0.0250  | 0.4891 | 1.4891 | 1.9783 | 2.4674 | 0.10 | 0.008633 |
| 0.15 | 0.92 | 0.5 | 1.84 | 0.0375  | 0.4620 | 1.4620 | 1.9239 | 2.3859 | 0.15 | 0.012591 |
| 0.20 | 0.92 | 0.5 | 1.84 | 0.0500  | 0.4348 | 1.4348 | 1.8696 | 2.3043 | 0.20 | 0.016298 |
| 0.25 | 0.92 | 0.5 | 1.84 | 0.0625  | 0.4076 | 1.4076 | 1.8152 | 2.2228 | 0.25 | 0.019747 |
| 0.30 | 0.92 | 0.5 | 1.84 | 0.0750  | 0.3804 | 1.3804 | 1.7609 | 2.1413 | 0.30 | 0.022930 |
| 0.35 | 0.92 | 0.5 | 1.84 | 0.0874  | 0.3533 | 1.3533 | 1.7065 | 2.0598 | 0.35 | 0.025838 |
| 0.40 | 0.92 | 0.5 | 1.84 | 0.0999  | 0.3261 | 1.3261 | 1.6522 | 1.9783 | 0.40 | 0.028464 |
| 0.45 | 0.92 | 0.5 | 1.84 | 0.1124  | 0.2989 | 1.2989 | 1.5978 | 1.8967 | 0.45 | 0.030801 |
| 0.50 | 0.92 | 0.5 | 1.84 | 0.1249  | 0.2717 | 1.2717 | 1.5435 | 1.8152 | 0.50 | 0.032843 |
| 0.55 | 0.92 | 0.5 | 1.84 | 0.1374  | 0.2446 | 1.2446 | 1.4891 | 1.7337 | 0.55 | 0.034585 |
| 0.60 | 0.92 | 0.5 | 1.84 | 0.1499  | 0.2174 | 1.2174 | 1.4348 | 1.6522 | 0.60 | 0.036022 |
| 0.67 | 0.92 | 0.5 | 1.84 | 0.1674  | 0.1793 | 1.1793 | 1.3587 | 1.5380 | 0.67 | 0.037519 |
| 0.70 | 0.92 | 0.5 | 1.84 | 0.1749  | 0.1630 | 1.1630 | 1.3261 | 1.4891 | 0.70 | 0.037978 |
| 0.75 | 0.92 | 0.5 | 1.84 | 0.1874  | 0.1359 | 1.1359 | 1.2717 | 1.4076 | 0.75 | 0.038502 |
| 0.80 | 0.92 | 0.5 | 1.84 | 0.1999  | 0.1087 | 1.1087 | 1.2174 | 1.3261 | 0.80 | 0.038731 |
| 0.85 | 0.92 | 0.5 | 1.84 | 0.2124  | 0.0815 | 1.0815 | 1.1630 | 1.2446 | 0.85 | 0.038680 |
| 0.90 | 0.92 | 0.5 | 1.84 | 0.2249  | 0.0543 | 1.0543 | 1.1087 | 1.1630 | 0.90 | 0.038367 |
| 0.95 | 0.92 | 0.5 | 1.84 | 0.2373  | 0.0272 | 1.0272 | 1.0543 | 1.0815 | 0.95 | 0.037819 |
| 1.00 | 0.92 | 0.5 | 1.84 | 0.2498  | 0.0000 | 1.0000 | 1.0000 | 1.0000 | 1.00 | 0.037072 |

Lampiran 7. Dokumentasi





