# 附錄

針對的4張電腦模擬結果，在不同抽樣方式，第二種至第四種物種與區塊假設下之模擬，重複抽樣次數為1000次，結果如以下表格所示：

Table S. 1取後放回的抽樣方式在第二種物種與區塊假設下，群落一為同質模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 124.84 | 269.26 | -30.74 | 61.37 | 46.09 | 68.61 | 0.86 |
| Pan | 245.44 | -54.56 | 40.48 | 27.76 | 67.92 | 0.82 |
| 30 | New | 238.61 | 284.7 | -15.3 | 19.95 | 18.05 | 25.13 | 0.89 |
| Pan | 275.22 | -24.78 | 13.59 | 11.76 | 28.26 | 0.88 |
| 50 | New | 265.18 | 295.03 | -4.97 | 17.2 | 15.4 | 17.9 | 0.87 |
| Pan | 287.6 | -12.4 | 11.82 | 10.15 | 17.13 | 0.87 |
| 70 | New | 275.28 | 299.83 | -0.17 | 16.08 | 14.19 | 16.07 | 0.85 |
| Pan | 293.29 | -6.71 | 10.96 | 9.37 | 12.85 | 0.85 |

Table S. 2取後放回的抽樣方式在第二種物種與區塊假設下，兩群落皆為均勻模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 118.72 | 239.86 | -60.14 | 54.85 | 40.74 | 81.37 | 0.87 |
| Pan | 215.07 | -84.93 | 33.16 | 22.92 | 91.17 | 0.83 |
| 30 | New | 222.32 | 276.8 | -23.2 | 21.96 | 20.52 | 31.94 | 0.9 |
| Pan | 264.23 | -35.77 | 14.67 | 12.74 | 38.66 | 0.88 |
| 50 | New | 252.94 | 289.31 | -10.69 | 17.5 | 16.05 | 20.5 | 0.88 |
| Pan | 280.84 | -19.16 | 12 | 10.54 | 22.61 | 0.88 |
| 70 | New | 267.23 | 295.18 | -4.82 | 14.71 | 13.98 | 15.47 | 0.88 |
| Pan | 288.57 | -11.43 | 10.33 | 9.39 | 15.4 | 0.87 |

Table S. 3取後放回的抽樣方式在第二種物種與區塊假設下，群落一為均勻模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 119.37 | 229.87 | -70.13 | 48.08 | 38.03 | 85.02 | 0.86 |
| Pan | 204.97 | -95.03 | 29.66 | 21.54 | 99.54 | 0.84 |
| 30 | New | 214.79 | 272.01 | -27.99 | 24.65 | 21.57 | 37.29 | 0.88 |
| Pan | 258.13 | -41.87 | 16.59 | 13.56 | 45.03 | 0.87 |
| 50 | New | 244.86 | 289.81 | -10.19 | 20.88 | 19.23 | 23.23 | 0.88 |
| Pan | 278.69 | -21.31 | 14.38 | 12.54 | 25.7 | 0.87 |
| 70 | New | 260.18 | 296.43 | -3.57 | 18.26 | 17.32 | 18.59 | 0.89 |
| Pan | 287.62 | -12.38 | 12.68 | 11.42 | 17.72 | 0.88 |

Table S. 4取後放回的抽樣方式在第二種物種與區塊假設下，群落一為Broken-stick模型，群落二為對數常數模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 115.86 | 229.83 | -70.17 | 50.19 | 40.94 | 86.26 | 0.87 |
| Pan | 201.22 | -98.78 | 30.98 | 22.83 | 103.52 | 0.85 |
| 30 | New | 209.58 | 275.15 | -24.85 | 29.75 | 24.58 | 38.75 | 0.88 |
| Pan | 259.48 | -40.52 | 19.16 | 15.05 | 44.81 | 0.87 |
| 50 | New | 242.73 | 291.06 | -8.94 | 21.86 | 20.18 | 23.61 | 0.88 |
| Pan | 279.33 | -20.67 | 14.79 | 12.93 | 25.41 | 0.89 |
| 70 | New | 259.41 | 297.41 | -2.59 | 19.32 | 17.82 | 19.49 | 0.88 |
| Pan | 288.54 | -11.46 | 13.44 | 11.66 | 17.66 | 0.87 |

Table S. 5取後放回的抽樣方式在第三種物種與區塊假設下，群落一為同質模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 151.89 | 291.68 | -8.32 | 55.83 | 43.77 | 56.42 | 0.87 |
| Pan | 270.85 | -29.15 | 37.98 | 27.72 | 47.87 | 0.84 |
| 30 | New | 229.94 | 295.36 | -4.64 | 25.16 | 21.78 | 25.57 | 0.9 |
| Pan | 285.24 | -14.76 | 17.63 | 14.62 | 22.99 | 0.89 |
| 50 | New | 262.44 | 300.04 | 0.04 | 18.16 | 16.1 | 18.15 | 0.89 |
| Pan | 293.07 | -6.93 | 12.65 | 10.84 | 14.42 | 0.88 |
| 70 | New | 276.46 | 300.61 | 0.61 | 14.48 | 12.96 | 14.49 | 0.86 |
| Pan | 295.85 | -4.15 | 10.32 | 8.84 | 11.12 | 0.85 |

Table S. 6取後放回的抽樣方式在第三種物種與區塊假設下，兩群落皆為均勻模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 154.86 | 253.01 | -46.99 | 38.53 | 32.68 | 60.76 | 0.88 |
| Pan | 233.32 | -66.68 | 25.11 | 19.11 | 71.24 | 0.86 |
| 30 | New | 218.3 | 275.39 | -24.61 | 22.88 | 21.29 | 33.59 | 0.92 |
| Pan | 262.64 | -37.36 | 15.29 | 13.13 | 40.36 | 0.9 |
| 50 | New | 244.6 | 285.93 | -14.07 | 18.46 | 17.49 | 23.2 | 0.9 |
| Pan | 276.47 | -23.53 | 12.69 | 11.24 | 26.73 | 0.89 |
| 70 | New | 258.78 | 291.59 | -8.41 | 15.85 | 15.3 | 17.94 | 0.9 |
| Pan | 283.96 | -16.04 | 11.14 | 10.1 | 19.53 | 0.88 |

Table S. 7取後放回的抽樣方式在第三種物種與區塊假設下，群落一為均勻模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 149.91 | 250.1 | -49.9 | 39.71 | 34.31 | 63.76 | 0.89 |
| Pan | 228.42 | -71.58 | 25.27 | 19.96 | 75.9 | 0.87 |
| 30 | New | 210.79 | 275.31 | -24.69 | 27.07 | 23.77 | 36.63 | 0.89 |
| Pan | 260.27 | -39.73 | 17.73 | 14.62 | 43.5 | 0.89 |
| 50 | New | 238.46 | 287 | -13 | 21.37 | 19.78 | 25 | 0.9 |
| Pan | 275.48 | -24.52 | 14.5 | 12.64 | 28.48 | 0.88 |
| 70 | New | 253.86 | 291.79 | -8.21 | 17.98 | 17.07 | 19.76 | 0.89 |
| Pan | 283.04 | -16.96 | 12.63 | 11.19 | 21.14 | 0.86 |

Table S. 8取後放回的抽樣方式在第三種物種與區塊假設下，群落一為Broken-stick模型，群落二為對數常數模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 145.97 | 243.51 | -56.49 | 41.24 | 33.87 | 69.92 | 0.88 |
| Pan | 219.83 | -80.17 | 25.29 | 19.35 | 84.06 | 0.86 |
| 30 | New | 203.73 | 270.95 | -29.05 | 28.84 | 24.61 | 40.92 | 0.88 |
| Pan | 254.7 | -45.3 | 18.87 | 15.08 | 49.07 | 0.87 |
| 50 | New | 231.27 | 282.68 | -17.32 | 23.18 | 20.65 | 28.93 | 0.88 |
| Pan | 270.41 | -29.59 | 15.53 | 13.09 | 33.42 | 0.86 |
| 70 | New | 247.5 | 290.08 | -9.92 | 19.83 | 18.4 | 22.16 | 0.89 |
| Pan | 279.96 | -20.04 | 13.62 | 11.94 | 24.23 | 0.88 |

Table S. 9取後放回的抽樣方式在第四種物種與區塊假設下，群落一為同質模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 150.09 | 305.42 | 5.42 | 60.34 | 46.78 | 60.55 | 0.87 |
| Pan | 283.4 | -16.6 | 41.32 | 28.51 | 44.52 | 0.81 |
| 30 | New | 273.08 | 301.7 | 1.7 | 12.44 | 11.78 | 12.55 | 0.91 |
| Pan | 297.95 | -2.05 | 9.09 | 8.35 | 9.32 | 0.91 |
| 50 | New | 293.35 | 300.54 | 0.54 | 5.19 | 5.32 | 5.22 | 0.86 |
| Pan | 299.45 | -0.55 | 4.01 | 3.96 | 4.05 | 0.87 |
| 70 | New | 297.44 | 299.97 | -0.03 | 3.08 | 3.08 | 3.08 | 0.78 |
| Pan | 299.4 | -0.6 | 2.41 | 2.27 | 2.48 | 0.77 |

Table S. 10取後放回的抽樣方式在第四種物種與區塊假設下，兩群落皆為均勻模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 189.35 | 292.07 | -7.93 | 35.51 | 30.45 | 36.37 | 0.89 |
| Pan | 278.38 | -21.62 | 24.72 | 18.7 | 32.83 | 0.85 |
| 30 | New | 284.54 | 301 | 1 | 8.81 | 8.7 | 8.86 | 0.9 |
| Pan | 298.27 | -1.73 | 6.39 | 6.11 | 6.61 | 0.88 |
| 50 | New | 296.12 | 300.51 | 0.51 | 4.03 | 4.08 | 4.06 | 0.83 |
| Pan | 299.73 | -0.27 | 3.09 | 3.05 | 3.1 | 0.82 |
| 70 | New | 298.58 | 300.06 | 0.06 | 2.09 | 2.24 | 2.09 | 0.77 |
| Pan | 299.73 | -0.27 | 1.66 | 1.69 | 1.68 | 0.75 |

Table S. 11取後放回的抽樣方式在第四種物種與區塊假設下，群落一為均勻模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 179.09 | 280.11 | -19.89 | 39.18 | 31.17 | 43.92 | 0.86 |
| Pan | 262.25 | -37.75 | 25.55 | 18.42 | 45.58 | 0.83 |
| 30 | New | 274.47 | 300.73 | 0.73 | 13.23 | 11.92 | 13.24 | 0.88 |
| Pan | 295.92 | -4.08 | 9.39 | 8.01 | 10.23 | 0.86 |
| 50 | New | 291.63 | 301.1 | 1.1 | 6.6 | 6.55 | 6.69 | 0.87 |
| Pan | 299.63 | -0.37 | 5.02 | 4.78 | 5.03 | 0.86 |
| 70 | New | 296.42 | 300.37 | 0.37 | 3.98 | 4.04 | 3.99 | 0.81 |
| Pan | 299.7 | -0.3 | 3.13 | 3.06 | 3.14 | 0.81 |

Table S. 12取後放回的抽樣方式在第四種物種與區塊假設下，群落一為Broken-stick模型，群落二為對數常數模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample size | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 10 | New | 173.62 | 275.55 | -24.45 | 42.65 | 33.45 | 49.14 | 0.87 |
| Pan | 252.91 | -47.09 | 26.06 | 18.94 | 53.82 | 0.85 |
| 30 | New | 267.04 | 299.99 | -0.01 | 15.73 | 14.21 | 15.72 | 0.89 |
| Pan | 294.02 | -5.98 | 10.84 | 9.28 | 12.38 | 0.88 |
| 50 | New | 287.71 | 300.53 | 0.53 | 8.33 | 7.85 | 8.34 | 0.88 |
| Pan | 298.39 | -1.61 | 6.08 | 5.6 | 6.29 | 0.87 |
| 70 | New | 294.25 | 300.18 | 0.18 | 4.78 | 5.08 | 4.78 | 0.85 |
| Pan | 299.23 | -0.77 | 3.72 | 3.81 | 3.79 | 0.85 |

Table S. 13取後不放回的抽樣方式在第二種物種與區塊假設下，群落一為同質模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 130.68 | 362.92 | 62.92 | 57.39 | 51.85 | 85.15 | 0.92 |
| wNew2 | 367.58 | 67.58 | 67.43 | 56.68 | 95.45 | 0.91 |
| wChao2 | 246.5 | -53.5 | 30.8 | 24.32 | 61.73 | 0.87 |
| New | 281.9 | -18.1 | 57.45 | 45.58 | 60.21 | 0.89 |
| 0.3 | wNew1 | 251.46 | 301.58 | 1.58 | 12.87 | 9.28 | 12.96 | 0.86 |
| wNew2 | 303.04 | 3.04 | 17.49 | 14.57 | 17.75 | 0.9 |
| wChao2 | 281.44 | -18.56 | 9.7 | 9.14 | 20.94 | 0.91 |
| New | 300.09 | 0.09 | 19.47 | 19.1 | 19.46 | 0.93 |
| 0.5 | wNew1 | 277.73 | 298.96 | -1.04 | 6.91 | 7.47 | 6.98 | 0.96 |
| wNew2 | 297.61 | -2.39 | 6.19 | 5.87 | 6.64 | 0.94 |
| wChao2 | 293 | -7 | 6.28 | 5.83 | 9.4 | 0.89 |
| New | 313.52 | 13.52 | 16.8 | 16.91 | 21.56 | 0.91 |
| 0.7 | wNew1 | 289.07 | 299.78 | -0.22 | 3.77 | 4.05 | 3.78 | 0.97 |
| wNew2 | 298.57 | -1.43 | 3.41 | 3.51 | 3.7 | 0.96 |
| wChao2 | 298.03 | -1.97 | 3.72 | 3.73 | 4.2 | 0.9 |
| New | 324.13 | 24.13 | 14.71 | 17.16 | 28.25 | 0.94 |

Table S. 14取後不放回的抽樣方式在第二種物種與區塊假設下，兩群落皆為均勻模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 127.75 | 307 | 7 | 46.02 | 44.82 | 46.52 | 0.96 |
| wNew2 | 310.62 | 10.62 | 51.95 | 43.1 | 53 | 0.93 |
| wChao2 | 216.34 | -83.66 | 24.65 | 19.44 | 87.21 | 0.87 |
| New | 246.24 | -53.76 | 46.83 | 38.83 | 71.28 | 0.9 |
| 0.3 | wNew1 | 234.05 | 293.31 | -6.69 | 14.79 | 14.22 | 16.22 | 0.95 |
| wNew2 | 297.63 | -2.37 | 20.14 | 16.8 | 20.27 | 0.92 |
| wChao2 | 269.31 | -30.69 | 10.75 | 9.88 | 32.52 | 0.91 |
| New | 294.08 | -5.92 | 22.85 | 21.09 | 23.6 | 0.9 |
| 0.5 | wNew1 | 266.21 | 296.56 | -3.44 | 8.7 | 8.48 | 9.35 | 0.95 |
| wNew2 | 299.01 | -0.99 | 10.75 | 8.89 | 10.79 | 0.9 |
| wChao2 | 287.46 | -12.54 | 7.63 | 6.76 | 14.68 | 0.9 |
| New | 314.96 | 14.96 | 20.43 | 19.06 | 25.31 | 0.91 |
| 0.7 | wNew1 | 282.98 | 299.08 | -0.92 | 5.17 | 4.97 | 5.25 | 0.94 |
| wNew2 | 299.33 | -0.67 | 5.34 | 4.81 | 5.38 | 0.93 |
| wChao2 | 296.37 | -3.63 | 5.05 | 4.55 | 6.22 | 0.89 |
| New | 338.29 | 38.29 | 20.47 | 21.34 | 43.42 | 0.94 |

Table S. 15取後不放回的抽樣方式在第二種物種與區塊假設下，群落一為均勻模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 126.46 | 290.5 | -9.5 | 43.59 | 38.73 | 44.59 | 0.92 |
| wNew2 | 298.7 | -1.3 | 55.97 | 44.9 | 55.96 | 0.91 |
| wChao2 | 208.76 | -91.24 | 24.23 | 19.12 | 94.4 | 0.87 |
| New | 243.6 | -56.4 | 47.84 | 38.78 | 73.94 | 0.88 |
| 0.3 | wNew1 | 226.84 | 292.14 | -7.86 | 16.96 | 14.86 | 18.68 | 0.93 |
| wNew2 | 292.69 | -7.31 | 23.21 | 17.63 | 24.33 | 0.89 |
| wChao2 | 266.22 | -33.78 | 12.58 | 10.78 | 36.04 | 0.88 |
| New | 296.13 | -3.87 | 27.57 | 24.19 | 27.82 | 0.89 |
| 0.5 | wNew1 | 261.66 | 297.21 | -2.79 | 8.82 | 9.22 | 9.25 | 0.95 |
| wNew2 | 295.56 | -4.44 | 10.48 | 9.19 | 11.37 | 0.92 |
| wChao2 | 286.87 | -13.13 | 7.84 | 7.46 | 15.29 | 0.9 |
| New | 321.63 | 21.63 | 21 | 22.07 | 30.14 | 0.94 |
| 0.7 | wNew1 | 281.01 | 299.48 | -0.52 | 5.33 | 5.33 | 5.35 | 0.95 |
| wNew2 | 298.62 | -1.38 | 5.29 | 5.07 | 5.47 | 0.94 |
| wChao2 | 296.41 | -3.59 | 5.23 | 4.89 | 6.34 | 0.89 |
| New | 342.5 | 42.5 | 20.79 | 23.2 | 47.31 | 0.95 |

Table S. 16取後放回的抽樣方式在第二種物種與區塊假設下，群落一為Broken-stick模型，群落二為對數常數模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 121.46 | 281.99 | -18.01 | 45.1 | 41.19 | 48.55 | 0.94 |
| wNew2 | 289.4 | -10.6 | 56.21 | 47.55 | 57.17 | 0.92 |
| wChao2 | 202.71 | -97.29 | 25.03 | 19.93 | 100.45 | 0.86 |
| New | 243.35 | -56.65 | 50.83 | 41.75 | 76.09 | 0.87 |
| 0.3 | wNew1 | 223.8 | 300.33 | 0.33 | 18.11 | 19.63 | 18.1 | 0.96 |
| wNew2 | 301.57 | 1.57 | 24.47 | 19.4 | 24.51 | 0.91 |
| wChao2 | 270.02 | -29.98 | 13.43 | 11.79 | 32.85 | 0.9 |
| New | 305 | 5 | 31.71 | 27.54 | 32.09 | 0.9 |
| 0.5 | wNew1 | 262.84 | 300.66 | 0.66 | 9.32 | 9.79 | 9.34 | 0.96 |
| wNew2 | 301.37 | 1.37 | 11.91 | 9.81 | 11.99 | 0.89 |
| wChao2 | 289.22 | -10.78 | 8.19 | 7.55 | 13.54 | 0.9 |
| New | 321.8 | 21.8 | 22.39 | 22.04 | 31.24 | 0.92 |
| 0.7 | wNew1 | 283.23 | 300.3 | 0.3 | 4.97 | 5.13 | 4.98 | 0.96 |
| wNew2 | 300.49 | 0.49 | 5.2 | 5.04 | 5.22 | 0.94 |
| wChao2 | 296.91 | -3.09 | 4.79 | 4.59 | 5.7 | 0.91 |
| New | 330.09 | 30.09 | 17.81 | 19.61 | 34.97 | 0.95 |

Table S. 17取後不放回的抽樣方式在第三種物種與區塊假設下，群落一為同質模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 159.06 | 372.81 | 72.81 | 47.62 | 39.16 | 86.99 | 0.91 |
| wNew2 | 381.44 | 81.44 | 70.92 | 56.44 | 107.96 | 0.92 |
| wChao2 | 271.82 | -28.18 | 27.94 | 23.77 | 39.67 | 0.9 |
| New | 308.83 | 8.83 | 56.2 | 44.22 | 56.86 | 0.9 |
| 0.3 | wNew1 | 243.7 | 322.57 | 22.57 | 16.72 | 12.52 | 28.08 | 0.85 |
| wNew2 | 324.62 | 24.62 | 23.44 | 17.08 | 33.99 | 0.87 |
| wChao2 | 289.62 | -10.38 | 11.8 | 10.95 | 15.71 | 0.92 |
| New | 312.97 | 12.97 | 23.34 | 21.64 | 26.69 | 0.92 |
| 0.5 | wNew1 | 277.54 | 305.85 | 5.85 | 7.26 | 6.93 | 9.32 | 0.94 |
| wNew2 | 306.52 | 6.52 | 10.1 | 7.98 | 12.02 | 0.9 |
| wChao2 | 296.67 | -3.33 | 6.05 | 5.99 | 6.9 | 0.91 |
| New | 322.72 | 22.72 | 18.08 | 18.55 | 29.03 | 0.94 |
| 0.7 | wNew1 | 291.93 | 301.16 | 1.16 | 3.25 | 3.74 | 3.45 | 0.97 |
| wNew2 | 302.56 | 2.56 | 3.73 | 4.04 | 4.53 | 0.96 |
| wChao2 | 299.35 | -0.65 | 3.02 | 3.18 | 3.09 | 0.91 |
| New | 329.92 | 29.92 | 14.28 | 18.41 | 33.14 | 0.96 |

Table S. 18取後不放回的抽樣方式在第三種物種與區塊假設下，兩群落皆為均勻模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 160.17 | 301.53 | 1.53 | 34.34 | 28.41 | 34.35 | 0.9 |
| wNew2 | 306.52 | 6.52 | 41.04 | 35.79 | 41.53 | 0.92 |
| wChao2 | 233.84 | -66.16 | 20.05 | 16.93 | 69.13 | 0.89 |
| New | 262.46 | -37.54 | 37.84 | 32.68 | 53.29 | 0.9 |
| 0.3 | wNew1 | 225.7 | 292.87 | -7.13 | 17.65 | 14.13 | 19.03 | 0.9 |
| wNew2 | 297.51 | -2.49 | 25.17 | 19.37 | 25.28 | 0.89 |
| wChao2 | 264.79 | -35.21 | 12.57 | 10.53 | 37.39 | 0.87 |
| New | 289 | -11 | 26.09 | 21.81 | 28.3 | 0.88 |
| 0.5 | wNew1 | 254.95 | 295.07 | -4.93 | 11.89 | 9.93 | 12.87 | 0.9 |
| wNew2 | 297.61 | -2.39 | 17.31 | 12.8 | 17.47 | 0.86 |
| wChao2 | 280.67 | -19.33 | 9.33 | 7.9 | 21.46 | 0.87 |
| New | 307.28 | 7.28 | 22.1 | 19.68 | 23.26 | 0.89 |
| 0.7 | wNew1 | 271.15 | 296.99 | -3.01 | 8.69 | 7.58 | 9.19 | 0.9 |
| wNew2 | 298.39 | -1.61 | 10.81 | 8.28 | 10.92 | 0.87 |
| wChao2 | 289.4 | -10.6 | 7.38 | 6.26 | 12.91 | 0.87 |
| New | 331.18 | 31.18 | 24.84 | 23.16 | 39.86 | 0.91 |

Table S. 19取後不放回的抽樣方式在第三種物種與區塊假設下，群落一為均勻模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 153.34 | 299.63 | -0.37 | 36.79 | 28.53 | 36.78 | 0.89 |
| wNew2 | 306.01 | 6.01 | 49.36 | 41.08 | 49.7 | 0.93 |
| wChao2 | 230.42 | -69.58 | 21.62 | 17.94 | 72.86 | 0.88 |
| New | 266.17 | -33.83 | 45.96 | 36.79 | 57.05 | 0.89 |
| 0.3 | wNew1 | 219.68 | 294.34 | -5.66 | 17.76 | 14.97 | 18.64 | 0.9 |
| wNew2 | 296.39 | -3.61 | 26.62 | 20.19 | 26.85 | 0.9 |
| wChao2 | 263.91 | -36.09 | 12.81 | 11.37 | 38.29 | 0.89 |
| New | 296.76 | -3.24 | 28.32 | 25.95 | 28.49 | 0.9 |
| 0.5 | wNew1 | 251.18 | 295.7 | -4.3 | 11.41 | 10.4 | 12.19 | 0.93 |
| wNew2 | 295.13 | -4.87 | 16.05 | 12.46 | 16.76 | 0.88 |
| wChao2 | 280.36 | -19.64 | 8.98 | 8.37 | 21.6 | 0.91 |
| New | 315.41 | 15.41 | 22.86 | 23.04 | 27.55 | 0.94 |
| 0.7 | wNew1 | 269.77 | 297.37 | -2.63 | 8.12 | 7.85 | 8.54 | 0.95 |
| wNew2 | 296.27 | -3.73 | 10.18 | 8.17 | 10.84 | 0.9 |
| wChao2 | 289.27 | -10.73 | 6.85 | 6.43 | 12.73 | 0.89 |
| New | 331.2 | 31.2 | 20.99 | 22.91 | 37.59 | 0.95 |

Table S. 20取後放回的抽樣方式在第三種物種與區塊假設下，群落一為Broken-stick模型，群落二為對數常數模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 154.28 | 287.93 | -12.07 | 34.12 | 30.25 | 36.17 | 0.92 |
| wNew2 | 295.85 | -4.15 | 45.06 | 37.19 | 45.22 | 0.92 |
| wChao2 | 225.06 | -74.94 | 20.74 | 16.82 | 77.76 | 0.88 |
| New | 262.05 | -37.95 | 42.71 | 35.21 | 57.12 | 0.88 |
| 0.3 | wNew1 | 218.34 | 294.71 | -5.29 | 19.27 | 17.85 | 19.98 | 0.93 |
| wNew2 | 297.44 | -2.56 | 26.98 | 21.25 | 27.09 | 0.91 |
| wChao2 | 263.33 | -36.67 | 13.56 | 11.91 | 39.1 | 0.9 |
| New | 295.2 | -4.8 | 30.68 | 25.92 | 31.03 | 0.9 |
| 0.5 | wNew1 | 248.75 | 296.35 | -3.65 | 13.12 | 12.26 | 13.61 | 0.94 |
| wNew2 | 295.36 | -4.64 | 17.39 | 13.65 | 17.99 | 0.9 |
| wChao2 | 279.09 | -20.91 | 10.32 | 9.11 | 23.32 | 0.88 |
| New | 305.35 | 5.35 | 23.07 | 21.46 | 23.67 | 0.9 |
| 0.7 | wNew1 | 266.82 | 297.64 | -2.36 | 8.66 | 9.02 | 8.97 | 0.95 |
| wNew2 | 295.41 | -4.59 | 11.58 | 9.24 | 12.45 | 0.89 |
| wChao2 | 287.74 | -12.26 | 7.36 | 7.17 | 14.3 | 0.91 |
| New | 310.82 | 10.82 | 17.42 | 18.4 | 20.5 | 0.92 |

Table S. 21取後不放回的抽樣方式在第四種物種與區塊假設下，群落一為同質模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 159.21 | 378.76 | 78.76 | 49.18 | 39.61 | 92.84 | 0.88 |
| wNew2 | 390.72 | 90.72 | 93.01 | 60.94 | 129.89 | 0.92 |
| wChao2 | 272.87 | -27.13 | 28.1 | 24.33 | 39.05 | 0.9 |
| New | 304.06 | 4.06 | 51.66 | 42.84 | 51.79 | 0.9 |
| 0.3 | wNew1 | 271.94 | 304.89 | 4.89 | 10.57 | 7.71 | 11.65 | 0.85 |
| wNew2 | 306.91 | 6.91 | 14.07 | 11.29 | 15.67 | 0.9 |
| wChao2 | 291.25 | -8.75 | 7.89 | 7.03 | 11.78 | 0.88 |
| New | 300.94 | 0.94 | 14.23 | 13.25 | 14.25 | 0.9 |
| 0.5 | wNew1 | 288.99 | 299.8 | -0.2 | 4.89 | 5.05 | 4.89 | 0.96 |
| wNew2 | 299.24 | -0.76 | 4.14 | 3.99 | 4.21 | 0.94 |
| wChao2 | 296.71 | -3.29 | 4.41 | 4.11 | 5.51 | 0.86 |
| New | 305.96 | 5.96 | 10.79 | 10.9 | 12.32 | 0.88 |
| 0.7 | wNew1 | 294.62 | 299.85 | -0.15 | 2.77 | 2.84 | 2.77 | 0.95 |
| wNew2 | 299.3 | -0.7 | 2.53 | 2.46 | 2.62 | 0.95 |
| wChao2 | 298.96 | -1.04 | 2.71 | 2.59 | 2.9 | 0.85 |
| New | 310.06 | 10.06 | 9.8 | 10.72 | 14.04 | 0.91 |

Table S. 22取後不放回的抽樣方式在第四種物種與區塊假設下，兩群落皆為均勻模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 157.26 | 303.89 | 3.89 | 37.19 | 29.35 | 37.37 | 0.88 |
| wNew2 | 305.92 | 5.92 | 46.18 | 37.24 | 46.53 | 0.91 |
| wChao2 | 231.82 | -68.18 | 21.15 | 17.38 | 71.38 | 0.88 |
| New | 256.95 | -43.05 | 38.25 | 32.16 | 57.57 | 0.88 |
| 0.3 | wNew1 | 250.49 | 296.33 | -3.67 | 13.18 | 10.6 | 13.68 | 0.9 |
| wNew2 | 297.62 | -2.38 | 19.24 | 15.12 | 19.37 | 0.89 |
| wChao2 | 277.91 | -22.09 | 9.81 | 8.74 | 24.16 | 0.9 |
| New | 295.75 | -4.25 | 19.08 | 17.75 | 19.53 | 0.9 |
| 0.5 | wNew1 | 275.77 | 298.84 | -1.16 | 7.36 | 6.71 | 7.45 | 0.94 |
| wNew2 | 298.2 | -1.8 | 7.68 | 6.89 | 7.89 | 0.93 |
| wChao2 | 291.99 | -8.01 | 6.51 | 5.92 | 10.32 | 0.89 |
| New | 311.21 | 11.21 | 15.68 | 15.64 | 19.27 | 0.92 |
| 0.7 | wNew1 | 288.22 | 299.65 | -0.35 | 4.22 | 4.07 | 4.23 | 0.94 |
| wNew2 | 298.83 | -1.17 | 3.97 | 3.79 | 4.13 | 0.94 |
| wChao2 | 297.66 | -2.34 | 4.12 | 3.82 | 4.74 | 0.88 |
| New | 323.15 | 23.15 | 14.83 | 16.28 | 27.49 | 0.93 |

Table S. 23取後不放回的抽樣方式在第四種物種與區塊假設下，群落一為均勻模型，群落二為Broken-stick模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 156.58 | 299.21 | -0.79 | 36.43 | 27.89 | 36.42 | 0.87 |
| wNew2 | 308.3 | 8.3 | 52.99 | 42.89 | 53.61 | 0.93 |
| wChao2 | 229.88 | -70.12 | 20.99 | 17.59 | 73.19 | 0.89 |
| New | 256.18 | -43.82 | 40.83 | 33.23 | 59.88 | 0.89 |
| 0.3 | wNew1 | 246.82 | 294.05 | -5.95 | 14.91 | 10.63 | 16.04 | 0.84 |
| wNew2 | 301.68 | 1.68 | 22.18 | 16.98 | 22.23 | 0.89 |
| wChao2 | 275.39 | -24.61 | 11.32 | 8.99 | 27.09 | 0.86 |
| New | 295.65 | -4.35 | 23.25 | 19.35 | 23.65 | 0.86 |
| 0.5 | wNew1 | 272.32 | 297.78 | -2.22 | 7.84 | 7.03 | 8.14 | 0.92 |
| wNew2 | 297.55 | -2.45 | 8.79 | 7.69 | 9.12 | 0.92 |
| wChao2 | 290.34 | -9.66 | 6.92 | 6.29 | 11.88 | 0.89 |
| New | 314.46 | 14.46 | 17.74 | 17.83 | 22.88 | 0.92 |
| 0.7 | wNew1 | 286.38 | 299.71 | -0.29 | 4.6 | 4.43 | 4.6 | 0.94 |
| wNew2 | 298.6 | -1.4 | 4.48 | 4.18 | 4.7 | 0.93 |
| wChao2 | 297.47 | -2.53 | 4.49 | 4.15 | 5.15 | 0.89 |
| New | 330.72 | 30.72 | 17.57 | 19.77 | 35.39 | 0.94 |

Table S. 24取後放回的抽樣方式在第四種物種與區塊假設下，群落一為Broken-stick模型，群落二為對數常數模型之情況下的估計結果。

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| q | Estimator | Obs | AVG Estimate | Bias | Sample SE | Est. SD | RMSE | 95% CI Coverage |
| 0.1 | wNew1 | 172.25 | 287.63 | -12.37 | 29.71 | 25.04 | 32.17 | 0.91 |
| wNew2 | 294.11 | -5.89 | 46.14 | 37.59 | 46.49 | 0.92 |
| wChao2 | 232.28 | -67.72 | 17.57 | 15.58 | 69.96 | 0.9 |
| New | 256.73 | -43.27 | 32.13 | 29.1 | 53.89 | 0.9 |
| 0.3 | wNew1 | 250.99 | 296.51 | -3.49 | 13.49 | 12.17 | 13.93 | 0.92 |
| wNew2 | 298.37 | -1.63 | 19.4 | 16.35 | 19.46 | 0.91 |
| wChao2 | 279.12 | -20.88 | 10.51 | 9.23 | 23.38 | 0.88 |
| New | 298.74 | -1.26 | 21.2 | 19.82 | 21.23 | 0.89 |
| 0.5 | wNew1 | 274.96 | 298.46 | -1.54 | 7.07 | 7.12 | 7.23 | 0.95 |
| wNew2 | 296.43 | -3.57 | 6.37 | 6.4 | 7.3 | 0.95 |
| wChao2 | 291.84 | -8.16 | 6.42 | 6.12 | 10.38 | 0.9 |
| New | 313.39 | 13.39 | 17 | 17.48 | 21.63 | 0.92 |
| 0.7 | wNew1 | 287.79 | 299.62 | -0.38 | 3.99 | 4.19 | 4.01 | 0.96 |
| wNew2 | 298.47 | -1.53 | 3.59 | 3.73 | 3.9 | 0.95 |
| wChao2 | 297.65 | -2.35 | 3.94 | 3.91 | 4.58 | 0.9 |
| New | 325.28 | 25.28 | 15.77 | 17.75 | 29.79 | 0.93 |