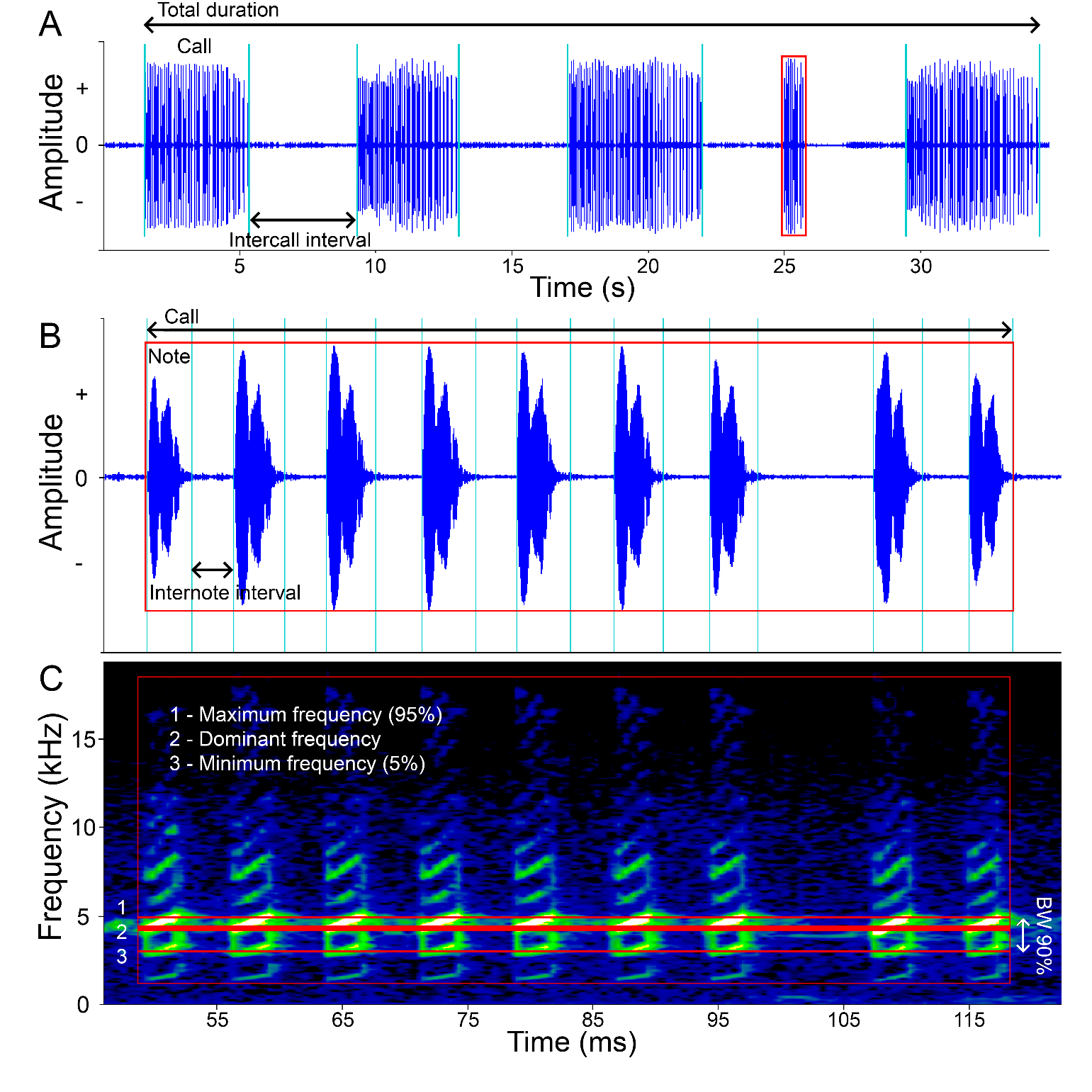
**Communication across multiple sensory modes: quantifying the rich behavioural repertoire of a Neotropical torrent frog**

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**Figure A1.** Demonstration of how we performed the selection of each parameter during the sounds analyses. The parameters of time were measured in the waveform, while the spectral parameters were measured in the spectrogram. (A) We measured call duration, selecting from the beginning of the first note to the end of the last one. Inter-call interval represents the measure between two calls of a same call group. The call rate was the number of calls within one minute. (B) We considered note as a call subunit with 100% of amplitude modulation. Notes per call were the number of these subunits in each call, and note duration was the duration from the beginning to the end of each note. Inter-note interval was the time between two notes. (C) For spectral parameters, we select the call completely in the spectrogram and the measurements were automatically available from the software: dominant frequency (peak frequency function in Raven); minimum frequency (frequency 5% function in Raven); maximum frequency (frequency 95% function in Raven); and frequency bandwidth (BW 90% function in Raven).

**Table A1.** Catalogue numbers of media analysed.

|  |  |  |  |
| --- | --- | --- | --- |
| Male ID | Field number | Audio voucher | Video voucher |
| 1 | GH001 | FNJV 45485 | ZUEC-VID 818 |
| 2 | GH002 | FNJV 45486 | ZUEC-VID 819 |
| 3 | GH003 | FNJV 45487 | ZUEC-VID 820 |
| 4 | GH004 | FNJV 45488 | ZUEC-VID 821 |
| 5 | GH005 | FNJV 45489 | ZUEC-VID 822 |
| 6 | GH006 | FNJV 45490 | ZUEC-VID 823 |
| 7 | GH007 | FNJV 45491 | ZUEC-VID 824 |
| 8 | GH008 | FNJV 45492 | ZUEC-VID 825 |
| 9 | GH009 | FNJV 45493 | ZUEC-VID 826 |
| 10 | GH010 | FNJV 45494 | ZUEC-VID 827 |
| 11 | GH011 | FNJV 45495 | ZUEC-VID 828 |
| 12 | GH012 | FNJV 45496 | ZUEC-VID 829 |
| 13 | GH013 | FNJV 45497 | ZUEC-VID 830 |
| 14 | GH014 | FNJV 45498 | ZUEC-VID 831 |
| 15 | GH015 | FNJV 45499 | ZUEC-VID 832 |
| 16 | GH016 | FNJV 45500 | ZUEC-VID 833 |
| 17 | GH017 | FNJV 45501 | ZUEC-VID 834 |
| 18 | GH018 | FNJV 45502 | ZUEC-VID 835 |
| 19 | GH035 | FNJV 45503 | ZUEC-VID 836 |
| 20 | GH036 | FNJV 45504 | ZUEC-VID 837 |
| 21 | GH037 | FNJV 45505 | ZUEC-VID 838 |
| 22 | GH038 | FNJV 45506 | ZUEC-VID 839 |
| 23 | GH039 | FNJV 45507 | ZUEC-VID 840 |
| 24 | GH040 | FNJV 45508 | ZUEC-VID 841 |
| 25 | GH041 | FNJV 45509 | ZUEC-VID 842 |
| 26 | GH042 | FNJV 45510 | ZUEC-VID 843 |
| 27 | GH043 | FNJV 45511 | ZUEC-VID 844 |
| 28 | GH044 | FNJV 45512 | ZUEC-VID 845 |
| 29 | GH045 | FNJV 45513 | ZUEC-VID 846 |
| 30 | GH046 | FNJV 45514 | ZUEC-VID 847 |
| 31 | GH047 | FNJV 45515 | ZUEC-VID 848 |
| 32 | GH049 | FNJV 45516 | ZUEC-VID 849 |
| 33 | GH019 | FNJV 45517 | ZUEC-VID 850 |
| 34 | GH020 | FNJV 45518 | ZUEC-VID 851 |
| 35 | GH021 | FNJV 45519 | ZUEC-VID 852 |
| 36 | GH022 | FNJV 45520 | ZUEC-VID 853 |
| 37 | GH023 | FNJV 45521 | ZUEC-VID 854 |
| 38 | GH024 | FNJV 45522 | ZUEC-VID 855 |
| 39 | GH025 | FNJV 45523 | ZUEC-VID 856 |
| 40 | GH026 | FNJV 45524 | ZUEC-VID 857 |
| 41 | GH027 | FNJV 45525 | ZUEC-VID 858 |
| 42 | GH028 | FNJV 45526 | ZUEC-VID 859 |
| 43 | GH029 | FNJV 45527 | ZUEC-VID 860 |
| 44 | GH030 | FNJV 45528 | ZUEC-VID 861 |
| 45 | GH031 | FNJV 45529 | ZUEC-VID 862 |
| 46 | GH032 | FNJV 45530 | ZUEC-VID 863 |
| 47 | GH033 | FNJV 45531 | ZUEC-VID 864 |
| 48 | GH034 | FNJV 45532 | ZUEC-VID 865 |
| 49 | GH048 | FNJV 45533 | ZUEC-VID 866 |
| 50 | GH050 | FNJV 45534 | ZUEC-VID 867\* |
| 51 | GH051 | FNJV 45535 | ZUEC-VID 868 |
| 52 | GH052 | FNJV 45536 | ZUEC-VID 869 |
| 53 | GH053 | FNJV 45537 | ZUEC-VID 870 |
| 54 | GH054 | FNJV 45538 | ZUEC-VID 871 |
| 55 | GH055 | FNJV 45539 | ZUEC-VID 872 |
| 56 | GH056 | FNJV 45540 | ZUEC-VID 873 |
| 57 | GH059 | FNJV 45541 | ZUEC-VID 874 |
| 58 | GH060 | FNJV 45542 | ZUEC-VID 875 |
| 59 | RVB001 | not recorded | ZUEC-VID 876 |
| 60 | RVB002 | not recorded | ZUEC-VID 877 |
| 61 | RVB003 | not recorded | ZUEC-VID 878 |
| 62 | RVB004 | not recorded | ZUEC-VID 879 |
| 63 | RVP001 | not recorded | ZUEC-VID 880 |
| 64 | RVP002 | not recorded | ZUEC-VID 881 |
| 65 | RVP003 | not recorded | ZUEC-VID 882 |
| 66 | RVP004 | not recorded | ZUEC-VID 883 |
| 67 | RVP005 | not recorded | ZUEC-VID 884 |
| 68 | RVP006 | not recorded | ZUEC-VID 885 |
| 69 | RVP007 | not recorded | ZUEC-VID 886 |
| 70 | RVP008 | not recorded | ZUEC-VID 887 |
| 71 | RVP009 | not recorded | ZUEC-VID 888 |
| 72 | RVP010 | not recorded | ZUEC-VID 889 |
| 73 | RVP011 | not recorded | ZUEC-VID 890 |
| 74 | RVP012 | not recorded | ZUEC-VID 891 |
| 75 | RVP013 | not recorded | ZUEC-VID 892 |
| 76 | RVP014 | not recorded | ZUEC-VID 893 |
| 77 | RVP015 | not recorded | ZUEC-VID 894 |
| 78 | RVP016 | not recorded | ZUEC-VID 867\* |

Audios and videos were deposited at Audiovisual Collection (Fonoteca Neotropical Jacques Vielliard (FNJV) and Video Collection(Museu de Diversidade Biológica (MDBio), Universidade Estadual de Campinas (Unicamp), Campinas, SP, Brazil. An asterisk represents two males observed in the same video.

**Table A2.** Summary of the principal component importance and axis loading on advertisement call parameters of the *Hylodes phyllodes* from Bertioga and Picinguaba.

|  |  |  |  |
| --- | --- | --- | --- |
|  | PC1 | PC2 | PC3 |
| Variance | 2.585 | 1.990 | 1.855 |
| Proportion of variance | 25.848 | 19.904 | 18.547 |
| Cumulative | 25.848 | 45.752 | 64.299 |
|  |  |  |  |
| Loadings |  |  |  |
| Call duration | –0.764 | 0.547 | 0.025 |
| Notes per call | –0.681 | 0.558 | –0.029 |
| Inter-call interval | 0.408 | 0.385 | –0.438 |
| Note duration | –0.324 | 0.018 | 0.274 |
| Inter-note interval | 0.102 | 0.016 | 0.494 |
| Call rate | 0.245 | –0.72 | 0.425 |
| Dominant frequency | 0.433 | 0.347 | 0.575 |
| Minimun frequency | –0.435 | 0.026 | 0.752 |
| Maximun frequency | 0.516 | 0.595 | 0.506 |
| Frequency bandwidth | 0.744 | 0.488 | –0.095 |

**Table A3.** Advertisement call spectral and temporal parameters from all individuals of *Hylodes phyllodes* analysed.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Male ID | Locality | Call duration (s) | Notes per call (*n*) | Inter-call interval (s) | Note duration (ms) | Inter-note interval (ms) | Call rate (calls/min) | Dominant frequency (kHz) | Minimum frequency (kHz) | Maximum frequency (kHz) | Frequency bandwidth (kHz) |
| 1 | B | 1.88 ± 0.66 | 17.19 ± 4.75 | 1.76 ± 0.33 | 37.53 ± 4.53 | 77.56 ± 38.97 | 16.65 | 4.80 ± 0.16 | 4.43 ± 0.05 | 5.37 ± 0.07 | 0.94 ± 0.07 |
| (0.62–5.13; 48) | (7–38; 48) | (1.45–3.28; 47) | (23.6–54.2; 810) | (35.1–293.6; 761) | (4.48–5.25; 48) | (4.31–4.56; 48) | (5.25–5.51; 48) | (0.86–1.12; 48) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | B | 1.55 ± 0.77 | 14.42 ± 6.23 | 3.54 ± 0.66 | 51.18 ± 6.16 | 57.78 ± 26.64 | 12.06 | 5.12 ± 0.29 | 4.33 ± 0.17 | 5.41 ± 0.07 | 1.08 ± 0.17 |
| (0.40–4.74; 36) | (4–39; 36) | (2.86–6.32; 34) | (30.8–64.8; 525) | (13.4–193.5; 483) | (4.56–5.51; 36) | (3.53–4.56; 36) | (5.25–5.51; 36) | (0.86–1.89; 36) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | B | 1.46 ± 0.23 | 14.86 ± 1.48 | 3.54 ± 0.65 | 37.53 ± 3.9 | 65.61 ± 31.04 | 12.29 | 4.85 ± 0.19 | 4.53 ± 0.19 | 5.29 ± 0.1 | 0.76 ± 0.23 |
| (0.60–1.86; 29) | (12–18; 29) | (2.84–5.31; 28) | (29–51.5; 420) | (27.3–163.2; 397) | (4.65–5.25; 29) | (3.62–4.74; 29) | (4.99–5.43; 29) | (0.43–1.81; 29) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 4 | B | 1.76 ± 0.58 | 18.37 ± 4.98 | 3.4 ± 0.5 | 40.46 ± 4.67 | 56.11 ± 27.24 | 11.98 | 4.64 ± 0.16 | 4.42 ± 0.08 | 5.28 ± 0.08 | 0.86 ± 0.06 |
| 0.92–3; 30) | (11–30; 30) | (2.41–4.64; 29) | (27.4–54.9; 551) | (21.7–173.5; 491) | (4.39–5.17; 30) | (4.31–4.56; 30) | (5.17–5.43; 30) | (0.77–0.95; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | B | 0.99 ± 0.16 | 10.47 ± 1.46 | 8.11 ± 6.14 | 27.12 ± 6.05 | 73.51 ± 33.62 | 6.89 | 4.73 ± 0.16 | 4.11 ± 0.09 | 4.93 ± 0.14 | 0.82 ± 0.08 |
| (0.81–1.46; 19) | (9–15; 19) | (3.99–29.55; 18) | (8.4–38.1; 199) | (35.1–176.8; 180) | (4.56–4.99; 19) | (3.87–4.31; 19) | (4.65–5.08; 19) | (0.69–0.95; 19) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 6 | B | 1.28 ± 0.14 | 13.47 ± 1.36 | 3.41 ± 0.43 | 38.23 ± 3.1 | 58.93 ± 24.81 | 13.06 | 5.03 ± 0.11 | 3.93 ± 0.16 | 5.37 ± 0.05 | 1.44 ± 0.15 |
| (1.04–1.66; 30) | (11–17; 30) | (2.66–4.4; 29) | (30.1–48.4; 404) | (21.9–142.4; 373 | (4.65–5.08; 30) | (3.36–4.22; 30) | (5.25–5.43; 30) | (1.12–1.89; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 7 | B | 0.99 ± 0.17 | 8.45 ± 1.16 | 3.04 ± 0.4 | 48.34 ± 5.26 | 77.76 ± 30.02 | 15.42 | 4.97 ± 0.21 | 4.43 ± 0.08 | 5.43 ± 0.06 | 1 ± 0.08 |
| (0.17–0.52; 20) | (5–10; 20) | (2.44 -3.85; 19) | (21.8–62.6; 169) | (28.8–190.3; 149) | (4.74–5.34; 20) | (4.22–4.56; 20) | (5.25–5.51; 20) | (0.86–1.2; 20) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 8 | B | 1.60 ± 0.26 | 14.5 ± 1.71 | 4.95 ± 1.41 | 38.32 ± 3.84 | 75.41 ± 38.1 | 9.37 | 5.22 ± 0.09 | 4.38 ± 0.28 | 5.38 ± 0.04 | 0.99 ± 0.3 |
| (1.16–2.17; 30) | (12–19; 30) | (3.62–9.53; 29) | (29.1–54.8; 435) | (32.9–246; 404 | (5.08–5.34; 30) | (3.44–4.56; 30) | (5.34–5.43; 30) | (0.77–1.98; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 9 | B | 1.27 ± 0.27 | 12.8 ± 2.2 | 4.19 ± 0.88 | 39.14 ± 4.34 | 64.73 ± 32.67 | 10.77 | 4.54 ± 0.29 | 3.95 ± 0.28 | 5.27 ± 0.14 | 1.32 ± 0.34 |
| (0.55–1.85; 30) | (7–18; 30) | (3.23–6.92; 29) | (27.5–50.1; 398) | (29.9–172.9; 367) | (4.22–5.34; 30) | (3.36–4.31; 30) | (5.08–5.51; 30) | (0.95–2.07; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 10 | B | 1.83 ± 0.53 | 18.8 ± 5.01 | 4.03 ± 0.65 | 34.42 ± 3.74 | 64.68 ± 31.94 | 10.51 | 4.65 ± 0 | 3.83 ± 0.31 | 5.04 ± 0.06 | 1.29 ± 0.27 |
| (0.65–2.66; 30) | (8–26; 30) | (2.81–5.72; 29) | (12.6–45.7; 564) | (30.1–251.8; 533) | (4.65–4.65; 30) | (3.39–4.31; 30) | (4.91–5.17; 30) | (0.77–1.64; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 11 | B | 1.52 ± 0.21 | 13.82 ± 1.71 | 3.96 ± 1.16 | 38.99 ± 4.61 | 75.11 ± 36.18 | 11.26 | 5 ± 0.11 | 4.69 ± 0.07 | 5.21 ± 0.05 | 0.52 ± 0.09 |
| (1.13–2.04; 28) | (11–18; 28) | (2.83–7.73; 26) | (28.1–52.6; 386) | (37.2–193.6; 357) | (4.82–5.25; 28) | (4.56–4.91; 28) | (5.17–5.34; 28) | (0.34–0.69; 28) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 12 | B | 2.25 ± 0.63 | 19 ± 4.81 | 5.84 ± 3.86 | 35.82 ± 4.9 | 85.64 ± 38.8 | 7.58 | 5.22 ± 0.08 | 4.38 ± 0.1 | 5.31 ± 0.05 | 0.92 ± 0.08 |
| (1.14–3.49; 30) | (11–29; 30) | (2.11–22.07; 29) | (25.3–52.2; 570) | (39.3–238.8; 539) | (5.08–5.34; 30) | (4.22–4.65; 30) | (5.25–5.43; 30) | (0.77–1.03; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 13 | B | 2.52 ± 1.13 | 20.53 ± 8.02 | 4.58 ± 1.63 | 39.53 ± 3.36 | 85.36 ± 34.92 | 8.62 | 4.62 ± 0.04 | 4.18 ± 0.26 | 4.95 ± 0.08 | 0.77 ± 0.24 |
| (1.15–6.17; 30) | (13–47; 30) | (2.53–9.74; 29) | (10.3–48.3; 616) | (44.8–190.5; 586) | (4.56–4.65; 30) | (3.36–4.39; 30) | (4.82–5.08; 30) | (0.6–1.46; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 14\* | B | 2.2 ± 0.69 | 20.43 ± 5.29 | 4.08 ± 0.78 | 38.15 ± 4.05 | 71.9 ± 33.56 | 9.58 | 5.32 ± 0.16 | 3.56 ± 0.39 | 5.44 ± 0.08 | 1.88 ± 0.42 |
| (1.2–3.81; 30) | (12–32; 30) | (2.84–5.87; 29) | (17–51; 613) | (31.5–182.1; 582) | (4.48–5.43; 30) | (3.27–4.39; 30) | (5.34–5.86; 30) | (1.03–2.58; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 15\* | B | 1.02 ± 0.26 | 10.73 ± 2.29 | 4.88 ± 1.39 | 37.7 ± 4.25 | 61.55 ± 22.56 | 10.43 | 4.87 ± 0.16 | 3.32 ± 0.08 | 5.08 ± 0.07 | 1.76 ± 0.1 |
| (0.24–1.45; 30) | (3–15; 30) | (3.27–8.65; 29) | (16.3–47.8; 322) | (35–161.4; 292) | (4.56–4.99; 30) | (3.1–3.53; 30) | (4.99–5.17; 30) | (1.55–1.89; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 16 | B | 1.51 ± 0.19 | 14.87 ± 1.5 | 3.59 ± 0.62 | 34.9 ± 3.86 | 69.25 ± 32.26 | 12 | 4.79 ± 0.21 | 4.05 ± 0.07 | 4.93 ± 0.04 | 0.88 ± 0.05 |
| (1.15–1.92; 30) | (12–18; 30) | (3.13–6.57; 29) | (25.2–51.8; 446) | (32.7–189.2; 416) | (4.22–4.91; 30) | (3.96–4.13; 30) | (4.82–4.99; 30) | (0.77–0.95; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 17\* | B | 0.9 ± 0.11 | 10.03 ± 1.22 | 4.73 ± 1.77 | 30.22 ± 3.67 | 64.27 ± 27.4 | 10.95 | 5.06 ± 0.17 | 3.53 ±0.068 | 5.98 ± 0.58 | 2.45 ± 0.62 |
| (0.68–1.15; 30) | (8–13; 30) | (2.92–11.17; 29) | (18.8–39.9; 301) | (34.1–158.6; 271) | (4.82–5.68; 30) | (3.44–3.62;30) | (5.68–7.41; 30) | (2.07–3.96; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 18\* | B | 1.82 ± 0.4 | 19.5 ± 3.68 | 2.93 ± 0.54 | 33.84 ± 3.86 | 59.63 ± 28.11 | 12.88 | 5.42 ± 0.41 | 3.44 ± 0.03 | 7.07 ± 0.15 | 3.63 ± 0.15 |
| (1.15–2.62; 30) | (13–28; 30) | (2.14–4.03; 29) | (23–44; 585) | (27.2–158.1; 555) | (4.74–5.68; 30) | (3.36–3.53; 30) | (6.63–7.41; 30) | (3.19–3.96; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 19\* | B | 1.77 ± 0.23 | 15.34 ± 1.89 | 5.1 ± 0.56 | 40.92 ± 4.35 | 77.95 ± 35.62 | 8.95 | 4.93 ± 0.10 | 3.46 ± 0.13 | 5.55 ± 0.33 | 2.09 ± 0.37 |
| (1.09–2.28; 30) | (10–20; 30) | (4.31–6.39; 29) | (27.9–54.6; 460) | (30.6–189.8; 432) | (4.74–5.08; 30) | (3.19–3.79; 30) | (5.17–6.37; 30) | (1.64–2.93; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 20 | B | 2.56 ± 0.74 | 22.42 ± 5.33 | 5.71 ± 1.41 | 38.56 ± 5.56 | 78.53 ± 39.07 | 7.46 | 4.39 ± 0 | 4.21 ± 0.02 | 5.01 ± 0.07 | 0.8 ± 0.06 |
| (1.24–3.84; 24) | (13–32; 24) | (2.25–10.73; 23) | (25.2–62.8; 538) | (26.1–236.1; 514) | (4.39–4.39; 24) | (4.13–4.22; 24) | (4.91–5.25; 24) | (0.69–1.03; 24) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 21 | B | 2.38 ± 0.51 | 17.4 ± 3.06 | 3.49 ± 0.83 | 59.06 ± 4.65 | 81.77 ± 38.36 | 10.42 | 4.75 ± 0.15 | 4.48 ± 0.07 | 5.32 ± 0.06 | 0.85 ± 0.04 |
| (1.22–3.37; 30) | (11–24; 30) | (2.6–6.92; 29) | (40.2–77.8; 522) | (25.3–236; 492) | (4.48–4.91; 30) | (4.39–4.65; 30) | (5.25–5.43; 30) | (0.77–0.95; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 22 | B | 1.81 ± 0.35 | 14.43 ± 1.94 | 3.28 ± 0.63 | 41.39 ± 3.68 | 89.15 ± 34.65 | 12.02 | 4.31 ± 0.22 | 4.02 ± 0.23 | 5.06 ± 0.07 | 1.04 ± 0.27 |
| (0.79–2.47; 30) | (8–18; 30) | (2.52–5.6; 29) | (21–50.7; 433) | (45.7–192.1; 403) | (4.13–4.74; 30) | (2.84–4.22; 30) | (4.91–5.34; 30) | (0.86–2.5; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 23 | B | 1.06 ± 0.15 | 11.13 ± 1.28 | 4.6 ± 0.98 | 46.76 ± 6.42 | 52.12 ± 29.03 | 10.89 | 4.59 ± 0.27 | 4.05 ± 0.09 | 5.34 ± 0.05 | 1.29 ± 0.08 |
| (0.07–1.27; 30) | (8–13; 30) | (3.31–7.56; 29) | (30.3–58.5; 334) | (21–176.7; 304) | (4.39–5.34; 30) | (3.79–4.22; 30) | (5.25–5.43; 30) | (1.21–1.55; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 24\* | B | 1.19 ± 0.18 | 11.73 ± 1.44 | 6.23 ± 3.39 | 32.86 ± 5.04 | 72.76 ± 27.98 | 8.31 | 4.54 ± 0.08 | 3.29 ± 0.13 | 4.94 ± 0.09 | 1.65 ± 0.17 |
| (0.74–1.55; 30) | (8–14; 30) | (4.58–23.5; 29) | (20.7–43; 352) | (46.7–197.2; 322) | (4.48–4.65; 30) | (3.1–3.53; 30) | (4.82–5.08; 30) | (1.29–1.89; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 25\* | B | 3.06 ± 0.67 | 26 ± 4.66 | 7.76 ± 3.39 | 36.3 ± 2.7 | 83.33 ± 34.79 | 5.73 | 5.21 ± 0.07 | 4.6 ± 0.1 | 8.81 ± 1.3 | 4.2 ± 1.31 |
| (2.05–4.73; 22) | (19–37; 22) | (4.99–20.8; 21) | (22.9–47.1; 572) | (45.8–197.6; 550) | (5.17–5.34; 22) | (4.39–4.74; 22) | (6.8–10.77; 22) | (2.24–6.37; 22) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 26 | B | 1.44 ± 0.24 | 13.97 ± 1.91 | 6.76 ± 3.42 | 38.96 ± 3.48 | 69 ± 25.62 | 7.51 | 5.08 ± 0 | 3.65 ± 0.1 | 5.27 ± 0.03 | 1.62 ± 0.11 |
| (0.69–1.86; 30) | (8–17; 30) | (4.89–22.67; 29) | (27.6–46.9; 416) | (40.9–166.2; 386) | (5.08–5.08; 30) | (3.44–3.88; 30) | (5.25–5.34; 30) | (1.38–1.81; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 27\* | B | 2.71 ± 1.28 | 21.59 ± 7.76 | 4.22 ± 1.33 | 35.25 ± 3.37 | 93.02 ± 32.28 | 8.96 | 5.24 ± 0.13 | 3.94 ± 0.34 | 6.26 ± 1.06 | 2.32 ± 1.16 |
| (1.09–7.25; 17) | (10–48; 17) | (2.44–8.07; 16) | (29.7–61.2; 367) | (40.7–213.8; 350) | (4.99–5.34; 17) | (3.36–4.74; 17) | (5.34–8.53; 17) | (1.12–4.91; 17) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 28 | B | 1.87 ± 0.52 | 15.2 ± 4 | 6.03 ± 1.57 | 43.51 ± 3.13 | 87.72 ± 43.81 | 7.83 | 4.82 ± 0 | 4.34 ± 0.12 | 5.01 ± 0.04 | 0.66 ± 0.1 |
| (0.74–3; 25) | (7–24; 25) | (4.44–9.72; 24) | (23–51.8; 371) | (40.3–252.4; 346) | (4.82–4.82; 25) | (3.88–4.56; 25) | (4.91–5.08; 25) | (0.43–1.03; 25) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 29 | B | 7.54 ± 4.74 | 66.68 ± 0.04 | 3.35 ± 1.62 | 46.06 ± 3.98 | 67.56 ± 31.49 | 5.6 | 4.81 ± 0.03 | 4.37 ± 0.06 | 5.29 ± 0.18 | 0.92 ± 0.16 |
| (0.91–18.31; 19) | (10–160; 19) | (2.17–9.73; 18) | (35–57.3; 1,267) | (24.2–192.1; 1,248) | (4.74–4.82; 19) | (4.31–4.47; 19) | (5.17–5.94; 19) | (0.77–1.55; 19) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 30 | B | 2.31 ± 0.95 | 22.8 ± 7.09 | 4.8 ± 2.04 | 38.41 ± 5.39 | 64.83 ± 31.81 | 8.64 | 4.84 ± 0.04 | 4.5 ± 0.11 | 5.41 ± 0.15 | 0.91 ± 0.12 |
| (1.17–5.11; 30) | (14–43; 30) | (2.66–11.79; 29) | (18.5–55.5; 684) | (18.5–221.4; 654) | (4.74–4.91; 30) | (4.31–4.74; 30) | (5.25–6.03; 30) | (0.77–1.46; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 31 | B | 1.37 ± 0.23 | 13.53 ± 1.91 | 4.93 ± 1.1 | 46.18 ± 4.85 | 57.54 ± 24.84 | 9.76 | 5.23 ± 0.09 | 4.37 ± 0.1 | 5.39 ± 0.05 | 1.02 ± 0.07 |
| (0.53–1.65; 30) | (7–16; 30) | (3.87–8.61; 29) | (31.6–58.3; 406) | (19.4–116.7; 376) | (4.82–5.34; 30) | (4.13–4.56; 30) | (5.25–5.43; 30) | (0.86–1.12; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 32 | B | 2.04 ± 0.45 | 18.87 ± 3.45 | 3.74 ± 0.95 | 38.24 ± 3.65 | 72.54 ± 34.24 | 10.6 | 5.23 ± 0.13 | 4.58 ± 0.17 | 5.56 ± 0.1 | 0.98 ± 0.24 |
| (1.32–3.25; 30) | (13–27; 30) | (2.82–7.42; 29) | (22.8–51.8; 566) | (33.1–192.5; 536) | (4.56–5.34; 30) | (3.88–4.74; 30) | (5.43–5.94; 30) | (0.77–1.98; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 33 | P | 1.8 ± 0.35 | 15.3 ± 2.92 | 5.22 ± 1.86 | 27.94 ± 4.52 | 94.82 ± 45.28 | 8.745 | 4.9 ± 0.04 | 4.42 ± 0.46 | 5.22 ± 0.14 | 0.79 ± 0.58 |
| (1.13–2.71; 30) | (11–24; 30) | (3.26–11.29; 29) | (10–43.3; 458) | (45.4 -285.1; 428) | (4.82–4.99; 30) | (3.27–4.65; 30) | (5.08–5.86; 30) | (0.52–2.58; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 34\* | P | 1.66 ± 0.15 | 18.63 ± 1.6 | 4.6 ± 0.61 | 28.16 ± 2.52 | 63.21 ± 19.25 | 9.82 | 4.37 ± 0.06 | 3.07 ± 0.07 | 4.86 ± 0.08 | 1.78 ± 0.04 |
| (1.19–1.95; 30) | (14–21; 30) | (3.76–6.74; 29) | (20–36.1; 559) | (45.7–174.5; 529) | (4.31–4.56; 30) | (2.76–3.19; 30) | (4.56–4.99; 30) | (1.72–1.81; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 35 | P | 1.65 ± 0.28 | 19.8 ± 2.77 | 4.22 ± 2.05 | 24.99 ± 5.76 | 59.81 ± 31.17 | 10.46 | 4.57 ± 0.21 | 3.48 ± 0.6 | 5 ± 0.15 | 1.53 ± 0.55 |
| (0.53–2.13; 30) | (8–23; 30) | (2.88–11.37; 29) | (10.3–40.2; 594) | (27.8–159.5; 564) | (4.05–4.91; 30) | (2.41–4.39; 30) | (4.48–5.17; 30) | (0.69–2.58; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 36 | P | 6.23 ± 3.24 | 67.93 ± 33.3 | 1.79 ± 0.35 | 32.51 ± 3.05 | 58.79 ± 25.28 | 7.54 | 5.22 ± 0.14 | 4.45 ± 0.07 | 5.27 ± 0.06 | 0.82 ± 0.05 |
| (1.59–16.92; 29) | (19–178; 29) | (1.32–3.22; 28) | (23–43.2; 1,970) | (30.8–211.6; 1,941) | (4.99–5.34; 29) | (4.31–4.56; 29) | (5.17–5.34; 29) | (0.69–0.86; 29) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 37 | P | 2.06 ± 0.36 | 22.57 ± 3.4 | 5.45 ± 1.35 | 32.71 ± 5.58 | 60.2 ± 28.58 | 8.19 | 4.29 ± 0.26 | 3.48 ± 0.28 | 4.75 ± 0.2 | 1.27 ± 0.28 |
| (1.26–2.64; 30) | (15–28; 30) | (3.43–8.04; 29) | (9–43.9; 678) | (32.7–172.6; 648) | (4.05–4.82; 30) | (2.93–3.96; 30) | (4.13–5.08; 30) | (0.95–1.89; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 38 | P | 5.54 ± 2.3 | 59.53 ± 23.89 | 3.05 ± 0.95 | 32.44 ± 3.45 | 60.58 ± 30.87 | 7.06 | 4.39 ± 0.07 | 4.24 ± 0.05 | 4.87 ± 0.06 | 0.63 ± 0.04 |
| (0.71–11.2; 30) | (9–114; 30) | (1.74–5.6; 29) | (24.3–47.5; 1786) | (26.9–356.3; 1756) | (4.31–4.74; 30) | (4.13–4.31; 30) | (4.82–4.99; 30) | (0.6–0.69; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 39 | P | 1.4 ± 0.26 | 16.3 ± 2.77 | 5.98 ± 4.61 | 31.9 ± 6.17 | 56.05 ± 26.49 | 8.35 | 4.41 ± 0.07 | 3.39 ± 0.38 | 4.92 ± 0.17 | 1.52 ± 0.24 |
| (0.5–1.83; 30) | (7–22; 30) | (2.7–24.17; 29) | (4.5–44.2; 489) | (30.2–192.4; 459) | (4.39–4.74; 30) | (2.76–4.13; 30) | (4.56–5.17; 30) | (1.03–1.89; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 40 | P | 2.3 ± 0.4 | 24.47 ± 3.6 | 2.37 ± 0.26 | 31.3 ± 4.46 | 64.72 ± 30.66 | 13.05 | 4.64 ± 0.02 | 3.94 ± 0.08 | 4.76 ± 0.06 | 0.82 ± 0.05 |
| (1.11–3.07; 30) | (14–31; 30) | (1.89- 3.03; 29) | (10.5–42.6; 734) | (29.6–195; 704) | (4.56–4.65; 30) | (3.79–4.13; 30) | (4.65–4.91; 30) | (0.77–0.95; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 41\* | P | 3.58 ± 0.91 | 37.23 ± 8.2 | 3.01 ± 0.51 | 38.31 ± 4.69 | 57.7 ± 30.1 | 9.23 | 5.03 ± 0.28 | 3.58 ± 0.21 | 5.41 ± 0.06 | 1.83 ± 0.25 |
| (2.03–6.59; 30) | (23–64; 30) | (2.31–4.89; 29) | (21.5–62; 1,117) | (15.2–186.7; 1,088) | (4.65–5.34; 30) | (3.36–4.39; 30) | (5.25–5.51; 30) | (0.95–2.07; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 42 | P | 1.19 ± 0.16 | 13.43 ± 1.41 | 3.51 ± 0.56 | 33.3 ± 4.9 | 58.31 ± 31.76 | 13.08 | 4.9 ± 0.24 | 3.19 ± 0.15 | 5.20 ± 0.06 | 2.01 ± 0.11 |
| (0.88–1.48; 30) | (11–16; 30) | (2.62–4.83; 29) | (18.2–46.2; 403) | (27.2–155.2; 373) | (4.65–5.17; 30) | (2.93–3.53; 30) | (5.08–5.25; 30) | (1.72–2.15; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 43\* | P | 1.1 ± 0.14 | 14.23 ± 1.45 | 3.98 ± 0.86 | 23.57 ± 3.41 | 56.35 ± 22.46 | 12.08 | 4.89 ± 0.27 | 2.93 ± 0.11 | 5.14 ± 0.14 | 2.21 ± 0.14 |
| (0.88–1.32; 30) | (12–16; 30) | (2.96–6.91; 29) | (11.9–32.2; 427) | (35.8–169.2; 397) | (4.31–5.17; 30) | (2.67–3.1; 30) | (4.91–5.77; 30) | (2.07–2.84; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 44 | P | 1.6 ± 0.23 | 20.23 ± 2.44 | 4.71 ± 2.84 | 42.23 ± 4.75 | 38.03 ± 28.15 | 9.73 | 4.81 ± 0.19 | 4.39 ± 0.22 | 5.35 ± 0.15 | 0.96 ± 0.11 |
| (0.84–2.11; 30) | (13–26; 30) | (2.95–15.9; 29) | (24.7–51.1; 607) | (14.7–177.8; 577) | (4.74–5.51; 30) | (3.62–4.65; 30) | (5–5.5; 30) | (0.69–1.38; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 45 | P | 8.12 ± 5.28 | 82.68 ± 51.73 | 2.81 ± 0.43 | 44.98 ± 4.28 | 52.81 ± 29.33 | 5.54 | 4.57 ± 0.02 | 4.23 ± 0.05 | 4.89 ± 0.06 | 0.66 ± 0.04 |
| (2.45–21.18; 24) | (28–214; 24) | (2.16–4.43; 21) | (31.7–61.4; 1,820) | (16.8–275.4; 1,798) | (4.56–4.65; 24) | (4.13–4.31; 24) | (4.74–5; 24) | (0.6–0.69; 24) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 46 | P | 2.33 ± 0.33 | 25.1 ± 3.13 | 2.91 ± 0.28 | 32.59 ± 6.07 | 61.79 ± 40.72 | 11.67 | 5.05 ± 0.41 | 4.3 ± 0.09 | 5.37 ± 0.08 | 1.07 ± 0.06 |
| (1.77–3.04; 30) | (20 -32; 30) | (2.49–3.64; 29) | (13.3–49.3; 753) | (16.5–232.4; 723) | (4.48–5.34; 30) | (4.13–4.48; 30) | (5.17–5.51; 30) | (0.95–1.21; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 47 | P | 2.9 ± 1.58 | 30.23 ± 13.6 | 3.03 ± 0.78 | 34.63 ± 5.22 | 62.3 ± 34.61 | 10.3 | 4.89 ± 0.08 | 4.44 ± 0.19 | 5.13 ± 0.17 | 0.69 ± 0.33 |
| (1.09–8.26; 30) | (14–76; 30) | (1.9–5.85; 29) | (12.4–49.9; 905) | (28–282.5; 875) | (4.74–4.99; 30) | (3.62–4.65; 30) | (4.99–6.03; 30) | (0.43–2.41; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 48 | P | 1.53 ± 0.31 | 18.62 ± 3.52 | 11.99 ± 14.47 | 36.45 ± 6.02 | 47.73 ± 18.51 | 4.63 | 4.83 ± 0.26 | 3.08 ± 0.07 | 5.16 ± 0.15 | 2.08 ± 0.14 |
| (0.44–1.89; 21) | (6–22; 21) | (4.53–59.63; 20) | (12.6–50; 391) | (25.3–137.2; 370) | (4.48–5.08; 21) | (2.93–3.19; 21) | (4.82–5.6; 21) | (1.89–2.67; 21) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 49 | P | 1.51 ± 0.31 | 17.04 ± 3.15 | 5.89 ± 2.6 | 50.91 ± 6.06 | 39.58 ± 22.09 | 8.37 | 4.99 ± 0.17 | 3.94 ± 0.35 | 5.32 ± 0.27 | 1.38 ± 0.5 |
| (1.09–2.61; 24) | (13–28; 24) | (4.21–15.21; 23) | (31.2–63.3; 409) | (14–127; 385) | (4.74–5.34; 24) | (3.36–4.56; 24) | (5.17–6.55; 24) | (0.86–3.19; 24) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 50 | P | 3.17 ± 0.97 | 33.66 ± 10.03 | 5.14 ± 1.62 | 37.16 ± 3.93 | 58.11 ± 28.18 | 7.44 | 4.86 ± 0.07 | 4.3 ± 0.13 | 5.32 ± 0.07 | 1.02 ± 0.12 |
| (1.19–5.32; 21) | (13–54; 21) | (2.24–7.41; 20) | (25.9–52.4; 707) | (18.7–213.4; 686) | (4.74–4.91; 21) | (3.96–4.56; 21) | (5.17–5.51; 21) | (0.86–1.38; 21) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 51 | P | 6.78 ± 3.49 | 4.96 ± 0.05 | 2.99 ± 0.88 | 49.71 ± 4.43 | 62.15 ± 37.41 | 6.26 | 4.2 ± 0.06 | 4.2 ± 0.06 | 4.96 ± 0.05 | 0.76 ± 0.04 |
| (1.04–17.62; 16) | (4.91–5.08; 16) | (0.44–4.29; 15) | (34.3–65.3; 971) | (23.8–250.4; 955) | (4.13–4.31; 16) | (4.13–4.31; 16) | (4.91–5.08; 16) | (0.69–0.86; 16) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 52 | P | 1.95 ± 0.63 | 19.57 ± 5.07 | 16.43 ± 6.84 | 37.84 ± 4.38 | 64.66 ± 33.57 | 3.74 | 5.09 ± 0.27 | 3.68 ± 0.44 | 5.59 ± 0.12 | 1.91 ± 0.38 |
| (0.87–2.61; 7) | (11–25; 7) | (7.3–26.61; 6) | (21.8–51.6; 137) | (29–216.1; 130) | (4.82–5.43; 7) | (3.27–4.65; 7) | (5.43–5.77; 7) | (1.12–2.34; 7) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 53\* | P | 4.9 ± 1.63 | 46.47 ± 13.87 | 3.34 ± 0.56 | 39.53 ± 4.61 | 66.62 ± 28.8 | 7.37 | 4.53 ± 0.17 | 3.67 ± 0.27 | 5.01 ± 0.08 | 1.34 ± 0.31 |
| (1.48–9.82; 30) | (17–89; 30) | (2.76–5.95; 29) | (22.1–62.9; 1,394) | (26.4–282.2; 1,364) | (4.22–5.08; 30) | (3.19–4.22; 30) | (4.82–5.17; 30) | (0.77–1.98; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 54 | P | 1.57 ± 0.23 | 15.13 ± 1.75 | 5.4 ± 1.05 | 39.4 ± 2.92 | 67.83 ± 19.76 | 8.9 | 4.91 ± 0.32 | 4.04 ± 0.21 | 5.08 ± 0.08 | 1.04 ± 0.14 |
| (1.04–1.97; 23) | (11–18; 23) | (4.24–8.19; 22) | (25.7–47.8; 348) | (41.8–133.4; 325) | (4.22–5.08; 23) | (3.36–4.31; 23) | (4.82–5.17; 23) | (0.86–1.46; 23) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 55 | P | 1.57 ± 0.25 | 17.13 ± 2.33 | 5.15 ± 3.83 | 39.36 ± 4.25 | 54.84 ± 29.66 | 9.16 | 5.06 ± 0.29 | 4.4 ± 0.18 | 5.29 ± 0.06 | 0.89 ± 0.16 |
| (0.98–2.13; 30) | (12–22; 30) | (3.46–24.98; 29) | (25.7–54.1; 514) | (26–232; 484) | (4.48–5.25; 30) | (3.87–4.82; 30) | (5.08–5.34; 30) | (0.52–1.46; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 56 | P | 1.54 ± 0.23 | 16.17 ± 2.31 | 5.1 ± 1.35 | 39.66 ± 6.08 | 58.24 ± 27.91 | 9.13 | 4.3 ± 0.03 | 3.7 ± 0.26 | 4.43 ± 0.08 | 0.72 ± 0.21 |
| (0.59–1.87; 30) | (7 -19; 30) | (3.89–9.92; 29) | (11.2–56.3; 485) | (28.1–195.5; 455) | (4.22–4.31; 30) | (2.67–4.05; 30) | (4.31–4.74; 30) | (0.52–1.64; 30) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 57\* | P | 2 ± 0.293 | 21.11 ± 2.58 | 4.82 ± 1.33 | 34.42 ± 4.24 | 62.12 ± 27.89 | 9.03 | 4.84 ± 0.19 | 2.78 ± 0.06 | 4.95 ± 0.05 | 2.17 ± 0.03 |
| (1.43–2.74; 28) | (16–28; 28) | (3.56–8.8; 27) | (22.7–46.6; 591) | (35.5–219.1; 563) | (4.13–4.91; 28) | (2.67–2.84; 28) | (4.82–5; 28) | (2.15–2.24; 28) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 58\* | P | 1.77 ± 0.2 | 19.24 ± 1.89 | 5.08 ± 0.58 | 50.76 ± 6.48 | 43.21 ± 24.66 | 8.97 | 4.38 ± 0.2 | 3.08 ± 0.04 | 5.02 ± 0.1 | 1.94 ± 0.08 |
| (1.15–2.12; 29) | (13–22; 29) | (4.22–6.31; 28) | (22–62.4; 558) | (19.5–133.6; 529) | (4.31–5.08; 29) | (3.01–3.1; 29) | (4.82–5.17; 29) | (1.89–2.07; 29) |

Values are presented as mean ± standard deviation (range; sample size). On the locality column, B represents individuals from Bertioga and P represents individuals from Picinguaba, Ubatuba. An asterisk indicates individuals that we excluded from the analyses for minimum frequency, maximum frequency, and frequency bandwidth. This was necessary because we were not able to separate the influence of background noise from water flow and/or vehicle traffic from the call analyzed for these parameters.

**Table A4.** Spectral and temporal parameters of the advertisement calls emitted using one or both vocal sacs by the same individual of *Hylodes phyllodes*.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Male ID | Vocal sacs | Call duration (s) | Notes per call (n) | Note duration (ms) | Inter-note interval (ms) | Dominant frequency (kHz) | Minimum frequency (kHz) | Maximum frequency (kHz) | Frequency bandwidth (kHz) |
| 35 | 1 | 1.51 ± 0.13 | 21.6 ± 2.62 | 25.8 ± 5.64 | 45.07 ± 18.14 | 4.48 | 4.05 ± 0.07 | 4.85 ± 0.08 | 0.8 ± 0.04 |
| (1.32–1.6; 3) | (18–24; 3) | (12.2–38.9; 65) | (25.2–136.4; 62) | (3) | (3.96–4.13; 3) | (4.74–4.91; 3) | (0.77–0.86; 3) |
| 35 | 2 | 1.36 ± 0.17 | 18.28 ± 1.48 | 32.5 ± 9.17 | 51. 81 ± 33.8 | 4.56 | 4.34 ± 0.06 | 4.97 ± 0.04 | 0.63 ± 0.06 |
| (1.07–1.55; 7) | (15–20; 7) | (11.5–49.3; 141) | (17.8–176.3; 134) | (7) | (4.22–4.39; 7) | (4.91–4.99; 7) | (0.52–0.69; 7) |
| 39 | 1 | 1.69 | 21 | 35.32 ± 5.73 | 46.6 ± 19.06 | 4.48 | 3.79 | 4.82 | 1.03 |
| (1) | (1) | 21.4–46; 21) | (27.3–97; 20) | (1) | (1) | (1) | (1) |
| 39 | 2 | 1.51 ± 0.18 | 17.86 ± 1.88 | 40.88 ± 4.54 | 45.57 ± 22.49 | 4.67 ± 0.17 | 4.27 ± 0.06 | 4.98 ± 0.116 | 0.71 ± 0.06 |
| (1.21–1.86; 7) | (15–21; 7) | (23.8–50.9; 125) | (21.5–116.1; 118) | (4.48–4.82; 7) | (4.22–4.39; 7) | (4.91–5.25; 7) | (0.69–0.86; 7) |
| 42 | 1 | 1.12 ± 0.16 | 14.5 ± 1.5 | 32.05 ± 6.7 | 48.67 ± 19.85 | 4.65 | 3.74 ± 0.39 | 5.3 ± 0.21 | 1.55 ± 0.6 |
| (0.96–1.28; 2) | (13–16; 2) | (17.9–43.2; 29) | (29.4–109.5; 27) | (2) | (3.36–4.13; 2) | (5.08–5.51; 2) | (9.47–2.15; 2) |
| 42 | 2 | 1.61 ± 0.16 | 17.28 ± 1.48 | 48.24 ± 5.38 | 46.51 ± 32.45 | 4.73 | 4.32 ± 0.08 | 5.22 ± 0.07 | 0.89 ± 0.06 |
| (1.4–1.92; 7) | (15–20; 7) | (35.8–65.9; 121) | (12.3–135.2; 114) | (7) | (4.22–4.48; 7) | (5.08–5.34; 7) | (0.86–1.03; 7) |
| 44 | 1 | 2.62 | 33 | 37.75 ± 6.71 | 42.68 ± 24.62 | 4.91 | 3.19 | 5.08 | 1.89 |
| (1) | (1) | (25.4–53.4; 33) | (19–112.7; 32) | (1) | (1) | (1) | (1) |
| 44 | 2 | 1.97 ± 0.29 | 24.14 ± 3.27 | 47.02 ± 5.66 | 35.57 ± 27.32 | 4.69 ± 0.16 | 4.39 ± 0.05 | 5.36 ± 0.06 | 0.97 ± 0.04 |
| (1.58–2.4; 7) | (20–29; 7) | (22.6–57.5; 169) | (7.4–137.7; 162) | (4.48–4.91; 7) | (4.31–4.48; 7) | (5.25–5.43; 7) | (0.95–1.03; 7) |
| 47 | 1 | 2.15 ± 0.16 | 29 ± 3 | 33.35 ± 9.36 | 43.29 ± 21.9 | 4.65 ± 0.09 | 4.13 ± 0.09 | 4.99 ± 0.17 | 0.86 ± 0.26 |
| (1.98–2.31; 2) | 26–32; 2) | (15.4–55.5; 57) | (8.4–130.9; 55) | (4.56–4.74; 2) | (4.05–4.22; 2) | (4.82–5.17; 2) | (0.6–1.19; 2) |
| 47 | 2 | 1.64 ± 0.26 | 19.86 ± 2.69 | 39.67 ± 4.44 | 45.43 ± 31.63 | 4.7 ± 0.06 | 4.43 ± 0.08 | 5.06 ± 0.04 | 0.63 ± 0.09 |
| (1.22–2.06; 7) | (15–24; 7) | (30.9–53.8; 138) | (18.5–244.7; 131) | (4.65–4.82; 7) | (4.31–4.56; 7) | (4.99–5.08; 7) | (0.52–0.77; 7) |
| 21 | 1 | 1.99 | 18 | 42.28 ± 8.63 | 72.54 ± 33.43 | 4.99 | 4.22 | 5.25 | 1.03 |
| (1) | (1) | (24.9–57.2; 18) | (34.43–128.4; 17) | (1) | (1) | (1) | (1) |
| 21 | 2 | 2.35 ± 0.36 | 20.43 ± 2.82 | 47.88 ± 5.08 | 69.1 ± 35.34 | 4.96 ± 0.14 | 4.47 ± 0.07 | 5.39 ± 0.04 | 0.92 ± 0.06 |
| (1.86–3.03; 7) | (17–26; 7) | (34.8–62.2; 143) | (26.1–174.1; 136) | (4.65–5.08; 7) | (4.39–4.56; 7) | (5.34–5.43; 7) | (0.86–1.03; 7) |
| 23 | 1 | 1.03 | 12 | 41.29 ± 4.99 | 46.29 ± 13.5 | 4.91 | 4.39 | 5.08 | 0.69 |
| (1) | (1) | (32.7–49.8; 12) | (31.5–75.9; 11) | (1) | (1) | (1) | (1) |
| 23 | 2 | 0.88 ± 0.07 | 9.14 ± 0.64 | 51.39 ± 5.48 | 48.47 ± 25.31 | 4.56 | 4.19 ± 0.04 | 5.26 ± 0.05 | 1.07 ± 0.04 |
| (0.74–0.96; 7) | (8–10; 7) | (31.9–65.4; 64) | (14–118.3; 57) | (7) | (4.13–4.33; 7) | (5.17–5.34; 7) | (1.03–1.12; 7) |
| 56 | 1 | 0.97 | 11 | 43.5 ± 4.4 | 48.74 ± 7.75 | 4.56 | 3.96 | 4.65 | 0.69 |
| (1) | (1) | (37.4–52.6; 11) | (39.3–61.6; 10) | (1) | (1) | (1) | (1) |
| 56 | 2 | 2.1 ± 0.45 | 19.71 ± 3.69 | 51.57 ± 6.29 | 56.72 ± 34.74 | 4.06 ± 0.32 | 3.84 ± 0.19 | 4.58 ± 0.11 | 0.74 ± 0.1 |
| (1.1–2.55; 7) | (12–24; 7) | (31.4–68.6; 138) | (18.7–144.4; 131) | (3.79–4.56; 7) | (3.7–4.22; 7) | (4.48–4.74; 7) | (0.52–0.86; 7) |
| 69 | 1 | 1.64 ± 0.12 | 16.33 ± 1.7 | 39.24 ± 4.72 | 63.93 ± 25.26 | 4.74 | 3.1 ± 0.07 | 5.08 ± 0.07 | 1.98 ± 0.07 |
| (1.49–1.79; 3) | (14–18; 3) | (25.5–53.6; 49) | (27.8–136.7; 46) | (3) | (3.01–3.19; 3) | (4.99–5.17; 3) | (1.89–2.07; 3) |
| 69 | 2 | 1.85 ± 0.52 | 17.14 ± 4.12 | 45.87 ± 5.4 | 65.99 ± 28.68 | 5.08 | 3.26 ± 0.24 | 5.18 ± 0.03 | 1.92 ± 0.21 |
| (0.84–2.62; 7) | (9–23; 7) | (33.7–68; 120) | (23.1–160.9; 113) | (7) | (3.1–3.79; 7) | (5.17–5.25; 7) | (1.46–2.07; 7) |
| Total | 1 | 1.62 ± 0.46 | 19.73 ± 6.54 | 34.42 ± 8.76 | 49.85 ± 23.79 | 4.67 ± 0.16 | 3.78 ± 0.46 | 5.01 ± 0.12 | 1.23 ± 0.56 |
| (0.96–2.62; 15) | (11–33; 15) | (12.2–57.2; 295) | (8.4–136.7;280) | (4.48–4.99; 15) | (3.01–4.39; 15) | (4.65–5.51; 15) | (0.6–2.15; 15) |
| Total | 2 | 1.7 ± 0.51 | 18.21 ± 4.65 | 44.73 ± 8.15 | 50.67 ± 31.9 | 4.67 ± 0.3 | 4.17 ± 0.38 | 5.11 ± 0.25 | 0.94 ± 0.39 |
| (0.74–3.03; 63) | (8–29; 63) | (12.6–68.6; 1145) | (7.4–244.7; 1082) | (3.79–5.08; 63) | (3.1–4.56; 63) | (4.48–5.43; 63) | (0.52–2.07; 63) |

Values are presented as mean ± standard deviation (range; sample size).

**Table A5.** Visual signalling emission by each male of *Hylodes phyllodes*.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Male ID | Locality | Total visual signalling | Limb displays | | | | | | | | |  | Postural displays | | | | |  | Mouth and throat displays | |
|  |  |
| Arm lifting | Leg lifting | Two limbs lifting | Hand shaking | Foot shaking | Foot flagging | Arm waving | Toe flagging | Two–legged kicking |  | Truncated walking | Upright posture | Body lowering | Body raising | Head down |  | Mouth opening | Throat display |
|  |  |
| 1 | B | 25 | 12 | 11 | – | – | – | – | – | – | 2 |  | – | – | – | – | – |  | – | – |
| 2 | B | 39 | 28 | 9 | – | – | – | 2 | – | – | – |  | – | – | – | – | – |  | – | – |
| 3 | B | 31 | 7 | 20 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | 4(a) |
| 4 | B | 44 | 11 | – | – | – | – | – | – | 17 | 1 |  | – | 1 | – | – | – |  | 14 | – |
| 5 | B | 0 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 6 | B | 72 | 64 | 6 | – | – | – | – | – | – | 2 |  | – | – | – | – | – |  | – | – |
| 7 | B | 74 | 3 | 6 | – | – | – | 1 | – | 61 | 1 |  | – | 1 | – | – | – |  | 1 | – |
| 8 | B | 32 | 21 | 7 | – | – | – | – | – | – | – |  | – | 3 | – | – | – |  | – | 1(a) |
| 9 | B | 14 | 10 | 3 | – | – | – | – | – | – | – |  | 1 | – | – | – | – |  | – | – |
| 10 | B | 53 | 42 | 11 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 11 | B | 6 | 2 | 1 | – | – | – | – | – | – | – |  | – | 1 | – | – | – |  | – | 2(b) |
| 12 | B | 1 | 1 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 13 | B | 13 | 6 | 3 | – | – | – | – | 4 | – | – |  | – | – | – | – | – |  | – | – |
| 14 | B | 28 | 13 | 13 | – | – | – | – | – | – | 1 |  | – | – | – | – | – |  | – | 1(a) |
| 15 | B | 2 | 2 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 16 | B | 49 | 12 | 23 | 11(c) | – | – | 3 | – | – | – |  | – | – | – | – | – |  | – | – |
| 17 | B | 1 | 1 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 18 | B | 15 | 7 | 7 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 19 | B | 5 | 4 | 1 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 20 | B | 2 | 1 | 1 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 21 | B | 10 | 9 | 1 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 22 | B | 3 | 1 | – | 2(c) | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 23 | B | 12 | 5 | 1 | 2(c) | – | – | – | – | – | – |  | – | 1 | – | 1 | – |  | 9\* | 2(a) |
| 24 | B | 4 | 2 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | 1\* | 2(a/c) |
| 25 | B | 3 | 3 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 26 | B | 13 | 11 | 1 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | 1(a) |
| 27 | B | 1 | – | – | – | – | – | – | – | – | 1 |  | – | – | – | – | – |  | – | – |
| 28 | B | 5 | 3 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | 2(a) |
| 29 | B | 22 | 3 | 1 | – | – | – | – | – | 5 | – |  | – | – | – | – | – |  | – | 13(a) |
| 30 | B | 18 | 5 | 11 | 2(c) | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 31 | B | 6 | 6 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 32 | B | 11 | 4 | 3 | 2(a/b) | – | – | – | – | – | – |  | – | – | – | 1 | – |  | – | 1(c) |
| 59 | B | 27 | 6 | 1 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | 2\* | 18(b) |
| 60 | B | 14 | 6 | 4 | 2(c) | – | 2 | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 61 | B | 24 | 1 | – | – | – | – | 4 | – | 19 | – |  | – | – | – | – | – |  | – | – |
| 62 | B | 6 | 3 | 2 | – | 1 | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 33 | P | 25 | 12 | 2 | – | – | – | – | 5 | – | – |  | – | – | 2 | – | 4 |  | – | – |
| 34 | P | 12 | 7 | 2 | – | – | 1 | – | – | – | – |  | – | 2 | – | – | – |  | – | – |
| 35 | P | 29 | 1 | 19 | – | – | 4 | – | – | – | 1 |  | – | – | – | – | – |  | – | 4(b) |
| 36 | P | 13 | 3 | 10 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 37 | P | 77 | 29 | 41 | 3(a/b) | – | 1 | – | – | 2 | – |  | – | – | – | – | – |  | 1 | – |
| 38 | P | 2 | – | 2 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 39 | P | 143 | 57 | 47 | 25(a/b) | 2 | 3 | – | 8 | – | – |  | – | – | – | – | – |  | – | 1(b) |
| 40 | P | 6 | 2 | 3 | 1(b) | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 41 | P | 13 | 10 | 2 | – | – | – | 1 | – | – | – |  | – | – | – | – | – |  | – | – |
| 42 | P | 3 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | 3(b) |
| 43 | P | 0 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 44 | P | 1 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | 1(b) |
| 45 | P | 2 | 2 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 46 | P | 0 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 47 | P | 6 | 1 | 1 | – | – | – | 1 | – | – | – |  | – | 1 | – | – | – |  | – | 2(b) |
| 48 | P | 35 | 11 | – | – | – | – | 1 | – | 19 | – |  | – | 1 | – | – | – |  | 3 | – |
| 49 | P | 10 | 6 | – | – | 1 | – | – | – | – | – |  | – | – | – | – | – |  | – | 3(a) |
| 50 | P | 140 | 5 | 6 | – | – | – | 11 | – | 116 | – |  | 2 | – | – | – | – |  | – | – |
| 51 | P | 9 | 6 | 3 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 52 | P | 3 | 3 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 53 | P | 9 | 5 | 4 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | 1\* | – |
| 54 | P | 0 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 55 | P | 0 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 56 | P | 21 | 13 | 5 | – | – | 1 | – | – | – | – |  | – | 1 | – | – | – |  | 3\* | 1(b) |
| 57 | P | 18 | 4 | 5 | – | – | – | – | – | 3 | – |  | – | – | – | – | – |  | 6 | – |
| 58 | P | 29 | 18 | 5 | – | 4 | 1 | – | – | – | – |  | – | – | – | – | – |  | – | 1(b) |
| 63 | P | 1 | – | 1 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 64 | P | 2 | 2 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 65 | P | 7 | 7 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 66 | P | 0 | – | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 67 | P | 3 | – | – | – | – | – | 1 | – | – | – |  | – | 1 | – | 1 | – |  | – | – |
| 68 | P | 9 | 7 | 1 | – | – | – | – | – | – | 1 |  | – | – | – | – | – |  | – | – |
| 69 | P | 10 | 2 | 3 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | 26\* | 5(b) |
| 70 | P | 3 | 1 | – | – | – | – | 2 | – | – | – |  | – | – | – | – | – |  | – | – |
| 71 | P | 23 | 2 | 1 | – | – | – | 8 | – | 6 | – |  | 6 | – | – | – | – |  | – | – |
| 72 | P | 26 | 3 | 2 | 1(a) | – | – | 11 | – | 9 | – |  | – | – | – | – | – |  | – | – |
| 73 | P | 11 | 8 | 3 | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 74 | P | 79 | 44 | 32 | 2(a) | – | 1 | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 75 | P | 25 | 4 | 1 | – | – | – | 8 | – | 12 | – |  | – | – | – | – | – |  | – | – |
| 76 | P | 11 | 2 | 2 | – | – | – | 4 | – | 3 | – |  | – | – | – | – | – |  | – | – |
| 77 | P | 1 | 1 | – | – | – | – | – | – | – | – |  | – | – | – | – | – |  | – | – |
| 78 | P | 47 | 5 | – | – | – | – | 2 | – | 39 | – |  | – | – | – | – | – |  | – | 1(a) |

In the locality column, B represents individuals from Bertioga and P represents individuals from Picinguaba, Ubatuba. On the two limbs lifting column: lifting of one arm and one leg concomitantly (a); lifting of both legs concomitantly b); lifting of both legs alternatively (c). On the throat display column: inflating and deflating both vocal sacs without emitting audible sound (a); call emission using only one of the vocal sacs (b); keeping both vocal sacs inflated after the end of the call (c). An asterisk indicates individuals that were observed open their mouth after eating, probably related to the swallowing process. These cases were not included on visual displays frequencies tables in the manuscript, but they are indicated here.