Supplementary Tables

**Table S1: Criteria for assessing shark condition.**

|  |  |  |
| --- | --- | --- |
| **X** Alive – uninjured | **Y** Alive – injured | **Z** Alive – moribund |
|  |  |  |
| Use if **all** of the following apply: | Use if **at least one of** the following characteristics applies: | Shark is alive, but *presumed* to have **at least one of** the following lethal injuries: |
| Quick movements and/or response to being hauled | Minimal shark is movements and/or minimum reaction to being hauled | Bleeding from a torn or severed gill arch (unlikely to survive if gills are bleeding) |
| Frequent gill movement | Minimal gill movement | Multiple fins missing |
| Shark is not bleeding or is slowly bleeding and not from the gills (blood may be seen around mouth and/or jaw) | Blood is flowing freely, continuously, and shows no sign of slowing down or stopping | Deep wounds with internal organs visible |
| Hook is visible (e.g., mouth hooked) and has not been swallowed or hooked in the gills | Shark is gill hooked or hook is not visible and has obviously been swallowed | Serious damage to eyes or head |
| Jaw is intact and appears functional with injury limited to hook puncture and/or small hook extraction wound; with some bleeding possible from the wound | Jaw is damaged but still useable | Jaw broken, unusable or missing to the point where the shark will be unable to hunt or feed |
| If gear is wrapped around the shark, it is not inhibiting or it is removed with minimal damage  | Injuries (greater than hook puncture or minimal gear extraction wound) are present, but not immediately life threatening, e.g., fins may be frayed, damaged or torn, but are still useable | Amount of bleeding may be used to quantify whether a shark is moribund |
| Appendages remain functional after removal of gear | If wounds are present on the body (muscle may be visible but not deep enough to expose internal organs) |  |

**Table S2: Temperature, depth, and light intensity measurements recorded by tags suspected to be ingested, pre- and post-ingestion.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | Pre-ingestion | Post-ingestion |
| Species | Tag ID | Days at ingestion | Temp. range (°C) | Depth range (m) | Delta light intensity | Temp. range (°C) | Depth range (m) | Delta light intensity |
| Mako | 170512 | 34–37 | 16.7–21.6 | 0–447 | 118–196 | 25.2–29.0 | 0-517 | 34-63 |
| Mako | 170518 | 2–10 | 22.2 | 82 | 185 | 21.1–28.1 | 0–618 | 3–37 |
| Mako | 170583 | 40–45 | 16.6–24.2 | 0–819 | 114–196 | 20.4–27.8 | 0–185 | 1–6 |
| Mako | 170613 | 28–36 | 25.0–26.8 | 0–700 | 122–196 | 22.3–28.8 | 0–812 | 2–9 |
| Silky | 170571 | 51–61 | 20.5–25.6 | 0–1141 | 110–208 | 22.4–28.9 | 0–990 | 3–7 |

**Table S3: Mako and silky shark predicted proportion surviving and post-release mortality (with lower and upper 95% confidence limits (LCL, UCL)) at 5 – 60 days post-release for uninjured (AU) and injured (AI) condition classes. Predictions are for the median fork length in the Pacific Community (SPC) observer data and median branchline** **ratio in the tagging data. Predictions were generated from the ‘combined dataset’ survival rate model.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | Condition | Fork length (cm) | Branchline ratio | Days post-release | Proportion surviving | LCL | UCL | Post-release mortality | LCL | UCL |
|  |  |  |  |  |  |  |  |  |  |  |
| Mako | AU | 120 | 0.57 | 5 | 0.941 | 0.855 | 0.977 | 0.059 | 0.023 | 0.145 |
|  |  |  |  | 10 | 0.927 | 0.826 | 0.970 | 0.073 | 0.030 | 0.174 |
|  |  |  |  | 15 | 0.918 | 0.810 | 0.966 | 0.082 | 0.034 | 0.190 |
|  |  |  |  | 20 | 0.912 | 0.797 | 0.963 | 0.088 | 0.037 | 0.203 |
|  |  |  |  | 25 | 0.907 | 0.786 | 0.961 | 0.093 | 0.039 | 0.214 |
|  |  |  |  | 30 | 0.903 | 0.777 | 0.959 | 0.097 | 0.041 | 0.223 |
|  |  |  |  | 35 | 0.899 | 0.769 | 0.957 | 0.101 | 0.043 | 0.231 |
|  |  |  |  | 40 | 0.895 | 0.762 | 0.956 | 0.105 | 0.044 | 0.238 |
|  |  |  |  | 45 | 0.892 | 0.757 | 0.955 | 0.108 | 0.045 | 0.243 |
|  |  |  |  | 50 | 0.889 | 0.751 | 0.954 | 0.111 | 0.046 | 0.249 |
|  |  |  |  | 55 | 0.887 | 0.744 | 0.953 | 0.113 | 0.047 | 0.256 |
|  |  |  |  | 60 | 0.884 | 0.740 | 0.952 | 0.116 | 0.048 | 0.260 |
| Mako | AI | 120 | 0.57 | 5 | 0.609 | 0.248 | 0.836 | 0.391 | 0.164 | 0.752 |
|  |  |  |  | 10 | 0.539 | 0.183 | 0.797 | 0.461 | 0.203 | 0.817 |
|  |  |  |  | 15 | 0.500 | 0.150 | 0.773 | 0.500 | 0.227 | 0.850 |
|  |  |  |  | 20 | 0.472 | 0.127 | 0.758 | 0.528 | 0.242 | 0.873 |
|  |  |  |  | 25 | 0.451 | 0.113 | 0.743 | 0.549 | 0.257 | 0.887 |
|  |  |  |  | 30 | 0.433 | 0.102 | 0.731 | 0.567 | 0.269 | 0.898 |
|  |  |  |  | 35 | 0.419 | 0.094 | 0.721 | 0.581 | 0.279 | 0.906 |
|  |  |  |  | 40 | 0.406 | 0.087 | 0.715 | 0.594 | 0.285 | 0.913 |
|  |  |  |  | 45 | 0.395 | 0.080 | 0.707 | 0.605 | 0.293 | 0.920 |
|  |  |  |  | 50 | 0.385 | 0.074 | 0.700 | 0.615 | 0.300 | 0.926 |
|  |  |  |  | 55 | 0.376 | 0.068 | 0.696 | 0.624 | 0.304 | 0.932 |
|  |  |  |  | 60 | 0.368 | 0.063 | 0.691 | 0.632 | 0.309 | 0.937 |
| Silky | AU | 103 | 3.96 | 5 | 0.952 | 0.905 | 0.976 | 0.048 | 0.024 | 0.095 |
|  |  |  |  | 10 | 0.940 | 0.887 | 0.969 | 0.060 | 0.031 | 0.113 |
|  |  |  |  | 15 | 0.933 | 0.876 | 0.965 | 0.067 | 0.035 | 0.124 |
|  |  |  |  | 20 | 0.928 | 0.867 | 0.962 | 0.072 | 0.038 | 0.133 |
|  |  |  |  | 25 | 0.924 | 0.860 | 0.959 | 0.076 | 0.041 | 0.140 |
|  |  |  |  | 30 | 0.920 | 0.853 | 0.957 | 0.080 | 0.043 | 0.147 |
|  |  |  |  | 35 | 0.917 | 0.847 | 0.955 | 0.083 | 0.045 | 0.153 |
|  |  |  |  | 40 | 0.914 | 0.842 | 0.954 | 0.086 | 0.046 | 0.158 |
|  |  |  |  | 45 | 0.912 | 0.837 | 0.953 | 0.088 | 0.047 | 0.163 |
|  |  |  |  | 50 | 0.909 | 0.833 | 0.951 | 0.091 | 0.049 | 0.167 |
|  |  |  |  | 55 | 0.907 | 0.829 | 0.950 | 0.093 | 0.050 | 0.171 |
|   |   |   |   | 60 | 0.905 | 0.825 | 0.949 | 0.095 | 0.051 | 0.175 |
| Silky | AI | 103 | 3.96 | 5 | 0.668 | 0.377 | 0.852 | 0.332 | 0.148 | 0.623 |
|  |  |  |  | 10 | 0.605 | 0.307 | 0.815 | 0.395 | 0.185 | 0.693 |
|  |  |  |  | 15 | 0.569 | 0.267 | 0.792 | 0.431 | 0.208 | 0.733 |
|  |  |  |  | 20 | 0.543 | 0.241 | 0.775 | 0.457 | 0.225 | 0.759 |
|  |  |  |  | 25 | 0.523 | 0.222 | 0.763 | 0.477 | 0.237 | 0.778 |
|  |  |  |  | 30 | 0.507 | 0.205 | 0.754 | 0.493 | 0.246 | 0.795 |
|  |  |  |  | 35 | 0.493 | 0.191 | 0.745 | 0.507 | 0.255 | 0.809 |
|  |  |  |  | 40 | 0.481 | 0.178 | 0.737 | 0.519 | 0.263 | 0.822 |
|  |  |  |  | 45 | 0.470 | 0.168 | 0.730 | 0.530 | 0.270 | 0.832 |
|  |  |  |  | 50 | 0.460 | 0.158 | 0.725 | 0.540 | 0.275 | 0.842 |
|  |  |  |  | 55 | 0.452 | 0.150 | 0.721 | 0.548 | 0.279 | 0.850 |
|  |  |  |  | 60 | 0.443 | 0.143 | 0.715 | 0.557 | 0.285 | 0.857 |

**Table S4: Mako and silky shark predicted proportion surviving and post-release mortality (with lower and upper 95% confidence limits (LCL, UCL)) at 60 days post-release for fork lengths 75 – 200 cm and uninjured (AU) and injured (AI) condition classes. Predictions are for the median branchline ratio in the tagging data and were generated from the ‘combined dataset’ survival rate model.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | Condition | Days post-release | Branchline ratio | Fork length (cm) | Proportion surviving | LCL | UCL | Post-release mortality | LCL | UCL |
|  |  |  |  |  |  |  |  |  |  |  |
| Mako | AU | 60 | 0.57 | 75 | 0.746 | 0.354 | 0.921 | 0.254 | 0.079 | 0.646 |
|  |  |  |  | 100 | 0.835 | 0.597 | 0.937 | 0.165 | 0.063 | 0.403 |
|  |  |  |  | 125 | 0.895 | 0.767 | 0.956 | 0.105 | 0.044 | 0.233 |
|  |  |  |  | 150 | 0.934 | 0.846 | 0.972 | 0.066 | 0.028 | 0.154 |
|  |  |  |  | 175 | 0.959 | 0.887 | 0.985 | 0.041 | 0.015 | 0.113 |
|  |  |  |  | 200 | 0.974 | 0.911 | 0.993 | 0.026 | 0.007 | 0.089 |
| Mako | AI | 60 | 0.57 | 75 | 0.091 | 0.000 | 0.525 | 0.909 | 0.475 | 1.000 |
|  |  |  |  | 100 | 0.229 | 0.012 | 0.612 | 0.771 | 0.388 | 0.988 |
|  |  |  |  | 125 | 0.403 | 0.091 | 0.709 | 0.597 | 0.291 | 0.909 |
|  |  |  |  | 150 | 0.571 | 0.231 | 0.808 | 0.429 | 0.192 | 0.769 |
|  |  |  |  | 175 | 0.708 | 0.346 | 0.891 | 0.292 | 0.109 | 0.654 |
|  |  |  |  | 200 | 0.808 | 0.449 | 0.946 | 0.192 | 0.054 | 0.551 |
| Silky | AU | 60 | 3.96 | 75 | 0.842 | 0.686 | 0.924 | 0.158 | 0.076 | 0.314 |
|  |  |  |  | 100 | 0.900 | 0.815 | 0.946 | 0.100 | 0.054 | 0.185 |
|  |  |  |  | 125 | 0.937 | 0.874 | 0.969 | 0.063 | 0.031 | 0.126 |
|  |  |  |  | 150 | 0.961 | 0.902 | 0.985 | 0.039 | 0.015 | 0.098 |
|  |  |  |  | 175 | 0.976 | 0.918 | 0.993 | 0.024 | 0.007 | 0.082 |
|  |  |  |  | 200 | 0.985 | 0.929 | 0.997 | 0.015 | 0.003 | 0.071 |
| Silky | AI | 60 | 3.96 | 75 | 0.247 | 0.024 | 0.591 | 0.753 | 0.409 | 0.976 |
|  |  |  |  | 100 | 0.422 | 0.122 | 0.699 | 0.578 | 0.301 | 0.878 |
|  |  |  |  | 125 | 0.588 | 0.248 | 0.813 | 0.412 | 0.187 | 0.752 |
|  |  |  |  | 150 | 0.721 | 0.375 | 0.900 | 0.279 | 0.100 | 0.625 |
|  |  |  |  | 175 | 0.817 | 0.445 | 0.950 | 0.183 | 0.050 | 0.555 |
|  |  |  |  | 200 | 0.883 | 0.509 | 0.976 | 0.117 | 0.024 | 0.491 |

**Table S5: Mako and silky shark predicted proportion surviving and post-release mortality (with lower and upper 95% confidence limits (LCL, UCL)) at 60 days post-release for branchline ratios 0 – 8 and uninjured (AU) and injured (AI) condition classes. Predictions are for the median fork length in the Pacific Community (SPC) observer data and were generated from the ‘combined dataset’ survival rate model.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | Condition | Days post-release | Fork length (cm) | Branchline ratio | Proportion surviving | LCL | UCL | Post-release mortality | LCL | UCL |
|  |  |  |  |  |  |  |  |  |  |  |
| Mako | AU | 60 | 120 | 0 | 0.891 | 0.747 | 0.956 | 0.109 | 0.044 | 0.253 |
|  |  |  |  | 1 | 0.879 | 0.733 | 0.949 | 0.121 | 0.051 | 0.267 |
|  |  |  |  | 2 | 0.867 | 0.713 | 0.942 | 0.133 | 0.058 | 0.287 |
|  |  |  |  | 3 | 0.853 | 0.690 | 0.934 | 0.147 | 0.066 | 0.310 |
|  |  |  |  | 4 | 0.837 | 0.662 | 0.926 | 0.163 | 0.074 | 0.338 |
|  |  |  |  | 5 | 0.821 | 0.624 | 0.921 | 0.179 | 0.079 | 0.376 |
|  |  |  |  | 6 | 0.802 | 0.588 | 0.915 | 0.198 | 0.085 | 0.412 |
|  |  |  |  | 7 | 0.783 | 0.544 | 0.907 | 0.217 | 0.093 | 0.456 |
|  |  |  |  | 8 | 0.761 | 0.483 | 0.902 | 0.239 | 0.098 | 0.517 |
| Mako | AI | 60 | 120 | 0 | 0.390 | 0.077 | 0.703 | 0.610 | 0.297 | 0.923 |
|  |  |  |  | 1 | 0.351 | 0.056 | 0.682 | 0.649 | 0.318 | 0.944 |
|  |  |  |  | 2 | 0.311 | 0.039 | 0.656 | 0.689 | 0.344 | 0.961 |
|  |  |  |  | 3 | 0.273 | 0.026 | 0.639 | 0.727 | 0.361 | 0.974 |
|  |  |  |  | 4 | 0.235 | 0.013 | 0.618 | 0.765 | 0.382 | 0.987 |
|  |  |  |  | 5 | 0.200 | 0.007 | 0.589 | 0.800 | 0.411 | 0.993 |
|  |  |  |  | 6 | 0.166 | 0.002 | 0.582 | 0.834 | 0.418 | 0.998 |
|  |  |  |  | 7 | 0.136 | 0.001 | 0.569 | 0.864 | 0.431 | 0.999 |
|  |  |  |  | 8 | 0.108 | 0.000 | 0.544 | 0.892 | 0.456 | 1.000 |
| Silky | AU | 60 | 103 | 0 | 0.937 | 0.862 | 0.971 | 0.063 | 0.029 | 0.138 |
|  |  |  |  | 1 | 0.930 | 0.853 | 0.967 | 0.070 | 0.033 | 0.147 |
|  |  |  |  | 2 | 0.922 | 0.849 | 0.961 | 0.078 | 0.039 | 0.151 |
|  |  |  |  | 3 | 0.914 | 0.837 | 0.955 | 0.086 | 0.045 | 0.163 |
|  |  |  |  | 4 | 0.905 | 0.827 | 0.950 | 0.095 | 0.050 | 0.173 |
|  |  |  |  | 5 | 0.894 | 0.808 | 0.942 | 0.106 | 0.058 | 0.192 |
|  |  |  |  | 6 | 0.883 | 0.789 | 0.937 | 0.117 | 0.063 | 0.211 |
|  |  |  |  | 7 | 0.871 | 0.763 | 0.931 | 0.129 | 0.069 | 0.237 |
|  |  |  |  | 8 | 0.857 | 0.734 | 0.926 | 0.143 | 0.074 | 0.266 |
| Silky | AI | 60 | 103 | 0 | 0.588 | 0.292 | 0.793 | 0.412 | 0.207 | 0.708 |
|  |  |  |  | 1 | 0.554 | 0.259 | 0.773 | 0.446 | 0.227 | 0.741 |
|  |  |  |  | 2 | 0.518 | 0.218 | 0.752 | 0.482 | 0.248 | 0.782 |
|  |  |  |  | 3 | 0.480 | 0.179 | 0.734 | 0.520 | 0.266 | 0.821 |
|  |  |  |  | 4 | 0.442 | 0.144 | 0.708 | 0.558 | 0.292 | 0.856 |
|  |  |  |  | 5 | 0.403 | 0.098 | 0.698 | 0.597 | 0.302 | 0.902 |
|  |  |  |  | 6 | 0.363 | 0.065 | 0.685 | 0.637 | 0.315 | 0.935 |
|  |  |  |  | 7 | 0.324 | 0.042 | 0.668 | 0.676 | 0.332 | 0.958 |
|  |  |  |  | 8 | 0.285 | 0.023 | 0.655 | 0.715 | 0.345 | 0.977 |

**Table S6 Silky shark predicted post-release mortality and survival at 60 days post-release weighted by uninjured (AU) and injured (AI) condition classes (see Table S2). Predictions are for the median fork length in the Pacific Community (SPC) observer data and were generated from the ‘combined dataset’ survival rate model.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Species |   | Post-release mortality (PRM)  | Condition Class Proportion |  |  |
|  |  |  |  |  |  |  |
| Silky | Days | AU | AI | AU | AI | Overall PRM Estimate [(PRM AU \* Condition AU) + (PRM AI \* Condition AI)]  | Overall post-release survivalEstimate (1-PRM) |
|  | 5 | 0.048 | 0.332 | 0.757 | 0.243 | 0.117 | 0.883 |
|  | 10 | 0.060 | 0.395 | 0.757 | 0.243 | 0.141 | 0.859 |
|  | 15 | 0.067 | 0.431 | 0.757 | 0.243 | 0.155 | 0.845 |
|  | 20 | 0.072 | 0.457 | 0.757 | 0.243 | 0.166 | 0.834 |
|  | 25 | 0.076 | 0.477 | 0.757 | 0.243 | 0.173 | 0.827 |
|  | 30 | 0.080 | 0.493 | 0.757 | 0.243 | 0.180 | 0.820 |
|  | 35 | 0.083 | 0.507 | 0.757 | 0.243 | 0.186 | 0.814 |
|  | 40 | 0.086 | 0.519 | 0.757 | 0.243 | 0.191 | 0.809 |
|  | 45 | 0.088 | 0.530 | 0.757 | 0.243 | 0.195 | 0.805 |
|  | 50 | 0.091 | 0.540 | 0.757 | 0.243 | 0.200 | 0.800 |
|  | 55 | 0.093 | 0.548 | 0.757 | 0.243 | 0.204 | 0.796 |
|  | 60 | 0.095 | 0.557 | 0.757 | 0.243 | 0.207 | 0.793 |

**Table S7: Western and Central Pacific Fisheries Commission (WCPFC) tag deployment details and results for mako sharks.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | Country | Tag Argos | Tag serial | Date | Time | Latitude | Longitude | Fork length | Sex | Tag site | Alive | Track days |
| Mako | Fiji | 170543 | 17P0227 | 14-Aug-18 | 18:10 | -18.838 | 179.393 | 135 | F | water | Y | 60.6 |
| Mako | Fiji | 170544 | 17P0230 | 29-Jul-18 | 23:21 | -21.345 | 178.467 | 120 | F | water | Y | 60.5 |
| Mako | Fiji | 170545 | 17P0231 | 5-Dec-17 | 20:54 | -17.780 | 176.507 | 108 | F | water | Y | 20.2 |
| Mako | Fiji | 170546 | 17P0232 | 26-Dec-17 | 19:26 | -19.771 | 179.686 | 110 | F | water | Y | 23.8 |
| Mako | Fiji | 170548 | 17P0234 | 16-Jun-18 | 19:41 | -20.349 | 176.880 | 110 | F | water | Y | 60.7 |
| Mako | Fiji | 170549 | 17P0236 | 21-Jun-18 | 18:39 | -20.096 | 177.813 | 105 | F | water | Y | 44.5 |
| Mako | Fiji | 170551 | 17P0241 | 22-Jun-18 | 22:23 | -20.221 | 177.081 | 150 | F | water | N | 0.2 |
| Mako | Fiji | 170563 | 17P0253 | 4-Aug-18 | 0:00 | -23.163 | 179.219 | 126 | F | water | Y | 60.5 |
| Mako | Fiji | 170564 | 17P0254 | 10-Jul-18 | 22:16 | -18.079 | 175.872 | 135 | F | water | Y | 55.3 |
| Mako | Fiji | 170573 | 17P0265 | 22-Sep-18 | 5:44 | -13.585 | 175.888 | 200 |  | water | Y | 60.3 |
| Mako | Fiji | 170579 | 17P0315 | 21-Aug-18 | 1:30 | -17.527 | 179.893 | 220 |  | water | Y | 61.5 |
| Mako | Fiji | 170582 | 17P0322 | 18-Aug-18 | 18:47 | -17.611 | 179.566 | 170 | F | water | Y | 59.8 |
| Mako | Fiji | 170583 | 17P0364 | 17-Aug-18 | 1:40 | -18.261 | 179.685 | 108 | F | water | N | 48.4 |
| Mako | Fiji | 170585 | 17P0403 | 11-Aug-18 | 3:02 | -20.115 | 179.581 | 250 | M | water | Y | 57.2 |
| Mako | Fiji | 170586 | 17P0405 | 24-Aug-18 | 22:10 | -17.566 | 179.720 | 103 | F | deck | No report |  |
| Mako | New Caledonia | 170587 | 16P2212 | 11-Oct-18 | 19:01 | -22.091 | 167.396 | 135 |  | water | Y | 60.7 |
| Mako | New Caledonia | 170589 | 16P2438 | 10-Oct-18 | 15:25 | -21.638 | 166.780 | 181 | M | water | Y | 19.1 |
| Mako | New Caledonia | 170599 | 17P0407 | 3-Jul-18 | 15:58 | -23.495 | 161.304 | 227 |  | water | Y | 60.9 |
| Mako | New Caledonia | 170600 | 17P0409 | 12-Aug-18 | 19:24 | -22.786 | 165.097 | 319 | F | water | Y | 60.6 |
| Mako | New Caledonia | 170611 | 17P0477 | 22-Feb-19 | 4:00 | -22.533 | 163.133 | 154 | F | water | Y | 40.9 |
| Mako | New Caledonia | 170613 | 17P0481 | 30-Dec-18 | 14:05 | -21.435 | 162.687 | 99 |  | water | N | 26.9 |
| Mako | New Caledonia | 170615 | 17P0485 | 22-Oct-18 | 16:46 | -21.364 | 166.364 | 135 |  | water | Y | 13.1 |
| Mako | New Caledonia | 170617 | 17P0487 | 18-Aug-18 | 16:53 | -19.648 | 163.237 | 144 | F | deck | No report |  |
| Mako | New Caledonia | 170618 | 17P0516 | 20-Aug-18 | 14:08 | -19.941 | 162.534 | 209 | F | water | Y | 61.0 |
| Mako | New Caledonia | 170619 | 17P0637 | 11-Nov-18 | 22:00 | -20.354 | 158.205 | 190 |  | water | N | 14.5 |
| Mako | New Zealand | 100001 | 16P1800 | 4-Jun-17 | 22:16 | -39.053 | 178.483 | 175 | M | water | No report |  |
| Mako | New Zealand | 170504 | 16P1917 | 4-Jun-17 | 1:15 | -39.583 | 178.437 | 150 |  | water | Y | 60.5 |
| Mako | New Zealand | 170505 | 16P1990 | 4-Jul-17 | 12:55 | -37.015 | 178.648 | 125 | F | deck | Y | 61.8 |
| Mako | New Zealand | 170506 | 16P1991 | 3-Sep-17 | 19:38 | -36.861 | 177.735 | 140 |  | water | Y | 60.5 |
| Mako | New Zealand | 170507 | 16P1993 | 21-Aug-17 | 16:20 | -37.215 | 177.484 | 180 |  | water | Y | 60.9 |
| Mako | New Zealand | 170508 | 16P1995 | 7-Aug-17 | 19:06 | -37.183 | 177.767 | 185 |  | water | Y | 60.5 |
| Mako | New Zealand | 170509 | 16P1998 | 15-Aug-17 | 19:00 | -35.092 | 176.857 | 190 |  | water | Y | 60.4 |
| Mako | New Zealand | 170510 | 16P2008 | 31-Jul-17 | 20:05 | -36.585 | 178.307 | 130 |  | deck | Y | 60.7 |
| Mako | New Zealand | 170511 | 16P2033 | 28-Jun-17 | 23:49 | -36.648 | 177.017 | 145 |  | deck | Y | 60.5 |
| Mako | New Zealand | 170512 | 16P2034 | 31-Aug-17 | 16:37 | -34.803 | 176.228 | 140 |  | water | N | 32.3 |
| Mako | New Zealand | 170513 | 16P2035 | 25-Jan-18 | 14:50 | -36.817 | 176.367 | 150 | F | water | Y | 60.9 |
| Mako | New Zealand | 170514 | 16P2036 | 31-Jan-18 | 14:20 | -35.708 | 176.435 | 86 | F | deck | Y | 12.6 |
| Mako | New Zealand | 170515 | 16P2037 | 28-Jan-18 | 12:30 | -36.070 | 176.377 | 150 | F | water | Y | 61.0 |
| Mako | New Zealand | 170516 | 16P2038 | 10-Apr-18 | 16:20 | -39.168 | 178.772 | 140 | F | deck | Y | 10.1 |
| Mako | New Zealand | 170517 | 16P2048 | 23-Aug-17 | 21:50 | -35.172 | 175.910 | 179 | M | deck | Y | 26.5 |
| Mako | New Zealand | 170518 | 16P2052 | 10-Feb-18 | 16:50 | -37.258 | 178.833 | 107 | F | deck | N | 1.1 |
| Mako | New Zealand | 170519 | 16P1620 | 25-May-17 | 20:54 | -38.582 | 178.800 | 128 | F | deck | Y | 8.4 |
| Mako | New Zealand | 170520 | 16P1636 | 23-May-17 | 13:43 | -38.934 | 178.708 | 145 | F | water | Y | 35.6 |
| Mako | New Zealand | 170521 | 16P1768 | 28-May-17 | 18:40 | -38.769 | 178.702 | 135 | M | deck | Y | 30.5 |
| Mako | New Zealand | 170522 | 16P1774 | 6-Jun-17 | 20:14 | -39.565 | 178.377 | 128 | F | deck | Y | 10.4 |
| Mako | New Zealand | 170523 | 16P1777 | 16-Jun-17 | 14:51 | -36.880 | 178.073 | 130 |  | water | Y | 60.7 |
| Mako | New Zealand | 170524 | 16P1780 | 18-Jun-17 | 17:01 | -36.960 | 178.156 | 150 | F | water | Y | 1.6 |
| Mako | New Zealand | 170525 | 16P1781 | 5-Aug-17 | 16:44 | -37.019 | 176.985 | 94 | F | deck | N | 0.0 |
| Mako | New Zealand | 170526 | 16P1782 | 12-Jun-17 | 15:05 | -36.650 | 178.135 | 119 | F | deck | Y | 42.9 |
| Mako | New Zealand | 170527 | 16P1783 | 20-Jun-17 | 13:57 | -37.345 | 178.385 | 96 | F | deck | Y | 11.7 |
| Mako | New Zealand | 170528 | 16P1786 | 26-Jun-17 | 17:15 | -37.248 | 178.293 | 156 | M | deck | Y | 24.3 |
| Mako | New Zealand | 170529 | 16P1787 | 21-Jun-17 | 13:13 | -37.320 | 178.465 | 97 | F | deck | Y | 12.6 |
| Mako | New Zealand | 170530 | 16P1790 | 19-Jun-17 | 20:30 | -37.317 | 177.878 | 195 | F | deck | Y | 60.5 |
| Mako | New Zealand | 170531 | 16P1791 | 12-Jun-17 | 19:25 | -36.850 | 178.217 | 94 | F | deck | Y | 32.7 |
| Mako | New Zealand | 170532 | 16P1792 | 11-Jun-17 | 19:10 | -38.933 | 179.113 | 117 | M | deck | Y | 13.7 |
| Mako | New Zealand | 170533 | 16P1851 | 2-Jun-17 | 23:15 | -39.508 | 178.548 | 130 |  | water | Y | 60.7 |
| Mako | New Zealand | 170534 | 16P1976 | 11-Jun-17 | 22:10 | -37.962 | 179.200 | 220 |  | water | Y | 60.6 |
| Mako | New Zealand | 170535 | 16P1977 | 20-Jun-17 | 15:25 | -36.100 | 177.423 | 250 |  | water | Y | 60.8 |
| Mako | New Zealand | 170536 | 16P1980 | 23-Jun-17 | 17:35 | -37.172 | 178.405 | 150 |  | water | Y | 60.8 |
| Mako | New Zealand | 171016 | 16P1736 | 3-Jun-17 | 14:19 | -38.967 | 178.685 | 180 |  | water | Y | 15.9 |

**Table S8: Western and Central Pacific Fisheries Commission (WCPFC) tag deployment details and results for silky sharks.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | Country | Tag Argos | Tag serial | Date | Time | Latitude | Longitude | Fork length | Sex | Tag site | Alive | Track days |
| Silky | Fiji | 170537 | 17P0183 | 21-Oct-17 | 18:37 | -16.287 | 175.780 | 160 | F | water | Y | 60.7 |
| Silky | Fiji | 170538 | 17P0185 | 4-Dec-17 | 19:15 | -21.057 | 174.408 | 105 | F | water | Y | 60.7 |
| Silky | Fiji | 170539 | 17P0188 | 15-Aug-18 | 21:10 | -18.910 | 179.169 | 130 | F |  | Y | 59.6 |
| Silky | Fiji | 170540 | 17P0222 | 22-Nov-17 | 16:48 | -16.087 | 176.865 | 110 | F | water | Y | 60.8 |
| Silky | Fiji | 170541 | 17P0223 | 22-Nov-17 | 19:00 | -16.157 | 176.963 | 120 | F | water | No report |  |
| Silky | Fiji | 170542 | 17P0224 | 2-Jun-18 | 20:10 | -15.767 | -178.358 | 149 | F | deck | No report |  |
| Silky | Fiji | 170547 | 17P0233 | 2-Mar-18 | 19:54 | -22.093 | 173.851 | 115 | F | water | Y | 35.0 |
| Silky | Fiji | 170550 | 17P0238 | 22-Jun-18 | 19:32 | -20.130 | 177.812 | 110 | F | water | Y | 10.7 |
| Silky | Fiji | 170552 | 17P0332 | 24-Dec-17 | 20:16 | -16.070 | 178.332 | 140 | F | water | Y | 60.6 |
| Silky | Fiji | 170553 | 17P0339 | 11-Dec-17 | 1:53 | -16.109 | 176.502 | 140 | F | water | N | 0.4 |
| Silky | Fiji | 170554 | 17P0355 | 11-Dec-17 | 4:13 | -16.151 | 176.501 | 100 | F | water | Y | 60.3 |
| Silky | Fiji | 170555 | 17P0357 | 16-Dec-17 | 21:26 | -15.819 | 177.937 | 120 | F | water | Y | 60.6 |
| Silky | Fiji | 170556 | 17P0359 | 24-Dec-17 | 21:30 | -16.076 | 178.308 | 90 | F | water | No report |  |
| Silky | Fiji | 170558 | 17P0208 | 26-Mar-19 | 5:06 | -19.070 | -177.417 | 88 | M | water | Y | 56.2 |
| Silky | Fiji | 170559 | 17P0225 | 8-Sep-18 | 20:40 | -17.912 | -178.932 | 200 | M | deck | Y | 24.6 |
| Silky | Fiji | 170560 | 17P0247 | 21-Mar-19 | 3:55 | -19.890 | -177.568 | 105 | M | water | Y | 43.5 |
| Silky | Fiji | 170561 | 17P0250 | 8-Sep-18 | 20:23 | -17.912 | -178.932 | 200 | F | deck | Y | 37.2 |
| Silky | Fiji | 170562 | 17P0251 | 9-Sep-18 | 20:38 | -18.140 | -178.218 | 250 | F | water | Y | 60.7 |
| Silky | Fiji | 170565 | 17P0255 | 6-Feb-19 | 19:46 | -18.003 | 177.165 | 84 | F | water | Y | 13.4 |
| Silky | Fiji | 170566 | 17P0257 | 10-Sep-18 | 0:02 | -15.877 | -178.187 | 110 | M | water | Y | 23.6 |
| Silky | Fiji | 170567 | 17P0258 | 2-Feb-19 | 19:23 | -18.630 | 177.578 | 97 | F | water | Y | 18.8 |
| Silky | Fiji | 170568 | 17P0259 | 2-Sep-18 | 22:59 | -15.112 | -179.803 | 87 | M | water | Y | 57.7 |
| Silky | Fiji | 170570 | 17P0261 | 7-Feb-19 | 19:57 | -18.335 | 177.893 | 84 | F | water | Y | 4.9 |
| Silky | Fiji | 170571 | 17P0262 | 15-Sep-18 | 3:45 | -16.520 | -178.564 | 105 | M | water | N | 49.3 |
| Silky | Fiji | 170572 | 17P0263 | 24-Jan-19 | 2:06 | -17.301 | 179.844 | 84 | F | water | N | 9.3 |
| Silky | Fiji | 170574 | 17P0266 | 29-Aug-18 | 16:39 | -19.203 | 176.377 | 117 | M | water | Y | 55.1 |
| Silky | Fiji | 170575 | 17P0268 | 23-Jan-19 | 21:33 | -17.238 | -179.870 | 88 | F | water | Y | 60.6 |
| Silky | Fiji | 170576 | 17P0269 | 23-Aug-18 | 0:05 | -15.782 | 177.877 | 84 | M | water | Y | 61.5 |
| Silky | Fiji | 170577 | 17P0271 | 25-Jan-19 | 23:43 | -15.807 | 179.505 | 84 | F | water | Y | 47.7 |
| Silky | Fiji | 170578 | 17P0272 | 26-Sep-18 | 16:56 | -12.984 | 176.113 | 122 |  | water | Y | 18.0 |
| Silky | Fiji | 170580 | 17P0317 | 15-Aug-18 | 21:05 | -18.908 | 179.169 | 113 | M |  | Y | 32.5 |
| Silky | Fiji | 170581 | 17P0318 | 5-Sep-18 | 15:09 | -18.900 | -179.154 | 200 | F | water | Y | 25.7 |
| Silky | Fiji | 170584 | 17P0401 | 26-Jul-18 | 2:44 | -21.556 | 173.959 | 160 | M | water | Y | 60.5 |
| Silky | Fiji | 170651 | 17P1431 | 1-Apr-19 | 19:21 | -18.212 | 177.240 | 97 | F | water | Y | 8.6 |
| Silky | Fiji | 170653 | 17P1434 | 2-Apr-19 | 20:23 | -18.282 | 177.418 | 84 | F | water | Y | 22.8 |
| Silky | Fiji | 170655 | 17P1436 | 15-Mar-19 | 21:42 | -18.248 | 177.358 | 146 | F | water | Y | 20.2 |
| Silky | Fiji | 170656 | 17P1437 | 16-Mar-19 | 2:24 | -18.412 | 177.507 | 163 | F | water | Y | 60.4 |
| Silky | Fiji | 170660 | 17P1442 | 5-Apr-19 | 17:00 | -18.303 | 178.270 | 101 | M | water | Y | 60.8 |
| Silky | Fiji | 170662 | 17P1446 | 5-Apr-19 | 16:45 | -18.305 | 178.257 | 93 | M | water | Y | 59.8 |
| Silky | Fiji | 170666 | 17P1478 | 5-Apr-19 | 17:45 | -18.298 | 178.307 | 97 | F | water | Y | 60.6 |
| Silky | Fiji | 170668 | 17P1487 | 16-Mar-19 | 23:59 | -18.208 | 177.265 | 130 | F | water | Y | 60.5 |
| Silky | Fiji | 170669 | 17P1488 | 18-Mar-19 | 21:43 | -18.145 | 177.225 | 130 | F | water | No report |  |
| Silky | Fiji | 170679 | 18P0006 | 18-Mar-19 | 21:55 | -18.150 | 177.232 | 97 | F | water | Y | 0.7 |
| Silky | Marshall Islands | 170622 | 17P1166 | 28-Jul-18 | 22:23 | 4.909 | 171.751 | 140 |  | water | Y | 50.7 |
| Silky | Marshall Islands | 170623 | 17P1170 | 19-Jul-18 | 16:25 | 3.021 | 167.113 | 101 |  | water | Y | 36.1 |
| Silky | Marshall Islands | 170624 | 17P1189 | 22-Jul-18 | 22:55 | 3.129 | 169.082 | 125 | M | water | N | 0.1 |
| Silky | Marshall Islands | 170625 | 17P1195 | 21-Jul-18 | 22:07 | 2.960 | 167.988 | 115 |  | water | Y | 60.6 |
| Silky | Marshall Islands | 170626 | 17P1197 | 19-Jul-18 | 19:44 | 3.027 | 167.446 | 130 |  | water | Y | 31.2 |
| Silky | Marshall Islands | 170632 | 17P1352 | 13-Nov-18 | 21:55 | 8.532 | 169.353 | 130 |  |  | Y | 20.4 |
| Silky | Marshall Islands | 170633 | 17P1354 | 20-Jul-18 | 19:10 | 3.612 | 166.698 | 100 |  | water | N | 45.8 |
| Silky | Marshall Islands | 170634 | 17P1356 | 17-Jul-18 | 17:00 | 3.162 | 166.785 | 110 |  | water | Y | 60.8 |
| Silky | Marshall Islands | 170635 | 17P1357 | 21-Jul-18 | 20:45 | 3.812 | 166.578 | 110 |  | water | Y | 23.2 |
| Silky | Marshall Islands | 170636 | 17P1386 | 18-Jul-18 | 18:40 | 3.135 | 166.813 | 110 | M | water | Y | 2.4 |
| Silky | Marshall Islands | 170637 | 17P1390 | 24-Jul-18 | 16:50 | 4.247 | 166.735 | 98 |  | water | Y | 16.0 |
| Silky | Marshall Islands | 170638 | 17P1402 | 20-Jul-18 | 16:35 | 3.610 | 166.448 | 120 |  | water | Y | 60.8 |
| Silky | Marshall Islands | 170675 | 17P1504 | 24-Nov-18 | 18:40 | 7.638 | 169.994 | 125 |  |  | N | 0.1 |
| Silky | Marshall Islands | 170690 | 18P0024 | 15-Nov-18 | 17:00 | 2.420 | 169.573 | 75 |  |  | Y | 38.9 |

Supplementary Figures



**Figure S1:** Frequency distributions of Western and Central Pacific Fisheries Commission (WCPFC) tagging months by species and country. Only those tags that reported are shown.



**Figure S2:** Length-frequency distributions for Western and Central Pacific Fisheries Commission (WCPFC) tagged sharks by species and sex. Dashed lines indicate the median lengths at maturity for males and females. Data are shown only for tags that reported.



**Figure S3:** The effect of each model variable (species, condition, fork length, and trailing branchline ratio) on shark survival over time. The green line indicates the model coefficient without a time varying effect.

 **Figure S4:** Predicted survivorship (with 95% confidence limits) for the parameters from the ‘combined dataset’ (i.e., the five Pacific datasets, Table 1) model for mako (A, C, E) and silky sharks (B, D, F) refitted with a time-transforming function. A, B: Effect of number of days post-release on survivorship of uninjured (AU) and injured (AI) sharks, with fork length (FL, in cm) and branchline ratio fixed at their median values. C, D: Effect of fork length on survivorship at 60 days of uninjured sharks, with branchline ratio fixed at its median value. E, F: Effect of branchline ratio on survivorship at 60 days of uninjured sharks, with fork length fixed at its median value. Survivorship indicated by dotted lines should be treated with caution as they are likely influenced by the small number of mortalities.