**Table S1.** Sample information
Ad: adult, Ju: juvenile, M: male, F: female, U: unidentified

| spicies | year | longitude | latitude | body weight (g) | sex | age |
|---|---|---|---|---|---|---|
| Northern fulmar | 2009 | 57'30N | 180'00 | 580 | F | Ad |
| Northern fulmar | 2009 | 57'30N | 178'00W | 713 | U | Ad |
| Northern fulmar | 2009 | 57'30N | 178'00W | 601 | M | Ad |
| Northern fulmar | 2009 | 58'30N | 180'00 | 571 | F | Ad |
| Thick-billed murre | 2008 | 57'30N | 177'00E | 1129 | F | Ju |
| Thick-billed murre | 2008 | 58'30N | 180'00 | 1033 | M | Ju |
| Thick-billed murre | 2009 | 56'30N | 180'00 | 1052 | U | Ju |
| Thick-billed murre | 2009 | 57'30N | 179'00W | 1050 | F | Ad |
| Short-tailed shearwater | 2009 | 56'30N | 177'00E | 531 | M | Ju |
| Short-tailed shearwater | 2009 | 57'30N | 179'00W | 454 | M | Ad |
| Short-tailed shearwater | 2009 | 57'30N | 179'00W | 553 | F | Ad |
| Short-tailed shearwater | 2009 | 58'30N | 180'00 | 419 | M | Ad |
| Short-tailed shearwater | 2009 | 58'30N | 180'00 | 405 | M | Ad |
| Short-tailed shearwater | 2009 | 58'30N | 180'00 | 434 | M | Ad |
| Short-tailed shearwater | 2009 | 58'30N | 180'00 | 513 | F | Ad |
| Short-tailed shearwater | 2009 | 56'30N | 178'00W | 593 | M | Ad |
| Short-tailed shearwater | 2009 | 56'30N | 178'00W | 534 | U | Ad |
| Short-tailed shearwater | 2009 | 56'30N | 178'00W | 588 | F | U |
| Short-tailed shearwater | 2009 | 58'30N | 180'00 | 450 | M | Ad |
| Short-tailed shearwater | 2009 | 57'30N | 180'00 | 535 | F | Ad |
| Short-tailed shearwater | 2009 | 57'30N | 180'00 | 510 | U | Ad |
| Short-tailed shearwater | 2009 | 57'30N | 180'00 | 565 | F | Ad |
| Short-tailed shearwater | 2009 | 57'30N | 178'00W | 435 | U | Ju |
| Short-tailed shearwater | 2009 | 57'30N | 180'00 | 495 | U | Ju |
| Short-tailed shearwater | 2009 | 57'30N | 180'00 | 535 | F | Ju |
| Short-tailed shearwater | 2009 | 57'30N | 180'00 | 500 | F | Ad |
| Short-tailed shearwater | 2009 | 57'30N | 178'00W | 450 | M | Ju |
| Short-tailed shearwater | 2010 | 55'30N | 180'00 | 470 | U | Ju |
| Short-tailed shearwater | 2010 | 56'30N | 180'00 | 550 | M | Ju |
| Short-tailed shearwater | 2010 | 56'30N | 180'00 | 495 | U | Ad |
| Short-tailed shearwater | 2010 | 55'31N | 180'00 | 575 | U | Ju |
| Short-tailed shearwater | 2010 | 56'30N | 179'00E | 655 | U | U |
| Tufted puffin | 2008 | 45'00N | 180'00 | 836 | M | Ju |
| Tufted puffin | 2009 | 57'30N | 179'00W | 763 | F | Ju |
| Tufted puffin | 2010 | 47'30N | 180'00 | 975 | M | Ju |
| Tufted puffin | 2010 | 44'00N | 180'00 | 795 | M | Ad |
| Tufted puffin | 2010 | 46'00N | 180'00 | 835 | M | U |
| Horned puffin | 2008 | 45'00N | 180'00 | 527 | M | Ad |
| Horned puffin | 2008 | 45'00N | 180'00 | 653 | F | Ad |
| Horned puffin | 2010 | 46'00N | 180'00 | 715 | M | Ad |

**Table S2.** Pairwise correlation coefficients r for body weight, each metal and metalloid in the liver and stable isotope ratio in

| | | *r* | *P* -value |
|---|---|---|---|
| Hg | BW | 0.01 | 0.93 |
| Cd | BW | 0.5 | 0 |
| Cd | Hg | 0.41 | 0.01 |
| Cr | BW | 0.06 | 0.73 |
| Cr | Hg | -0.09 | 0.57 |
| Cr | Cd | -0.16 | 0.33 |
| Ni | BW | 0.32 | 0.04 |
| Ni | Hg | -0.19 | 0.23 |
| Ni | Cd | 0.25 | 0.12 |
| Ni | Cr | -0.24 | 0.14 |
| Pb | BW | -0.25 | 0.12 |
| Pb | Hg | -0.09 | 0.6 |
| Pb | Cd | -0.14 | 0.38 |
| Pb | Cr | -0.01 | 0.93 |
| Pb | Ni | -0.23 | 0.15 |
| Cu | BW | -0.07 | 0.68 |
| Cu | Hg | -0.12 | 0.48 |
| Cu | Cd | 0.04 | 0.82 |
| Cu | Cr | -0.26 | 0.11 |
| Cu | Ni | 0.17 | 0.29 |
| Cu | Pb | -0.18 | 0.26 |
| Zn | BW | 0.19 | 0.25 |
| Zn | Hg | 0.14 | 0.4 |
| Zn | Cd | 0.6 | <.0001 |
| Zn | Cr | -0.4 | 0.01 |
| Zn | Ni | 0.41 | 0.01 |
| Zn | Pb | -0.25 | 0.13 |
| Zn | Cu | 0.34 | 0.03 |
| Co | BW | 0 | 0.99 |
| Co | Hg | -0.23 | 0.16 |
| Co | Cd | 0.17 | 0.28 |
| Co | Cr | 0.32 | 0.05 |
| Co | Ni | 0.03 | 0.88 |
| Co | Pb | -0.09 | 0.6 |
| Co | Cu | 0.14 | 0.38 |
| Co | Zn | 0.41 | 0.01 |
| As | BW | 0.08 | 0.62 |
| As | Hg | 0.14 | 0.4 |
| As | Cd | 0.45 | 0 |
| As | Cr | -0.44 | 0 |
| As | Ni | 0.34 | 0.03 |
| As | Pb | -0.13 | 0.42 |
| As | Cu | 0.21 | 0.19 |
| As | Zn | 0.66 | <.0001 |
| As | Co | 0.15 | 0.37 |
| $\delta^{15}N$ | BW | 0.05 | 0.76 |
| $\delta^{15}N$ | Hg | 0.54 | 0 |
| $\delta^{15}N$ | Cd | 0.21 | 0.22 |
| $\delta^{15}N$ | Cr | -0.31 | 0.07 |
| $\delta^{15}N$ | Ni | -0.03 | 0.86 |
| $\delta^{15}N$ | Pb | -0.09 | 0.61 |
| $\delta^{15}N$ | Cu | 0.12 | 0.48 |
| $\delta^{15}N$ | Zn | 0.31 | 0.07 |
| $\delta^{15}N$ | Co | -0.26 | 0.13 |
| $\delta^{15}N$ | As | 0.26 | 0.14 |
| $\delta^{13}C$ | BW | -0.01 | 0.94 |
| $\delta^{13}C$ | Hg | 0.25 | 0.14 |
| $\delta^{13}C$ | Cd | 0.12 | 0.49 |
| $\delta^{13}C$ | Cr | -0.34 | 0.04 |
| $\delta^{13}C$ | Ni | 0.11 | 0.55 |
| $\delta^{13}C$ | Pb | -0.32 | 0.06 |
| $\delta^{13}C$ | Cu | 0.31 | 0.07 |
| $\delta^{13}C$ | Zn | 0.45 | 0.01 |
| $\delta^{13}C$ | Co | 0.09 | 0.62 |
| $\delta^{13}C$ | As | 0.38 | 0.03 |
| $\delta^{13}C$ | $\delta^{15}N$ | 0.71 | <.0001 |