

Supplementary Materials:

Table S1. Sample information, population of origin, ancestry notes, proportion (prop.) of missing data per genome, and posterior probability (prob.) assignment to each possible reference genome. (Abbreviation: APP, Algonquin Provincial Park; CFA, domestic dog; CLY, eastern wolf; CLU, gray wolf; CLA, coyote; CRU, red wolf; SSP, species survival plan; YNP, Yellowstone National Park). Bolded values indicate the new data collected for this study.

| Species | Sample ID | State or Province | Population | Ancestry notes | Reference | Prop. missing | Prop. Assignment (CFA, CLY, CLU, CLA, CRU) |
|---------------|------------------|---------------------------------|---------------------|------------------|---------------------------------------|---------------|--|
| | 12765 | | | | | | 0.04, 0.04, 0.03, 0.83, |
| Coyote | (Carmine) | Atlanta, Georgia, U.S.A. | Southeastern | To infer | This study | 0.191 | 0.06 |
| Coyote | 2199 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.043 | |
| Coyote | 2200 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.023 | |
| Coyote | 2201 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.060 | |
| Coyote | 2205 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.048 | |
| Coyote | 2206 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.022 | |
| Coyote | 2208 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.026 | |
| Coyote | 2209 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.029 | |
| Coyote | 2210 | Minnesota, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.020 | |
| Coyote | 2341 | Wisconsin, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.141 | |
| Coyote | 2342 | Wisconsin, U.S.A. | Great Lakes | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.329 | |
| Coyote | 6205 | Maine, U.S.A. | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.155 | |
| Coyote | 6207 | Maine, U.S.A. | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.152 | |
| Coyote | 6246 | Maine, U.S.A. | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.161 | |
| Coyote | 6862 | New Jersey, U.S.A. | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.114 | |
| Coyote | 5978 | New York, U.S.A. | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.116 | |
| Coyote | 5987 | New York, U.S.A. | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.162 | |
| Coyote | 1686 | Pennsylvania, U.S.A | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.311 | |

| | | | | | | |
|-----------|------|------------------------|--------------|---------------------|---------------------------------------|-------|
| Coyote | 1714 | Pennsylvania, U.S.A | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.370 |
| Coyote | 1732 | Pennsylvania, U.S.A | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.189 |
| Coyote | 1733 | Pennsylvania, U.S.A | Northeastern | Coyote reference | Heppenheimer, Harrigan, et al. (2018) | 0.061 |
| Coyote | 2830 | Alabama, U.S.A. | Southeastern | Coyote reference | Heppenheimer, Brzeski et al. (2018) | 0.034 |
| Coyote | 2832 | Alabama, U.S.A. | Southeastern | Coyote reference | Heppenheimer, Brzeski et al. (2018) | 0.267 |
| Coyote | 2847 | Alabama, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2018) | 0.028 |
| Coyote | 1894 | Florida, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2018) | 0.026 |
| Coyote | 8282 | Florida, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2020) | 0.370 |
| Coyote | 2861 | Georgia, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2018) | 0.032 |
| Coyote | 5549 | Georgia, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2020) | 0.231 |
| Coyote | 8682 | Kentucky, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2018) | 0.019 |
| Coyote | 5234 | North Carolina, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2020) | 0.205 |
| Coyote | 2862 | South Carolina, U.S.A. | Southeastern | Coyote reference | Heppenheimer et al. (2018) | 0.042 |
| Coyote | 6307 | Arizona, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.018 |
| Coyote | 4571 | California, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.020 |
| Coyote | 4618 | California, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.018 |
| Coyote | 4644 | California, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.022 |
| Coyote | 8723 | Idaho, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.037 |
| Coyote | 8731 | Idaho, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.099 |
| Coyote | 8740 | Idaho, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.042 |
| Coyote | 7950 | Missouri, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.096 |
| Coyote | 5857 | Neveda, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.034 |
| Coyote | 4597 | Washington, U.S.A. | Western | Coyote reference | Heppenheimer et al. (2018) | 0.019 |
| Gray wolf | 2144 | Michigan, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.117 |
| Gray wolf | 2149 | Michigan, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.064 |
| Gray wolf | 2152 | Michigan, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.027 |

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|--------------|------|----------------------|-------------|---------------------|---------------------------------------|-------|
| Gray wolf | 2162 | Michigan, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.155 |
| Gray wolf | 2169 | Minnesota, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.022 |
| Gray wolf | 2174 | Minnesota, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.040 |
| Gray wolf | 2198 | Minnesota, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.034 |
| Gray wolf | 2819 | Minnesota, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.019 |
| Gray wolf | 2338 | Wisconsin, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.034 |
| Gray wolf | 2340 | Wisconsin, U.S.A. | Great Lakes | Gray wolf reference | Heppenheimer, Harrigan, et al. (2018) | 0.050 |
| Gray wolf | 4778 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.073 |
| Gray wolf | 5372 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.199 |
| Gray wolf | 5373 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.209 |
| Gray wolf | 5374 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.121 |
| Gray wolf | 5375 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.180 |
| Gray wolf | 5376 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.229 |
| Gray wolf | 5377 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.015 |
| Gray wolf | 5378 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.017 |
| Gray wolf | 5380 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.058 |
| Gray wolf | 5381 | YNP, Wyoming, U.S.A. | Western | Gray wolf reference | Heppenheimer, Brzeski et al. (2018) | 0.016 |
| Eastern wolf | 2091 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.093 |
| Eastern wolf | 2094 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.081 |
| Eastern wolf | 2096 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.073 |
| Eastern wolf | 2101 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.049 |
| Eastern wolf | 7274 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.029 |
| Eastern wolf | 7275 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.034 |
| Eastern wolf | 7278 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.033 |
| Eastern wolf | 7280 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.033 |
| Eastern wolf | 7284 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.039 |

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|--------------|------|----------------------|----|---------------|---------------------------------------|-------|
| Eastern wolf | 7286 | APP, Ontario, Canada | -- | -- | Heppenheimer, Harrigan, et al. (2018) | 0.033 |
| Red wolf | 4800 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.267 |
| Red wolf | 4801 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.353 |
| Red wolf | 4817 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.062 |
| Red wolf | 4819 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.135 |
| Red wolf | 4824 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.114 |
| Red wolf | 4825 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.069 |
| Red wolf | 5516 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.347 |
| Red wolf | 5522 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.196 |
| Red wolf | 5532 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.156 |
| Red wolf | 5538 | SSP captive | -- | -- | Heppenheimer et al. (2020) | 0.043 |
| Domestic dog | 6054 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.183 |
| Domestic dog | 6056 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.117 |
| Domestic dog | 6058 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.396 |
| Domestic dog | 6075 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.304 |
| Domestic dog | 6076 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.049 |
| Domestic dog | 6077 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.100 |
| Domestic dog | 6101 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.233 |
| Domestic dog | 6102 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.105 |
| Domestic dog | 6109 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.179 |
| Domestic dog | 6110 | Ontario, Canada | -- | Dog reference | Heppenheimer, Harrigan, et al. (2018) | 0.374 |

Table S2. Posterior probability proportions (prop.) for each of the reference individuals with assignments up to two generations back. Notes are also provided to explain when admixture was detected among reference genomes and when samples were excluded from ancestry inference. (Abbreviations: gen, generation; n, number; Prop., proportion).

| Sample ID | Population label | Prop. Assignment to <i>a</i> | Prop. and population name | Notes |
|-----------|------------------|------------------------------|---------------------------|---|
| | | <i>priori</i> population | (n gen back) | |
| 2199 | Coyote | 1.0 | -- | |
| 2200 | Coyote | 1.0 | -- | |
| 2201 | Coyote | 1.0 | -- | |
| 2205 | Coyote | 1.0 | -- | |
| 2206 | Coyote | 1.0 | -- | |
| 2208 | Coyote | 1.0 | -- | |
| 2209 | Coyote | 1.0 | -- | |
| 2210 | Coyote | 1.0 | -- | |
| 2341 | Coyote | 1.0 | -- | |
| 2342 | Coyote | 1.0 | -- | |
| 1686 | Coyote | 0 | 1.0 Domestic dog (2) | |
| 1714 | Coyote | 1.0 | -- | |
| 1732 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 1733 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 5978 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 5987 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 6205 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 6207 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 6246 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 6862 | Coyote | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 2830 | Coyote | 1.0 | -- | |

| | | | | |
|------|--------------|-----|----------------------|---|
| 1894 | Coyote | 1.0 | -- | |
| 2832 | Coyote | 0 | 1.0 Red wolf (2) | Shared allele frequencies due to historic admixture |
| 2847 | Coyote | 1.0 | -- | |
| 2861 | Coyote | 1.0 | -- | |
| 2862 | Coyote | 1.0 | -- | |
| 5234 | Coyote | 1.0 | -- | |
| 5549 | Coyote | 1.0 | -- | |
| 8282 | Coyote | 0 | 1.0 Red wolf (2) | Shared allele frequencies due to historic admixture |
| 8682 | Coyote | 0 | 1.0 Domestic dog (2) | Excluded from ancestry inference |
| 4571 | Coyote | 1.0 | -- | |
| 4597 | Coyote | 1.0 | -- | |
| 4618 | Coyote | 1.0 | -- | |
| 4644 | Coyote | 1.0 | -- | |
| 5857 | Coyote | 1.0 | -- | |
| 6307 | Coyote | 1.0 | -- | |
| 7950 | Coyote | 1.0 | -- | |
| 8723 | Coyote | 1.0 | -- | |
| 8731 | Coyote | 1.0 | -- | |
| 8740 | Coyote | 1.0 | -- | |
| 6054 | Domestic dog | 1.0 | -- | |
| 6056 | Domestic dog | 1.0 | -- | |
| 6058 | Domestic dog | 1.0 | -- | |
| 6075 | Domestic dog | 1.0 | -- | |
| 6076 | Domestic dog | 1.0 | -- | |
| 6077 | Domestic dog | 1.0 | -- | |
| 6101 | Domestic dog | 1.0 | -- | |

| | | | |
|------|--------------|-----|----|
| 6102 | Domestic dog | 1.0 | -- |
| 6109 | Domestic dog | 1.0 | -- |
| 6110 | Domestic dog | 1.0 | -- |
| 2091 | Eastern wolf | 1.0 | -- |
| 2094 | Eastern wolf | 1.0 | -- |
| 2096 | Eastern wolf | 1.0 | -- |
| 2101 | Eastern wolf | 1.0 | -- |
| 7274 | Eastern wolf | 1.0 | -- |
| 7275 | Eastern wolf | 1.0 | -- |
| 7278 | Eastern wolf | 1.0 | -- |
| 7280 | Eastern wolf | 1.0 | -- |
| 7284 | Eastern wolf | 1.0 | -- |
| 7286 | Eastern wolf | 1.0 | -- |
| 4778 | Gray wolf | 1.0 | -- |
| 5372 | Gray wolf | 1.0 | -- |
| 5373 | Gray wolf | 1.0 | -- |
| 5374 | Gray wolf | 1.0 | -- |
| 5375 | Gray wolf | 1.0 | -- |
| 5376 | Gray wolf | 1.0 | -- |
| 5377 | Gray wolf | 1.0 | -- |
| 5378 | Gray wolf | 1.0 | -- |
| 5380 | Gray wolf | 1.0 | -- |
| 5381 | Gray wolf | 1.0 | -- |
| 2144 | Gray wolf | 1.0 | -- |
| 2149 | Gray wolf | 1.0 | -- |
| 2152 | Gray wolf | 1.0 | -- |

| | | | | |
|------|-----------|-----|----------------------|---|
| 2162 | Gray wolf | 0 | 1.0 Eastern wolf (2) | Shared allele frequencies due to historic admixture |
| 2169 | Gray wolf | 1.0 | -- | |
| 2174 | Gray wolf | 1.0 | -- | |
| 2198 | Gray wolf | 1.0 | -- | |
| 2338 | Gray wolf | 0 | 1.0 Coyote (2) | Excluded from ancestry inference |
| 2340 | Gray wolf | 1.0 | -- | |
| 2819 | Gray wolf | 1.0 | -- | |
| 4800 | Red wolf | 1.0 | -- | |
| 4801 | Red wolf | 1.0 | -- | |
| 4817 | Red wolf | 1.0 | -- | |
| 4819 | Red wolf | 1.0 | -- | |
| 4824 | Red wolf | 1.0 | -- | |
| 4825 | Red wolf | 1.0 | -- | |
| 5516 | Red wolf | 1.0 | -- | |
| 5522 | Red wolf | 1.0 | -- | |
| 5532 | Red wolf | 1.0 | -- | |
| 5538 | Red wolf | 1.0 | -- | |



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