

**CHARACTERIZATION OF MOLECULAR GENETIC MARKERS IN *SPHENISCUS* BANDED PENGUINS FOR THE IDENTIFICATION OF A STRANDED PENGUIN IN CENTRAL AMERICA**

**Supplementary Figure 1.** DNA sequence alignment of mitochondrial *COI* haplotypes found in the stranded penguin, as well as reference samples of Galapagos (Smen), Humboldt (Shum), and Magellanic (Smag) penguins. The reference haplotypes are listed with the GenBank accession number followed by the allele name. Note that Smen01 and Shum01 are identical sequences. Stranded penguin haplotype identity is an exact match to haplotype Smag01. Polymorphisms within the alignment (20 sites) are indicated in bold text, while sites with fixed differences between Galápagos/Humboldt and Magellanic haplotypes (14 sites) are additionally underlined and indicated by the symbol “\*” above the alignment.

Stranded penguin	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	50
MN565811_Smen01	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MN830877_Shum01	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MN830878_Shum02	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MN830879_Shum03	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MN565806_Smag01	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MN565807_Smag02	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MZ852655_Smag03	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MN830876_Smag04	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	
MZ852656_Smag08	AACATGAATTTCACTACAGAACCGATAAGAAGAGGAATCAAACCTCTGTG	

Stranded penguin	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>G</u> GCATCTTACCTTACCTG	100
MN565811_Smen01	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>A</u> GCATCTTACCTTACCTG	
MN830877_Shum01	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>A</u> GCATCTTACCTTACCTG	
MN830878_Shum02	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>A</u> GCATCTTACCTTACCTG	
MN830879_Shum03	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>A</u> GCATCTTACCTTACCTG	
MN565806_Smag01	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>G</u> GCATCTTACCTTACCTG	
MN565807_Smag02	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>G</u> GCATCTTACCTTACCTG	
MZ852655_Smag03	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>G</u> GCATCTTACCTTACCTG	
MN830876_Smag04	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>G</u> GCATCTTACCTTACCTG	
MZ852656_Smag08	AAAAGGACTACAGCCTAACGCCTTAACATT <u>C</u> <u>G</u> GCATCTTACCTTACCTG	

Stranded penguin	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATATCGGC	150
MN565811_Smen01	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>C</u> <u>T</u> GGC	
MN830877_Shum01	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>C</u> <u>T</u> GGC	
MN830878_Shum02	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>C</u> <u>T</u> GGC	
MN830879_Shum03	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>C</u> <u>T</u> GGC	
MN565806_Smag01	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>T</u> <u>A</u> CGGC	
MN565807_Smag02	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>T</u> <u>A</u> CGGC	
MZ852655_Smag03	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>T</u> <u>A</u> CGGC	
MN830876_Smag04	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>T</u> <u>A</u> CGGC	
MZ852656_Smag08	TGACCTTCATCAACCGATGATTATTCTCAACCAACCACAAAGATAT <u>T</u> <u>A</u> CGGC	

Stranded penguin	ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGC <u>C</u> T	200
MN565811_Smen01	ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGC <u>T</u> TCT	
MN830877_Shum01	ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGC <u>T</u> TCT	
MN830878_Shum02	ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATA <u>A</u> CCGGAACCGC <u>T</u> TCT	
MN830879_Shum03	ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGC <u>T</u> TCT	
MN565806_Smag01	ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGC <u>C</u> TCT	
MN565807_Smag02	ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGC <u>C</u> TCT	

MZ852655\_Smag03 ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGCCCT  
 MN830876\_Smag04 ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCACTCT  
 MZ852656\_Smag08 ACCCTTTACCTAATCTTCGGCGCATGAGCAGGCATAGCCGGAACCGCCCT

Stranded penguin CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG 250  
 MN565811\_Smen01 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MN830877\_Shum01 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MN830878\_Shum02 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MN830879\_Shum03 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MN565806\_Smag01 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MN565807\_Smag02 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MZ852655\_Smag03 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MN830876\_Smag04 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG  
 MZ852656\_Smag08 CAGCCTGCTCATCCGCGCAGAACTCGGTCAACCCGGAACCCTCCTAGGAG

Stranded penguin \* \* 300  
 MN565811\_Smen01 ACGACCAGATCTACAATGTAATTGTTACCGCCCATGCCTTCGTAATAATC  
 MN830877\_Shum01 ATGACCAGATCTACAATGTAATTGTTCACCGCCCATGCCTTCGTAATAATC  
 MN830878\_Shum02 ATGACCAGATCTACAATGTAATTGTTCACCGCCCATGCCTTCGTAATAATC  
 MN830879\_Shum03 ATGACCAGATCTACAATGTAATTGTTCACCGCCCATGCCTTCATAAATAATC  
 MN565806\_Smag01 ACGACCAGATCTACAATGTAATTGTTTACCGCCCATGCCTTCGTAATAATC  
 MN565807\_Smag02 ACGACCAGATCTACAATGTAATTGTTTACCGCCCATGCCTTCGTAATAATC  
 MZ852655\_Smag03 ACGACCAGATCTACAATGTAATTGTTTACCGCCCATGCCTTCGTAATAATC  
 MN830876\_Smag04 ACGACCAGATCTACAATGTAATTGTTTACCGCCCATGCCTTCGTAATAATC  
 MZ852656\_Smag08 ACGACCAGATCTACAATGTAATTGTTTACCGCCCATGCCTTCGTAATAATC

Stranded penguin \* 350  
 MN565811\_Smen01 TTCTTCATAGTAATACCTATTCATAATCGGAGGATTTGGAAACTGACTAGT  
 MN830877\_Shum01 TTCTTCATAGTAATACCTATTTATAATCGGAGGATTTGGAAACTGACTAGT  
 MN830878\_Shum02 TTCTTCATAGTAATACCTATTTATAATCGGAGGATTTGGAAACTGACTAGT  
 MN830879\_Shum03 TTCTTCATAGTAATACCTATTTATAATCGGAGGATTTGGAAACTGACTAGT  
 MN565806\_Smag01 TTCTTCATAGTAATACCTATCAATAATCGGAGGATTTGGAAACTGACTAGT  
 MN565807\_Smag02 TTCTTCATAGTAATACCCCATCAATAATCGGAGGATTTGGAAACTGACTAGT  
 MZ852655\_Smag03 TTCTTCATAGTAATACCCCATCAATAATCGGAGGATTTGGAAACTGACTAGT  
 MN830876\_Smag04 TTCTTCATAGTAATACCTATCAATAATCGGAGGATTTGGAAACTGACTAGT  
 MZ852656\_Smag08 TTCTTCATAGTAATACCCCATCAATAATCGGAGGATTTGGAAACTGACTAAT

Stranded penguin \* 400  
 MN565811\_Smen01 TCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MN830877\_Shum01 TCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MN830878\_Shum02 TCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MN830879\_Shum03 TCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MN565806\_Smag01 CCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MN565807\_Smag02 CCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MZ852655\_Smag03 CCCGCTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MN830876\_Smag04 CCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA  
 MZ852656\_Smag08 CCCACTTATAATCGGCGCCCCGACATAGCATTTC~~C~~CGCATAAATAACA

Stranded penguin TAAGCTTTTGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC 450  
 MN565811\_Smen01 TAAGCTTTTGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC  
 MN830877\_Shum01 TAAGCTTTTGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC  
 MN830878\_Shum02 TAAGCTTTTGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC

MN830879\_Shum03 TAAGCTTTTGGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC  
 MN565806\_Smag01 TAAGCTTTTGGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC  
 MN565807\_Smag02 TAAGCTTTTGGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC  
 MZ852655\_Smag03 TAAGCTTTTGGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC  
 MN830876\_Smag04 TAAGCTTTTGGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC  
 MZ852656\_Smag08 TAAGCTTTTGGACTACTACCTCCCTCCTTCCTACTCCTACTAGCCTCCTCC

Stranded penguin ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCATTAGC 500  
 MN565811\_Smen01 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCGTTAGC  
 MN830877\_Shum01 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCGTTAGC  
 MN830878\_Shum02 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCGTTAGC  
 MN830879\_Shum03 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCGTTAGC  
 MN565806\_Smag01 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCATTAGC  
 MN565807\_Smag02 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCATTAGC  
 MZ852655\_Smag03 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCATTAGC  
 MN830876\_Smag04 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCATTAGC  
 MZ852656\_Smag08 ACAGTAGAAGCAGGAGCCGGCACAGGATGAACCGTATAACCCACCCATTAGC

Stranded penguin AGGCAACCTAGCCCATGCCGGCGCATCAGTAGACCTAGCCATTTTTTTCAC 550  
 MN565811\_Smen01 AGGCAACCTAGCCCATGCCGGCGCATCAGTAGACCTAGCCATTTTTTTCAC  
 MN830877\_Shum01 AGGCAACCTAGCCCATGCCGGCGCATCAGTAGACCTAGCCATTTTTTTCAC  
 MN830878\_Shum02 AGGCAACCTAGCCCATGCCGGCGCATCAGTAGACCTAGCCATTTTTTTCAC  
 MN830879\_Shum03 AGGCAACCTAGCCCATGCCGGCGCATCAGTAGACCTAGCCATTTTTTTCAC  
 MN565806\_Smag01 AGGCAACCTAGCCCATGCCGGCGCATCAGTAGACCTAGCCATTTTTTTCAC  
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 MZ852656\_Smag08 AGGCAACCTAGCCCATGCCGGCGCATCAGTAGACCTAGCCATTTTTTTCAC

Stranded penguin TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC 600  
 MN565811\_Smen01 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MN830877\_Shum01 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MN830878\_Shum02 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MN830879\_Shum03 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MN565806\_Smag01 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MN565807\_Smag02 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MZ852655\_Smag03 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MN830876\_Smag04 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC  
 MZ852656\_Smag08 TCCACCTAGCAGGAATCTCCTCCATCCTAGGAGCAATCAACTTCATCACC

Stranded penguin ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT 650  
 MN565811\_Smen01 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MN830877\_Shum01 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MN830878\_Shum02 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MN830879\_Shum03 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MN565806\_Smag01 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MN565807\_Smag02 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MZ852655\_Smag03 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MN830876\_Smag04 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT  
 MZ852656\_Smag08 ACCGCCACTAACATAAAAACCCCCAGCCCTATCACAATACCAAACCCCCCT

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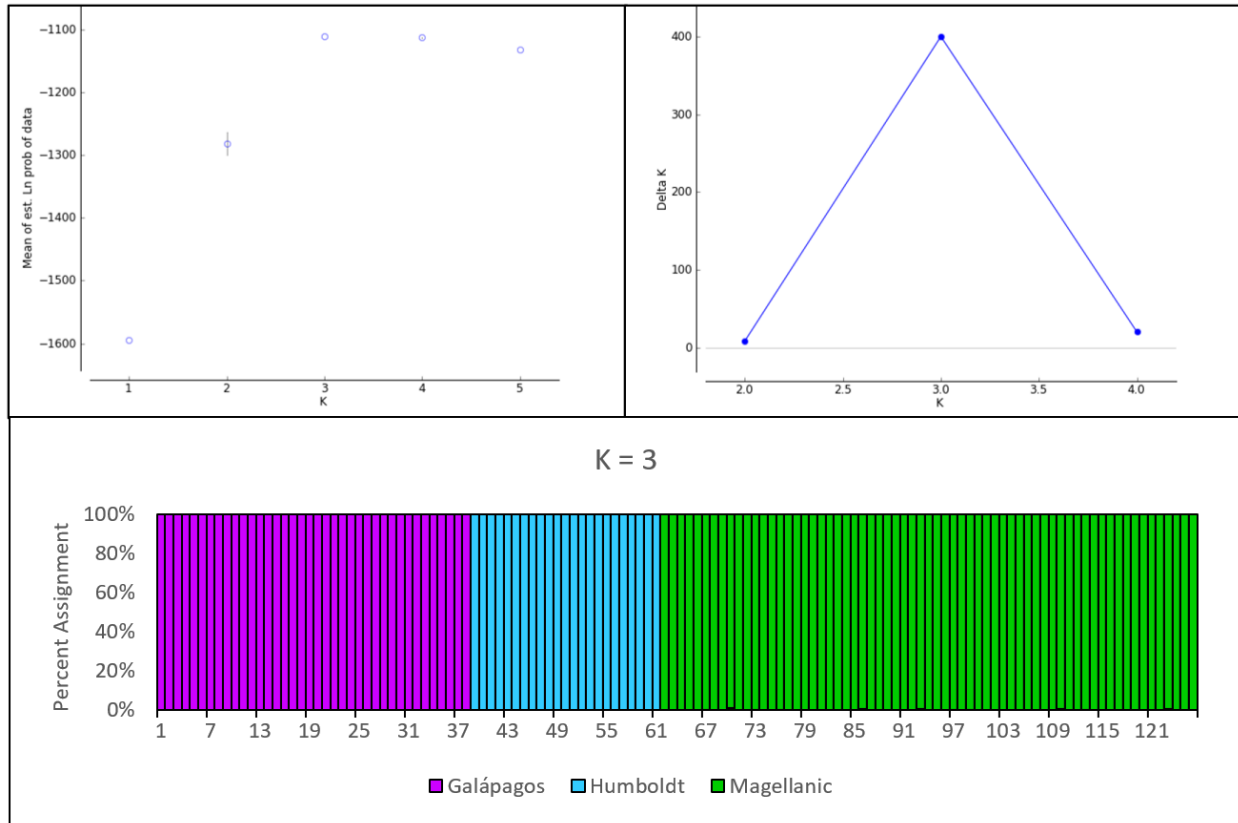
Stranded penguin	GTTTCGTATGATCC <u>G</u> TCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	700
MN565811_Smen01	GTTTCGTATGATC <u>T</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MN830877_Shum01	GTTTCGTATGATC <u>T</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MN830878_Shum02	GTTTCGTATGATC <u>T</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MN830879_Shum03	GTTTCGTATGATC <u>T</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MN565806_Smag01	GTTTCGTATGATC <u>C</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MN565807_Smag02	GTTTCGTATGATC <u>C</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MZ852655_Smag03	GTTTCGTATGATC <u>C</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MN830876_Smag04	GTTTCGTATGATC <u>C</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	
MZ852656_Smag08	GTTTCGTATGATC <u>C</u> GTCCTTATCACAGCTGTCCTCCTACTACTCTCACTTC	

\* \* \*

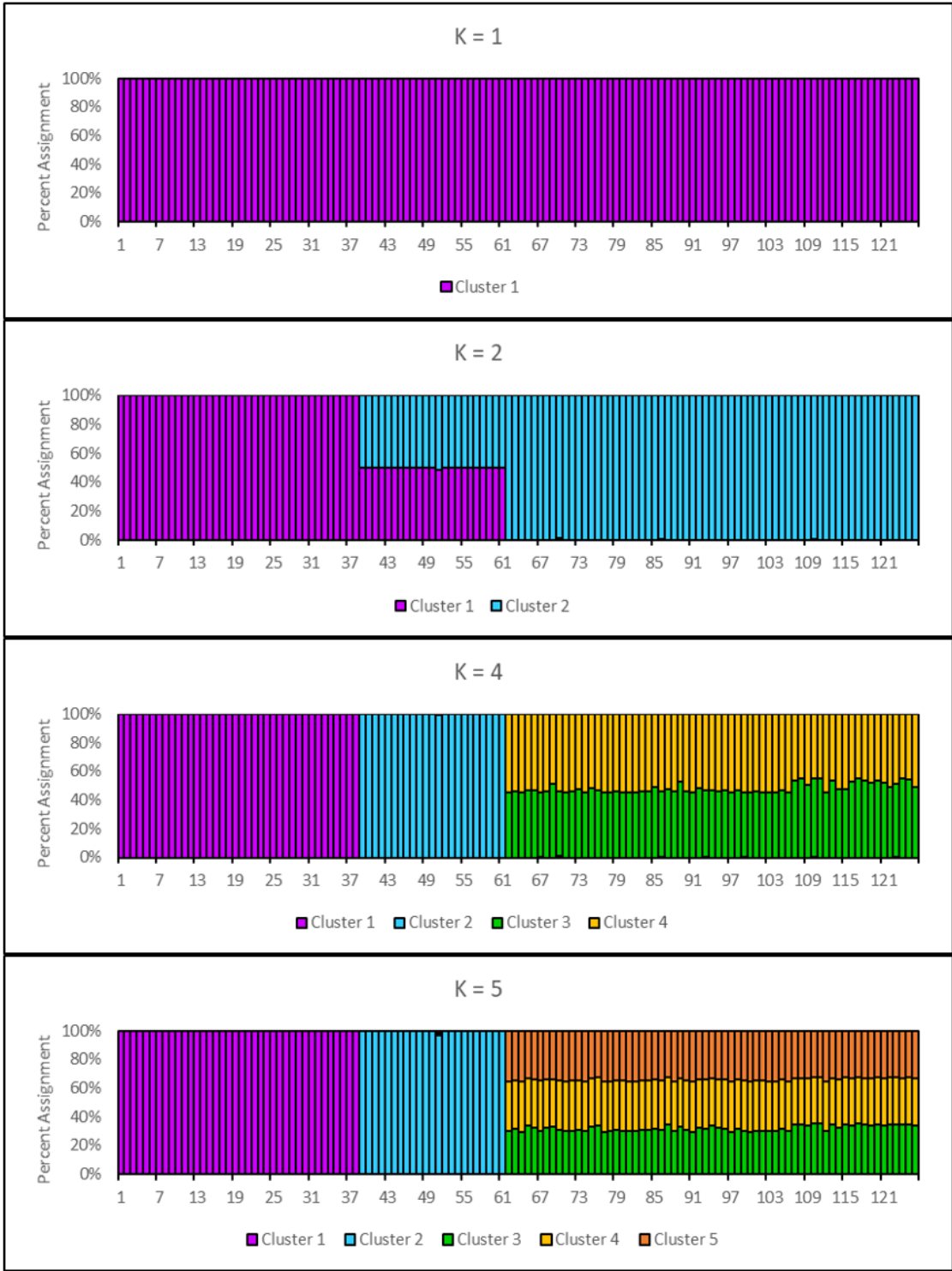
Stranded penguin	CCGTACTTGCTG <u>C</u> CGGCATCAC <u>C</u> ATGCTACTAACAGACCGAAACCTAAAC	750
MN565811_Smen01	CCGTACTTGCTG <u>C</u> GCTGGGCATCAC <u>T</u> ATGCTACTAACAGACCGAAACCTAAAC	
MN830877_Shum01	CCGTACTTGCTG <u>C</u> GCTGGGCATCAC <u>T</u> ATGCTACTAACAGACCGAAACCTAAAC	
MN830878_Shum02	CCGTACTTGCTG <u>C</u> GCTGGGCATCAC <u>T</u> ATGCTACTAACAGACCGAAACCTAAAC	
MN830879_Shum03	CCGTACTTGCTG <u>C</u> GCTGGGCATCAC <u>T</u> ATGCTACTAACAGACCGAAACCTAAAC	
MN565806_Smag01	CCGTACTTGCTG <u>T</u> GCCGGGCATCAC <u>C</u> ATGCTACTAACAGACCGAAACCTAAAC	
MN565807_Smag02	CCGTACTTGCTG <u>T</u> GCCGGGCATCAC <u>C</u> ATGCTACTAACAGACCGAAACCTAAAC	
MZ852655_Smag03	CCGTACTTGCTG <u>T</u> GCCGGGCATCAC <u>C</u> ATGCTACTAACAGACCGAAACCTAAAC	
MN830876_Smag04	CCGTACTTGCTG <u>T</u> GCCGGGCATCAC <u>C</u> ATGCTACTAACAGACCGAAACCTAAAC	
MZ852656_Smag08	CCGTACTTGCTG <u>T</u> GCCGGGCATCAC <u>C</u> ATGCTACTAACAGACCGAAACCTAAAC	

Stranded penguin	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	800
MN565811_Smen01	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MN830877_Shum01	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MN830878_Shum02	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MN830879_Shum03	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MN565806_Smag01	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MN565807_Smag02	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MZ852655_Smag03	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MN830876_Smag04	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	
MZ852656_Smag08	ACCACCTTCTTCGATCCAGCTGGAGGGGGAGACCCAATCCTATAACCAGCA	

Stranded penguin	CCTCTTC	807
MN565811_Smen01	CCTCTTC	
MN830877_Shum01	CCTCTTC	
MN830878_Shum02	CCTCTTC	
MN830879_Shum03	CCTCTTC	
MN565806_Smag01	CCTCTTC	
MN565807_Smag02	CCTCTTC	
MZ852655_Smag03	CCTCTTC	
MN830876_Smag04	CCTCTTC	
MZ852656_Smag08	CCTCTTC	



**Supplementary Figure 2.** Structure analysis of reference samples from Galapagos, Humboldt, and Magellanic Penguins. Top left: Mean log probabilities of data (posterior probabilities) for each tested  $K$ , indicating highest probability and lowest variability at  $K = 3$ . Plot created using Structure Harvester (Earl & vonHoldt 2012). Top right: Plot of  $\Delta K$  values created using Structure Harvester (Earl & vonHoldt 2012), showing a definitive peak in  $\Delta K$  at  $K = 3$ . Bottom: Assignment probabilities ( $Q$ ) for all individuals at  $K = 3$ . Each vertical bar represents an individual penguin. The three genetic clusters, each represented with a different color, corresponded exactly to the three reference species and all individuals were strongly assigned (>99%) to the proper species group.



**Supplementary Figure 3.** Assignment probabilities ( $Q$ ) for all individuals at  $K = 1$ ,  $K = 2$ ,  $K = 4$ , and  $K = 5$ . Each vertical bar represents an individual penguin. Each genetic cluster is represented with a different color. Mean log probabilities of data for each tested  $K$  indicates the highest probability and lowest variability at  $K = 3$ ;  $\Delta K$  values show a definitive peak in  $\Delta K$  at  $K = 3$  (see Supplementary Figure 2).