

**Supplemental Table S2. tMRCA analysis**

Gene	Node (X)	Node age	95 % HPD	Posterior probability
<b>PB2</b>	A/wild duck/ZL117/2022 (H9N2)			
	X			
	A/wild ducks/ZA/ ZL118/2022 (H9N2)	Jul 2021	Dec 2020-Dec 2021	1
	A/wild ducks/ZA/ ZL121/2022 (H9N2)			
	A/wild ducks/ZA/ ZL213/2022 (H9N2)			
<b>PB2</b>	A/wild ducks/ZA/ ZL309/2022 (H9N2)			
	A/wild duck/ZL117/2022 (H9N2)			
	A/wild ducks/ZA/ ZL118/2022 (H9N2)	Jul 2019	Aug 2018-Mar 2020	1
	A/wild ducks/ZA/ ZL121/2022 (H9N2)			
	A/wild ducks/ZA/ ZL213/2022 (H9N2)			
<b>PB2</b>	A/wild ducks/ZA/ ZL309/2022 (H9N2)			
	X			
	A/ostrich/ZA/090581/2020 (H5N2)			
	A/wild duck/ZL117/2022 (H9N2)	Feb 2018	May 2017-Nov 2018	0.39
	A/wild ducks/ZA/ ZL118/2022 (H9N2)			
<b>PB2</b>	A/wild ducks/ZA/ ZL121/2022 (H9N2)			
	A/wild ducks/ZA/ ZL213/2022 (H9N2)			
	A/wild ducks/ZA/ ZL309/2022 (H9N2)			
	A/ostrich/ZA/090581/2020 (H5N2)			
	A/ostrich/ZA/18090431/2018 (H11N1)			
<b>PB2</b>	X			
	A/ostrich/ZA/543-31/2019 (H11N1)	Apr 2018	Nov 2017- Aug 2018	0.79
	A/ostrich/ZA/543-20/2019 (H11N1)			
	A/ostrich/ZA/543-26/2019 (H11N1)			
	A/ostrich/ZA/543-17/2019 (H11N1)			
<b>PB2</b>	A/ostrich/ZA/0107-21/2019 (H11N1)			
	A/ostrich/ZA/0107-23/2019 (H11N1)			
	A/mallard/ZA/0156-38/2019 (H11N9)			
	X			
	A/wild duck/ZL117/2022 (H9N2)			
	A/wild ducks/ZA/ ZL118/2022 (H9N2)			
	A/wild ducks/ZA/ ZL121/2022 (H9N2)			
	A/wild ducks/ZA/ ZL213/2022 (H9N2)			
	A/wild ducks/ZA/ ZL309/2022 (H9N2)			
	A/wild duck/ZL117/2022 (H9N2)			
	A/wild ducks/ZA/ ZL118/2022 (H9N2)	Jan 2017	Feb 2016-Feb 2018	1
	A/wild ducks/ZA/ ZL121/2022 (H9N2)			
	A/wild ducks/ZA/ ZL213/2022 (H9N2)			
	A/wild ducks/ZA/ ZL309/2022 (H9N2)			
	A/ostrich/ZA/090581/2020 (H5N2)			
A/ostrich/ZA/18090431/2018 (H11N1)				
A/ostrich/ZA/543-31/2019 (H11N1)				
A/ostrich/ZA/543-20/2019 (H11N1)				
A/ostrich/ZA/543-26/2019 (H11N1)				
A/ostrich/ZA/543-17/2019 (H11N1)				
A/ostrich/ZA/0107-21/2019 (H11N1)				
A/ostrich/ZA/0107-23/2019 (H11N1)				
<b>PB2</b>	A/pintail/Egypt/MB-D-384C/2015 (H3N6)	May 2015	Nov 2014-Sep 2015	0.4
	X			
<b>PB1</b>	All ZA viruses above (PB2 gene)			
	A/wild duck/ZL117/2022 (H9N2)			
	A/wild ducks/ZA/ ZL118/2022 (H9N2)	Nov 2011	Apr 2005-May 2016	0.35
	A/wild ducks/ZA/ ZL121/2022 (H9N2)			
	A/wild ducks/ZA/ ZL213/2022 (H9N2)			

	A/wild ducks/ZA/ ZL309/2022 (H9N2) X A/Common Teal/Buryatia/89i/2019 (H11N1) A/Duck/Mongolia/2019-496/2019 (H11N1)			
<b>PA</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) X A/ostrich/ZA/070595/2020 (H7N1) A/ostrich/ZA/080067/2020 (H7N1) A/ostrich/ZA/653561/2020 (H7N1)	Apr 2019	Jun 2018-Feb 2020	1
<b>PA</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/ostrich/ZA/070595/2020 (H7N1) A/ostrich/ZA/080067/2020 (H7N1) A/ostrich/ZA/653561/2020 (H7N1) X A/mallard/Novosibirsk region/988k/2018 (H4N6)	Apr 2017	Mar 2016-May 2018	1
<b>HA</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) X A/Egyptian goose/ZA/TP2118/2021 (H9N2)	Feb 2019	Dec 2015- Dec 2020	1
<b>HA</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X A/pheasant/Italy/21 VIR2284-1/2021 (H9N2)	Jan 2013	Nov 2005-Feb 2020	1
<b>NP</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X A/Egyptian goose/ZA/TP2118/2021 (H9N2)	Oct 2018	Apr 2017-Dec 2019	1
<b>NP</b>	A/ostrich/ZA/18090431/2018 (H11N1) X A/ostrich/ZA/543-31/2019 (H11N1) A/ostrich/ZA/543-20/2019 (H11N1) A/ostrich/ZA/543-26/2019 (H11N1) A/ostrich/ZA/543-17/2019 (H11N1) A/ostrich/ZA/0107-21/2019 (H11N1) A/ostrich/ZA/0107-23/2019 (H11N1)	Jul 2018	Mar 2018-Aug 2018	1
<b>NP</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X	Jun 2015	Feb 2014-Dec 2016	1

	A/ostrich/ZA/18090431/2018 (H11N1) A/ostrich/ZA/543-31/2019 (H11N1) A/ostrich/ZA/543-20/2019 (H11N1) A/ostrich/ZA/543-26/2019 (H11N1) A/ostrich/ZA/543-17/2019 (H11N1) A/ostrich/ZA/0107-21/2019 (H11N1) A/ostrich/ZA/0107-23/2019 (H11N1)			
<b>NP</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) A/ostrich/ZA/18090431/2018 (H11N1) A/ostrich/ZA/543-31/2019 (H11N1) A/ostrich/ZA/543-20/2019 (H11N1) A/ostrich/ZA/543-26/2019 (H11N1) A/ostrich/ZA/543-17/2019 (H11N1) A/ostrich/ZA/0107-21/2019 (H11N1) A/ostrich/ZA/0107-23/2019 (H11N1) X A/Anas platyrhynchos/Belgium/17330cls42/2013 (H5N2)	Feb 2012	Mar 2011-Dec 2013	0.12
<b>NA</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X A/Egyptian goose/ZA/TP2118/2021 (H9N2)	Jun 2018	Feb 2017-Dec 2019	1
<b>NA</b>	/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X A/wild bird/Uganda/MUWRP-731/2017 (H6N2)	May 2016	Jan 2015-Aug 2017	1
<b>M</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X A/Egyptian goose/ZA/TP2118/2021 (H9N2)	Sep 2020	Feb 2020-Feb 2021	1
<b>M</b>	A/ostrich/ZA/18090431/2018 (H11N1) X A/ostrich/ZA/543-31/2019 (H11N1) A/ostrich/ZA/543-20/2019 (H11N1) A/ostrich/ZA/543-26/2019 (H11N1) A/ostrich/ZA/543-17/2019 (H11N1) A/ostrich/ZA/0107-21/2019 (H11N1) A/ostrich/ZA/0107-23/2019 (H11N1)	May 2018	Dec 2017-Aug 2018	0.9
<b>M</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X	Feb 2018	May 2017-Aug 2018	1

	A/ostrich/ZA/18090431/2018 (H11N1) A/ostrich/ZA/543-31/2019 (H11N1) A/ostrich/ZA/543-20/2019 (H11N1) A/ostrich/ZA/543-26/2019 (H11N1) A/ostrich/ZA/543-17/2019 (H11N1) A/ostrich/ZA/0107-21/2019 (H11N1) A/ostrich/ZA/0107-23/2019 (H11N1)			
<b>M</b>	All ZA viruses above (M gene) X A/mallard/Dagestan/1051/2018 (H7N3)	May 2017	Jul 2016-Feb 2018	1
<b>NS</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X A/Egyptian goose/ZA/TP2118/2021 (H9N2)	Sep 2020	Nov 2019-Feb 2021	1
<b>NS</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) X A/ostrich/ZA/070595/2020 (H7N1) A/ostrich/ZA/080067/2020 (H7N1) A/ostrich/ZA/653561/2020 (H7N1)	Sep 2018	Dec 2016-Sep 2019	1
<b>NS</b>	A/wild duck/ZL117/2022 (H9N2) A/wild ducks/ZA/ ZL118/2022 (H9N2) A/wild ducks/ZA/ ZL121/2022 (H9N2) A/wild ducks/ZA/ ZL213/2022 (H9N2) A/wild ducks/ZA/ ZL309/2022 (H9N2) A/Egyptian goose/ZA/TP2118/2021 (H9N2) A/ostrich/ZA/070595/2020 (H7N1) A/ostrich/ZA/080067/2020 (H7N1) A/ostrich/ZA/653561/2020 (H7N1) X A/mallard/Ukraine/AN-221-13-01/2020 (H7N2)	Aug 2016	Dec 2014-Jun 2018	0.99