

Supplementary Information of

**Combining kinship analysis and otolith geochemistry to investigate
homing and straying of invasive pink salmon
(*Oncorhynchus gorbuscha*)**

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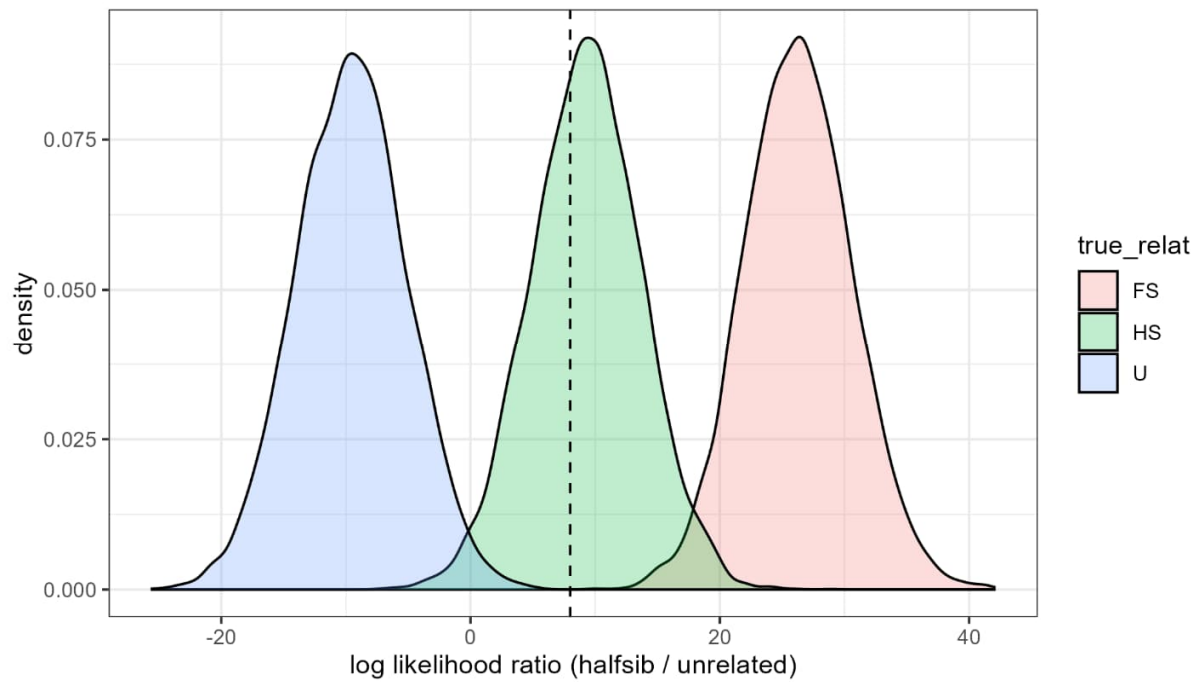


Figure S1. Distribution of log likelihood ratios (half-sibling / unrelated) for simulated full-sibling pairs (FS, red), half-sibling pairs (HS, green) and pairs of unrelated individuals (U, blue). Pairs are simulated based on allele frequencies observed in 329 pink salmon caught in 30 rivers in Norway in 2019. The dashed vertical line shows the log likelihood ratio threshold (8.0) used in the assignment of sibling pairs.

Table S1. Overview of genetic samples collected in 2019 from 31 rivers along the Norwegian Coast. In total 329 samples from 30 rivers were included in the kinship analysis.

Capture location	Lat	Lon	Kinship analysis	Samples collected
Batnfjordselva	62.89739	7.67829	5	6
Bogenvassdraget (Strandvatnet) (Strandaelva)	68.52571	16.99542	8	10
Botnelva i Kvaefjord	68.73727	16.24279	23	24
Daleelva (Hoyangervassdraget)	61.21488	6.07366	1	1
Elvegardselva	68.54605	17.56268	13	15
Velledalselva (Fetvassdraget)	62.33506	6.58993	2	3
Gaula i Sunnfjord (Gaularvassdraget)	61.36695	5.68016	5	5
Glomma	59.17731	10.95371	3	3
Hamnedalselva	70.87194	24.94500	1	1
Klokkerelva	69.85814	29.38688	8	8
Komagelva	70.24112	30.52439	12	18
Kongsfjordelva	70.65787	29.25835	44	45
Lakselva i Porsanger	70.08226	24.92328	58	60
Salvassdraget (Moelva)	64.69051	11.43691	2	3
Namsen (hele vassdraget)	64.45730	11.50698	1	1
Nordkjoselva i Kvaefjord	69.21526	19.54258	26	29
Oksfjordvassdraget (Fiskelva)	69.90568	21.32003	2	2
orstaelva	62.19595	6.12416	8	8
Oselva (Osenvassdraget) i Molde	62.79233	7.71934	1	1
Otra	58.14372	8.01335	1	1
Reisaelva	69.78342	21.00683	45	50
Ringvasselva	69.80530	19.26029	2	2
Roksdalsvassdraget (aelva)	69.04697	15.87412	25	27
Russelva (Ruossajakka)	70.61999	24.65595	9	10
Sandselva	69.39430	18.59874	3	9
Skienselva	59.12721	9.61635	2	2
Sor-Tverrfjordvassdraget	70.21943	21.71642	5	7
Steinsdalselva i Osen	64.29873	10.49902	1	1
Sundsfjordelva	66.98132	14.15401	9	10
Sylteelva/Moaelva	62.83441	7.20291	4	4
Stjørdalselva	63.44693	10.90920	0	2

Table S2. Sample overview and strontium isotope results for juvenile and adult pink salmon samples collected from the river Kongsfjordelva (all belonging to the same cohort). For juveniles the origin is known as they were collected in Kongsfjordelva, for adults the origin is predicted based on their otolith natal $^{87}\text{Sr}/^{86}\text{Sr}$.

Sample ID	Life stage	Year	Mean Natal $^{87}\text{Sr}/^{86}\text{Sr}$	SD	Origin
KONG_22_0025	Juvenile	2022	0.71929	0.00002	Local
KONG_22_0026	Juvenile	2022	0.72168	0.00068	Local
KONG_22_0104	Juvenile	2022	0.72058	0.00052	Local
KONG_22_0105	Juvenile	2022	0.72006	0.00015	Local
KONG_22_0113	Juvenile	2022	0.72145	0.00148	Local
23-290	Adult	2023	0.71331	0.00013	Non-local
23-291	Adult	2023	0.71546	0.00013	Non-local
23-293	Adult	2023	0.71601	0.00033	Non-local
23-294	Adult	2023	0.71911	0.00006	Non-local
23-295	Adult	2023	0.71378	0.00010	Non-local
23-297	Adult	2023	0.71283	0.00019	Non-local
23-300	Adult	2023	0.71760	0.00008	Non-local
23-301	Adult	2023	0.71637	0.00018	Non-local
23-303	Adult	2023	0.71574	0.00009	Non-local
23-304	Adult	2023	0.71738	0.00013	Non-local
23-305	Adult	2023	0.71629	0.00001	Non-local
23-306	Adult	2023	0.71639	0.00021	Non-local
23-308	Adult	2023	0.71383	0.00018	Non-local
23-309	Adult	2023	0.71557	0.00014	Non-local
23-310	Adult	2023	0.71592	0.00004	Non-local
23-311	Adult	2023	0.71543	0.00028	Non-local
23-312	Adult	2023	0.71589	0.00009	Non-local
23-315	Adult	2023	0.71476	0.00032	Non-local
23-318	Adult	2023	0.71504	0.00009	Non-local
23-322	Adult	2023	0.71647	0.00024	Non-local
23-323	Adult	2023	0.72107	0.00025	Local
23-325	Adult	2023	0.71945	0.00004	Local
23-327	Adult	2023	0.71957	0.00009	Local
23-328	Adult	2023	0.71465	0.00013	Non-local
23-329	Adult	2023	0.71790	0.00015	Non-local
23-330	Adult	2023	0.71807	0.00009	Non-local
23-332	Adult	2023	0.71573	0.00009	Non-local
23-333	Adult	2023	0.71542	0.00009	Non-local
23-334	Adult	2023	0.71488	0.00014	Non-local
23-335	Adult	2023	0.71380	0.00004	Non-local
23-336	Adult	2023	0.71522	0.00024	Non-local
23-337	Adult	2023	0.71861	0.00011	Non-local
23-339	Adult	2023	0.71348	0.00013	Non-local
23-340	Adult	2023	0.71260	0.00004	Non-local
23-342	Adult	2023	0.71261	0.00012	Non-local
23-344	Adult	2023	0.71481	0.00004	Non-local

Table S3. Summary of analytical conditions for strontium isotope analysis by LA-ICP-MS.**Sample Preparation**

Laboratory name Geological Survey of Norway

Sample type/mineral otolith/carbonate

Laser ablation system

Make, Model & type Teledyne-Cetac Analyte Excite

Ablation cell & volume HelEx II two volume cell

Laser wavelength 193 nm

Pulse width < 4 ns

Fluence 5 J.cm⁻²

Repetition rate 10 Hz

Ablation duration variable with 3 µm/s

Spot diameter 40 µm

Sampling mode / pattern line scans

Carrier gas 100% He in the cell, Ar make-up gas combined using a T-piece along the sample transport line. He/Ar in torch typically 0.4/1

Cell carrier gas flow (l/min) ~0.45 l/min

ICP-MS Instrument

Make, Model & type Nu instruments Plasma 3 MC-ICP-MS

Sample introduction ablation aerosol

RF power 1300 W

Make-up gas flow ca 0.77 l/min Ar

Detection system MC on Faraday cups with 10¹¹ Ω resistors

Masses measured 82, 82.5, 83, 83.5, 84, 84.5, 85, 85.5, 86, 86.5, 87, 87.5, 88

Integration time per peak/dwell 0.1 s

times

Total integration time 0.1 s

per output

datapoint

Table S4. Summary of analytical conditions for strontium isotope analysis of the water samples.**ICP-MS Instrument**

Make, Model & type Nu instruments Plasma 3 MC-ICP-MS (PD017)

Sample introduction Apex Omega

RF power 1300 W

Coolant Ar Flow 13 l/min Ar

Detection system Faraday cups with 10¹¹ Ω resistors

Masses measured 83, 84, 85, 86, 87, 88

Integration time (s) 10