Appendix 2

Area 08 Chum Salmon

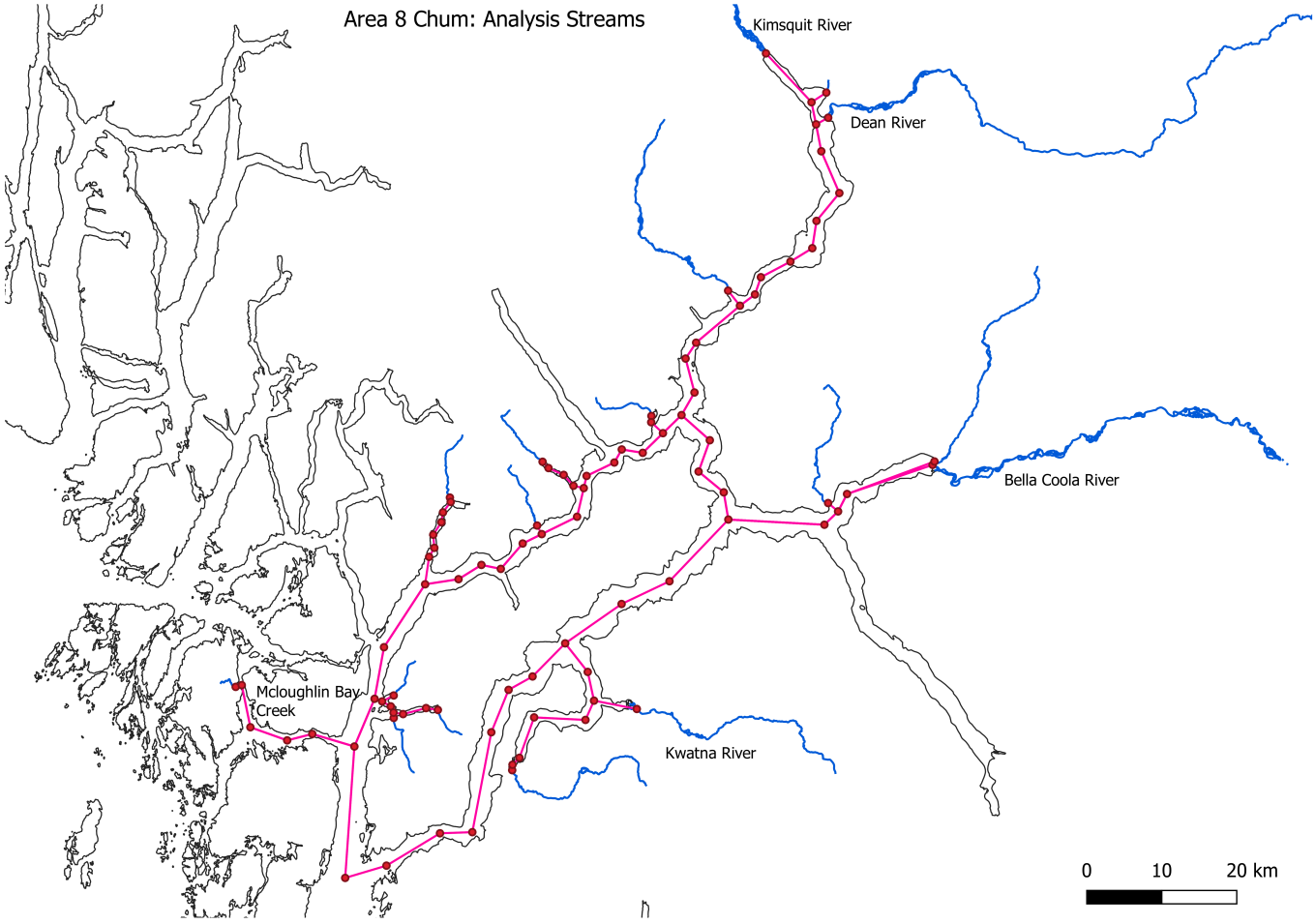
Coastland

2023-03-07

Contents

Study area

Area 8



Summary figures

Escapement: Raw and filtered stream list

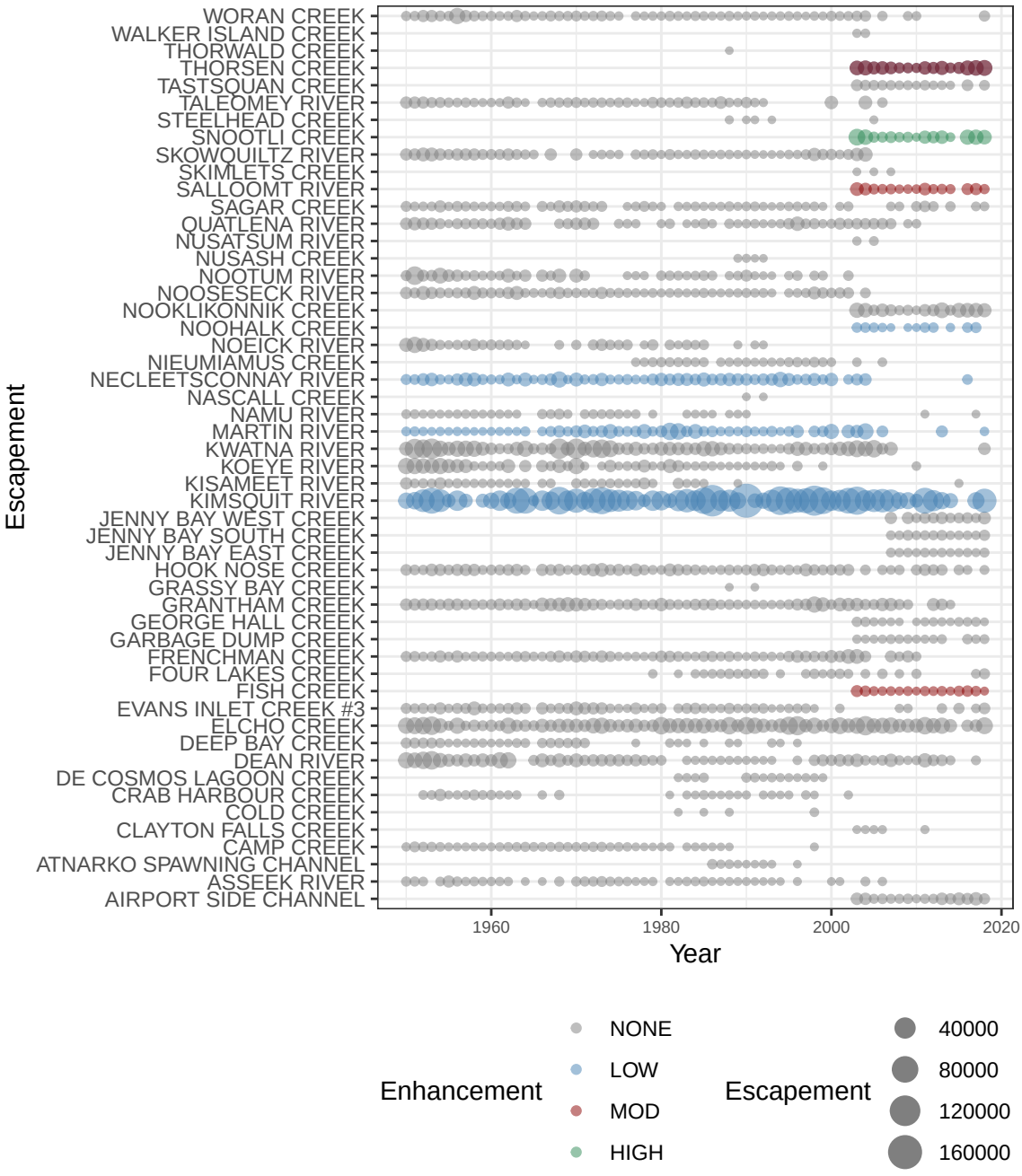


Figure 1: Escapement to area streams by enhancement rank.

Area 8 Escapement (filtered streams)

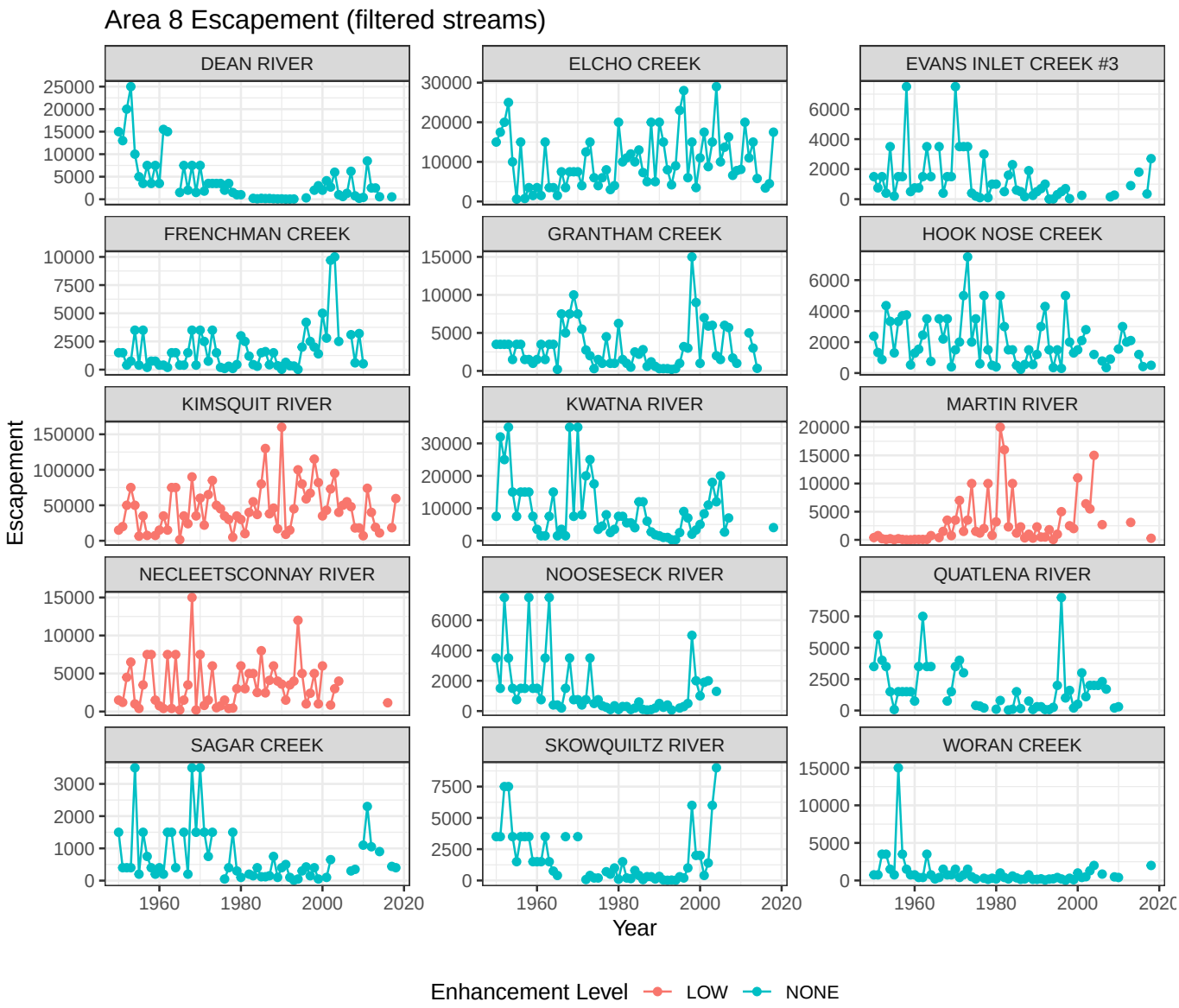


Figure 2: Escapement to filtered streams for Area 8 chum. Colour shows the stream enhancement level from the PSE database.

Table 1: Distance from enhanced systems (Bella Coola and McLaughlin

Stream	Dist. from Bella Coola (km)	Dist. from McLoughlin (km)
NECLEETSCONNAY RIVER	0.330	131.240
NOOSESECK RIVER	24.643	170.440
WORAN CREEK	76.866	120.913
SKOWQUILTZ RIVER	94.720	148.313
ELCHO CREEK	103.148	106.639
KWATNA RIVER	105.902	130.621
FRENCHMAN CREEK	107.102	86.179
QUATLENA RIVER	119.732	144.451
DEAN RIVER	131.461	185.054
GRANTHAM CREEK	137.067	190.660
KIMSQUIT RIVER	145.334	198.927
MARTIN RIVER	146.597	33.405
HOOK NOSE CREEK	156.657	42.239
SAGAR CREEK	157.723	43.305
EVANS INLET CREEK #3	166.711	52.293

Hatchery Releases: Total and by release site

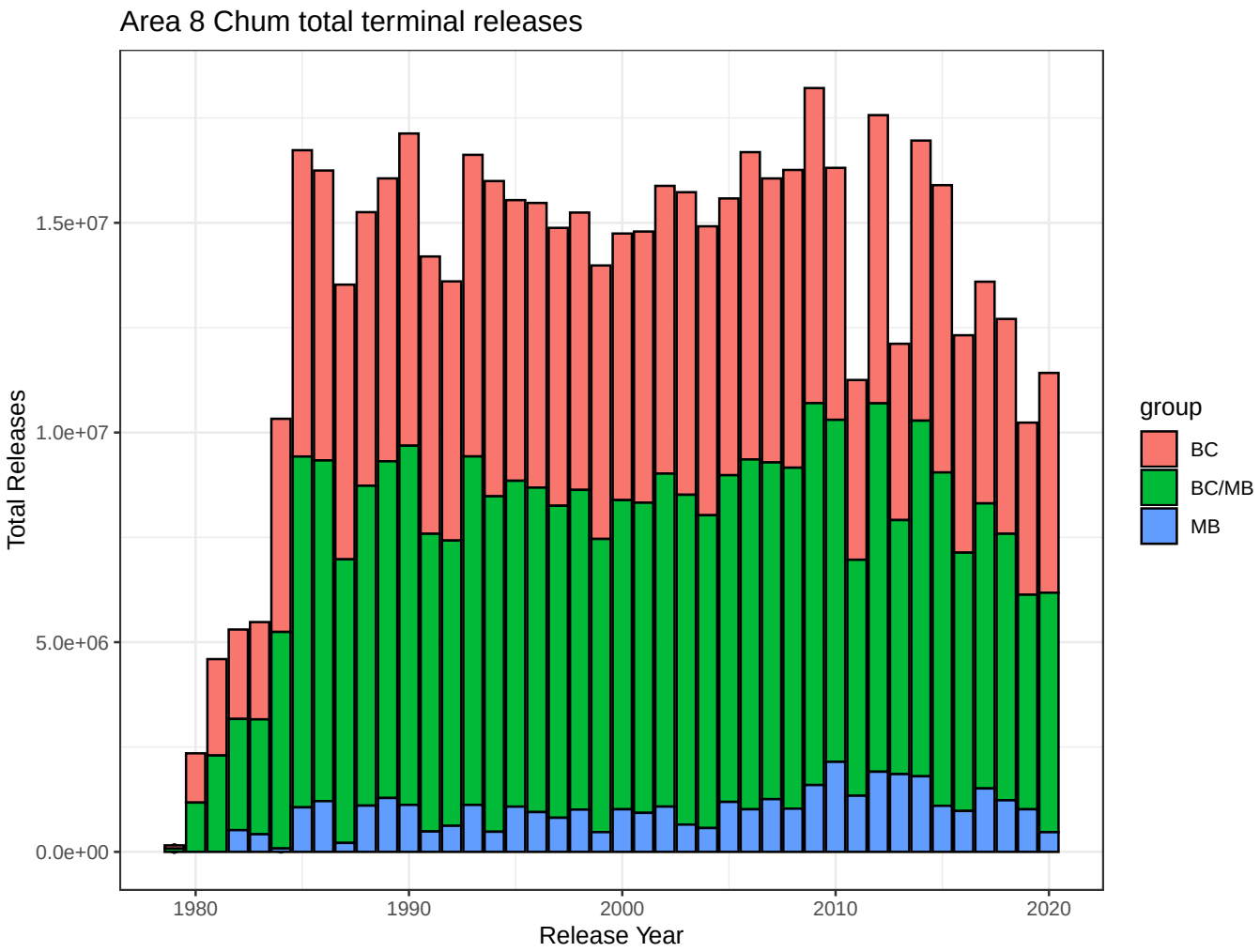


Figure 3: Total releases for Area 8

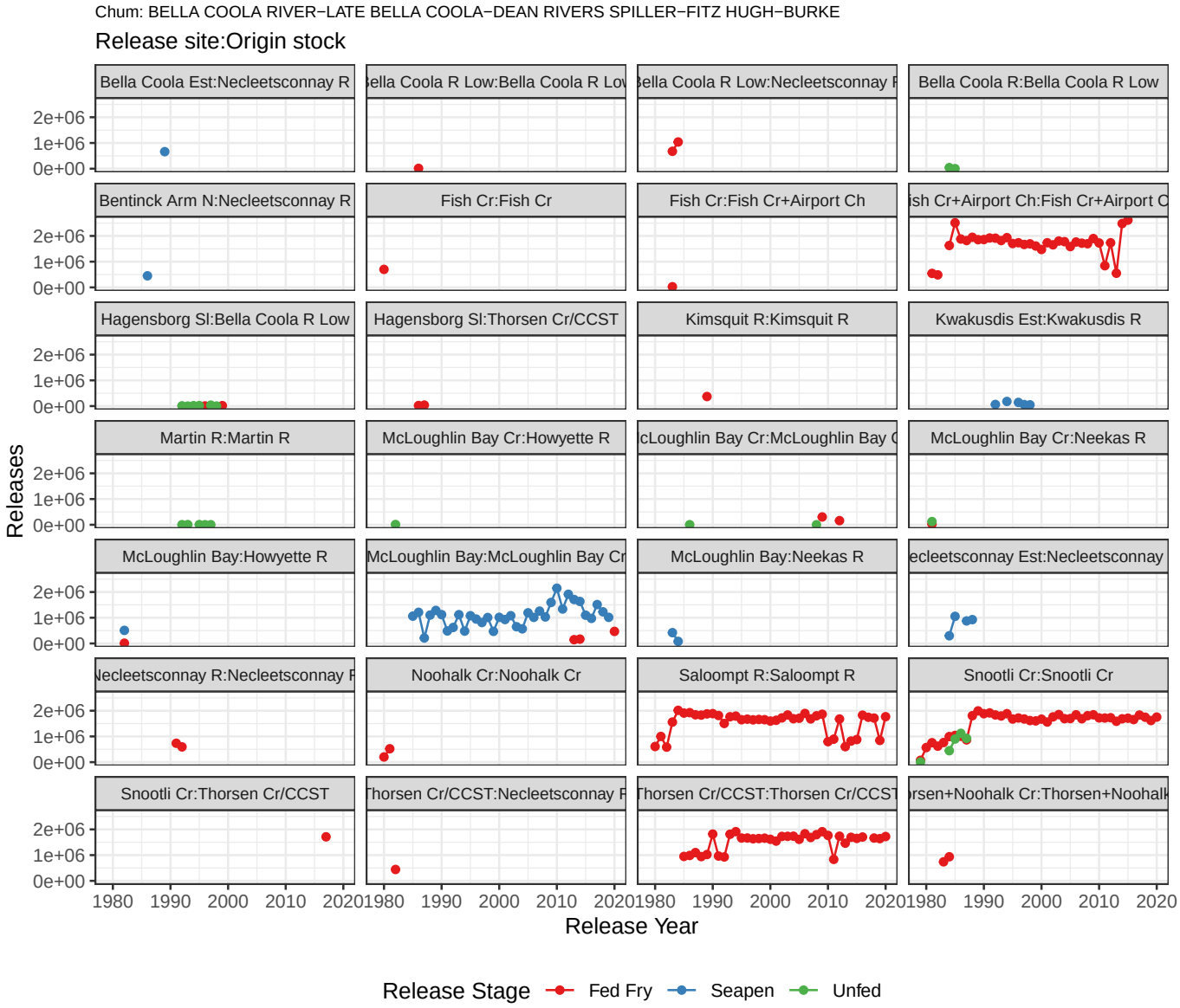


Figure 4: Facet plot of all releases in Area 8

Metrics

Escapement, logged escapement, Z-scores, Pavg, and moving average

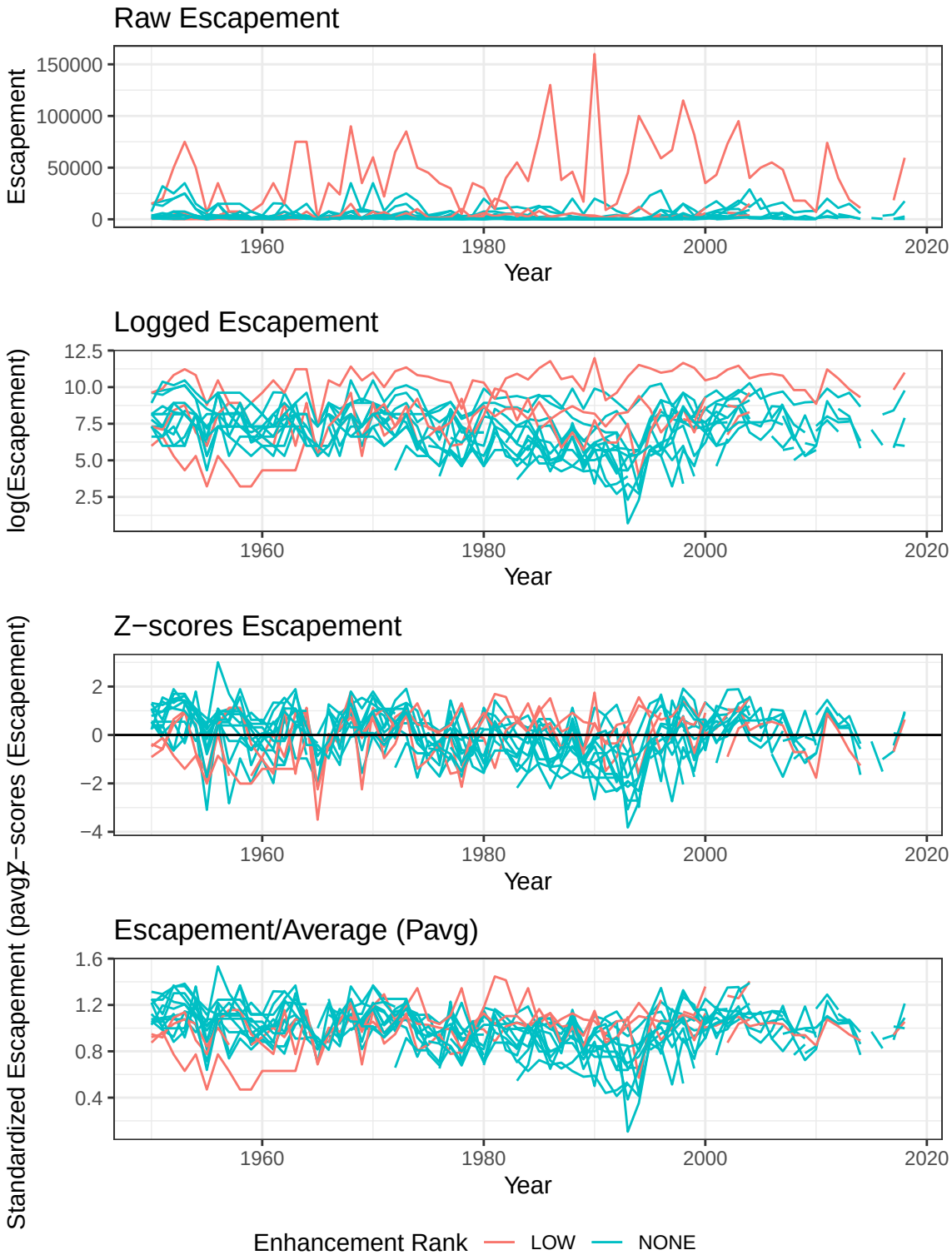


Figure 5: Various plots for escapement and transformations.

Moving average and LOESSS fit

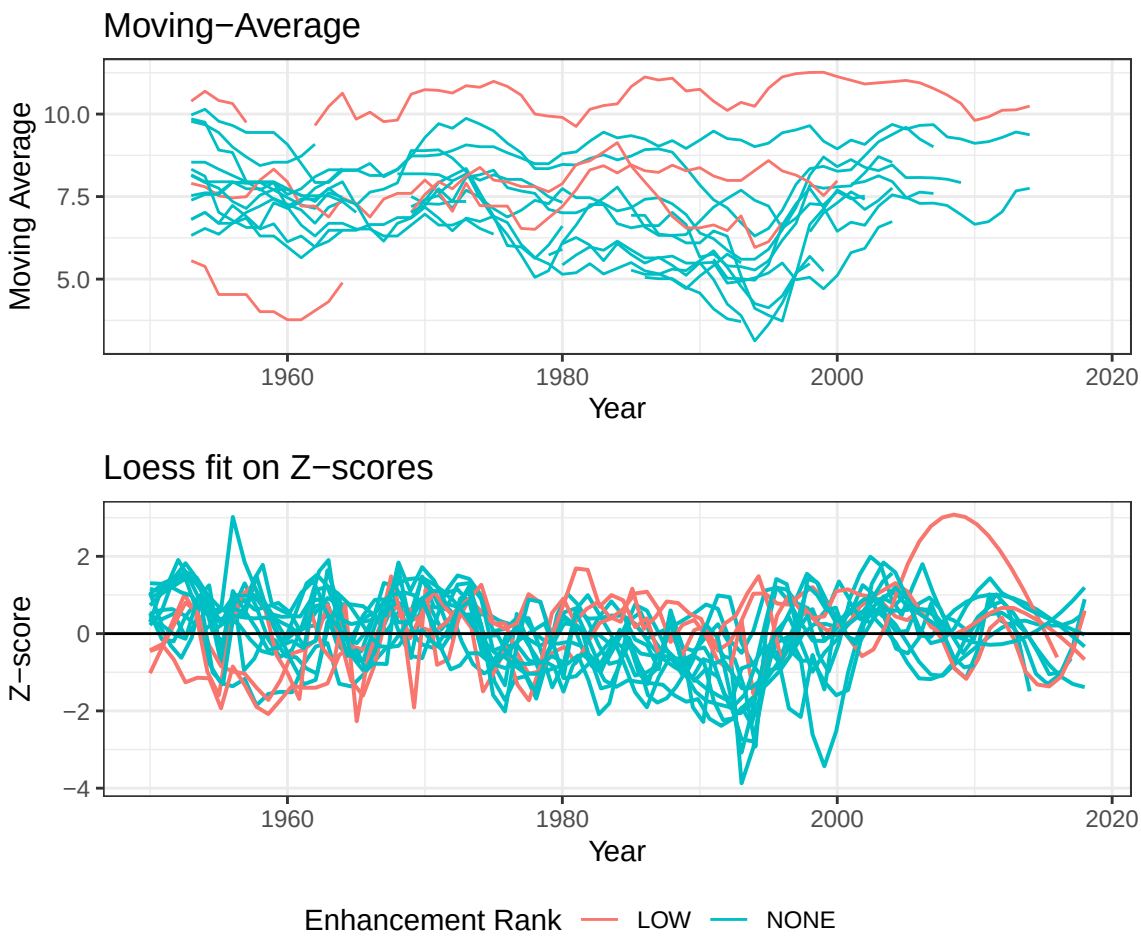


Figure 6: Moving average and LOESS fits on logged escapement by enhancement ranking.

Means trends by enhancement rank

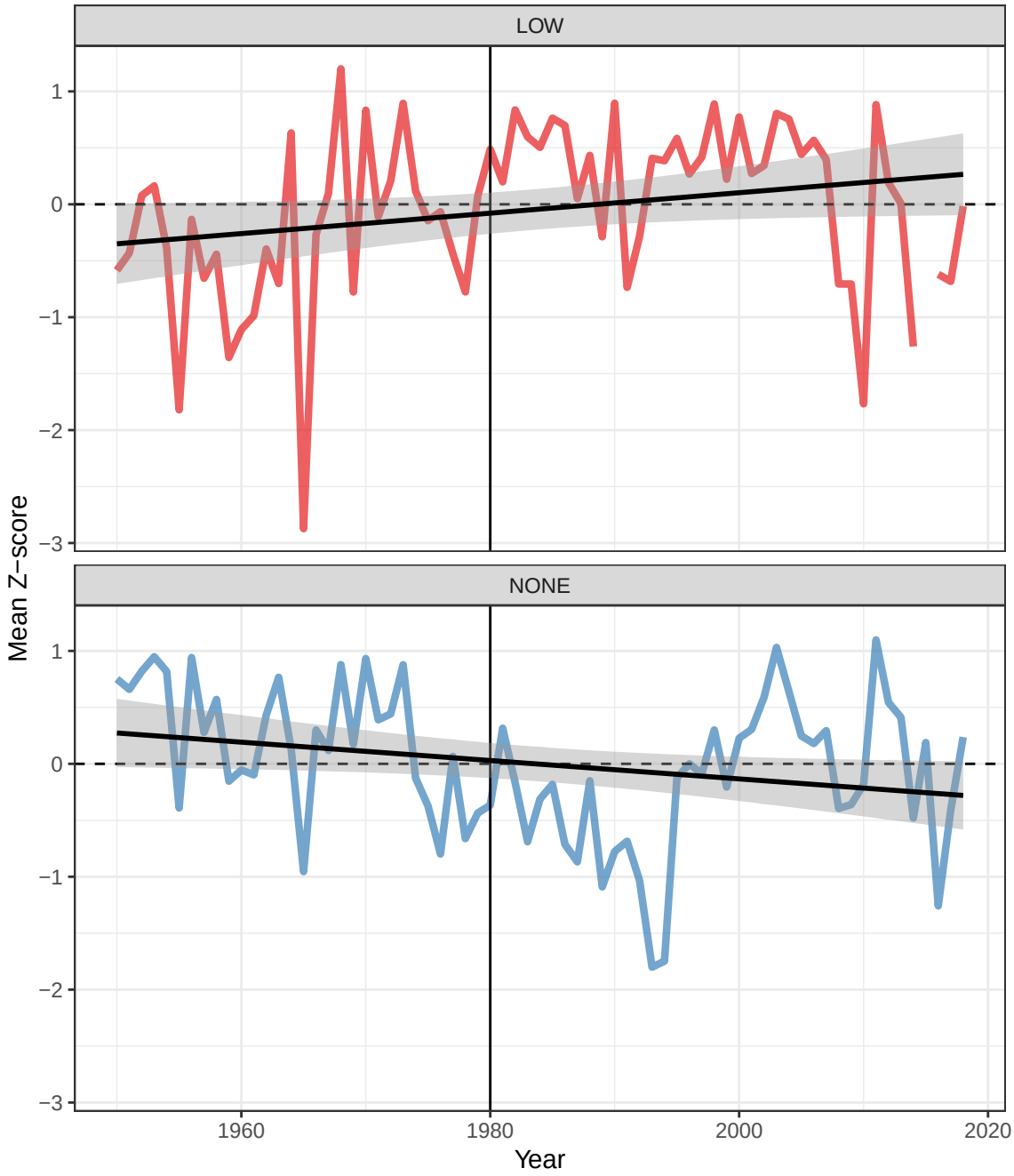


Figure 7: Area 8 chum: Mean Z-score for analysis streams by enhancement rank. Linear regression over all years with SE are shown.

Recruits per spawner

Recruits per spawner by system

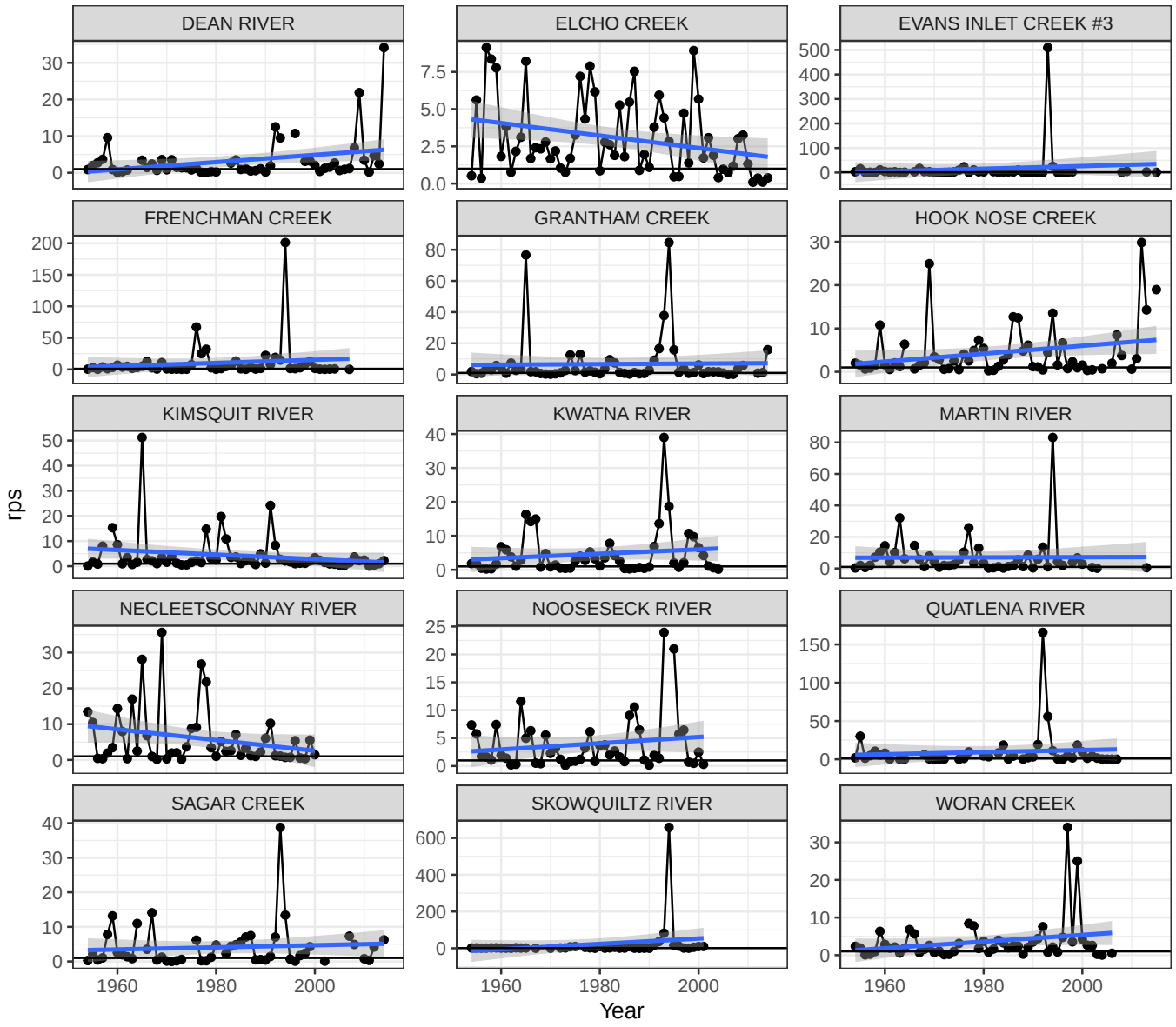


Figure 8: Recruits per spawner by system

Log recruits per spawner by system by period

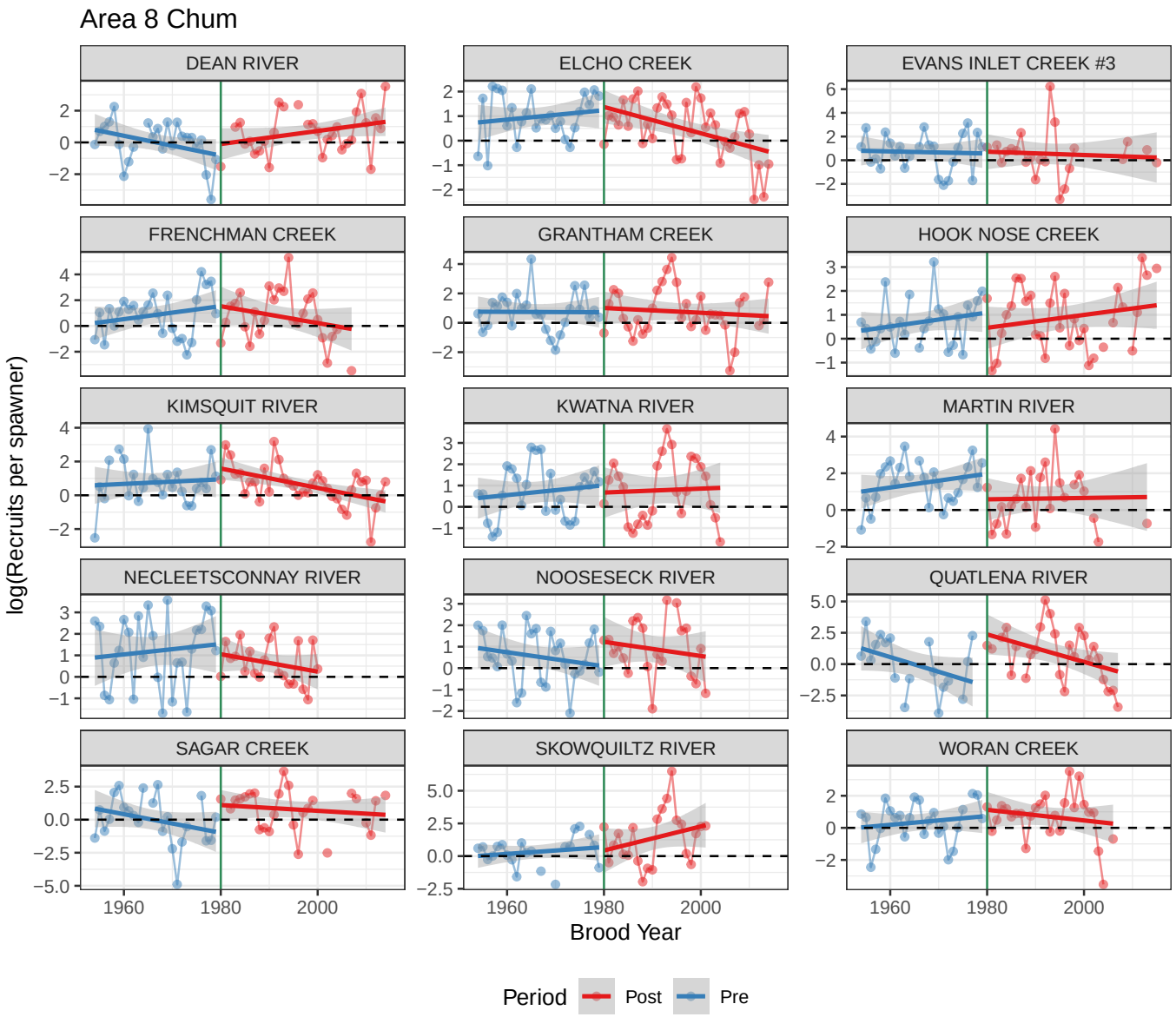


Figure 9: Area 8 chum: log recruits per spawner by system fitted with linear regression for the periods pre- and post-enhancement.

Log RPS comparison before and after enhancement

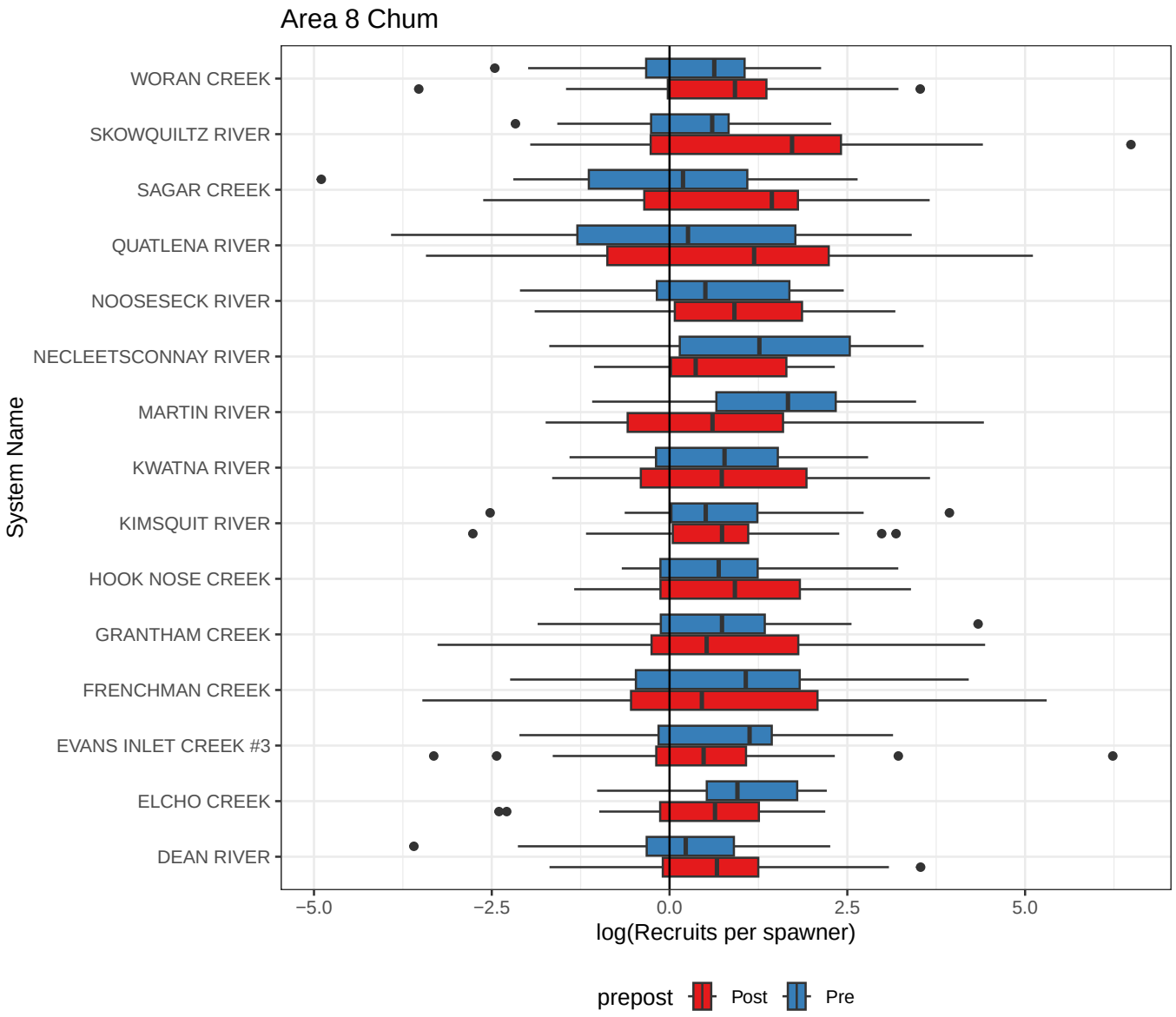


Figure 10: Boxplot of log recruits per spawner by system

Bubbleplots of metric by inlet

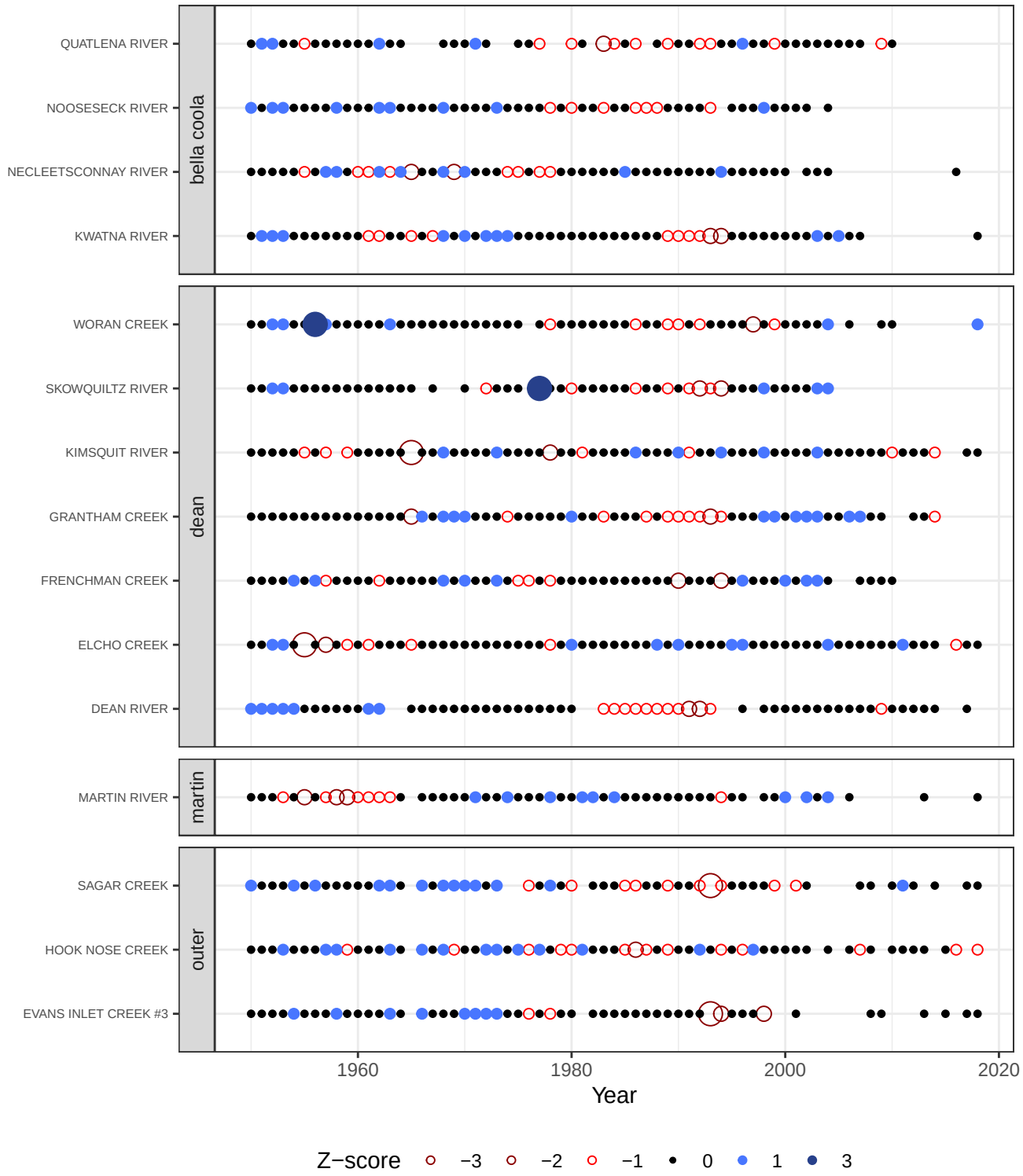


Figure 11: Z-scores of escapement for each system grouped by inlet. Solid blue points indicate positive values and open red circles indicate negative values. The size of the point indicates the magnitude of the metric.

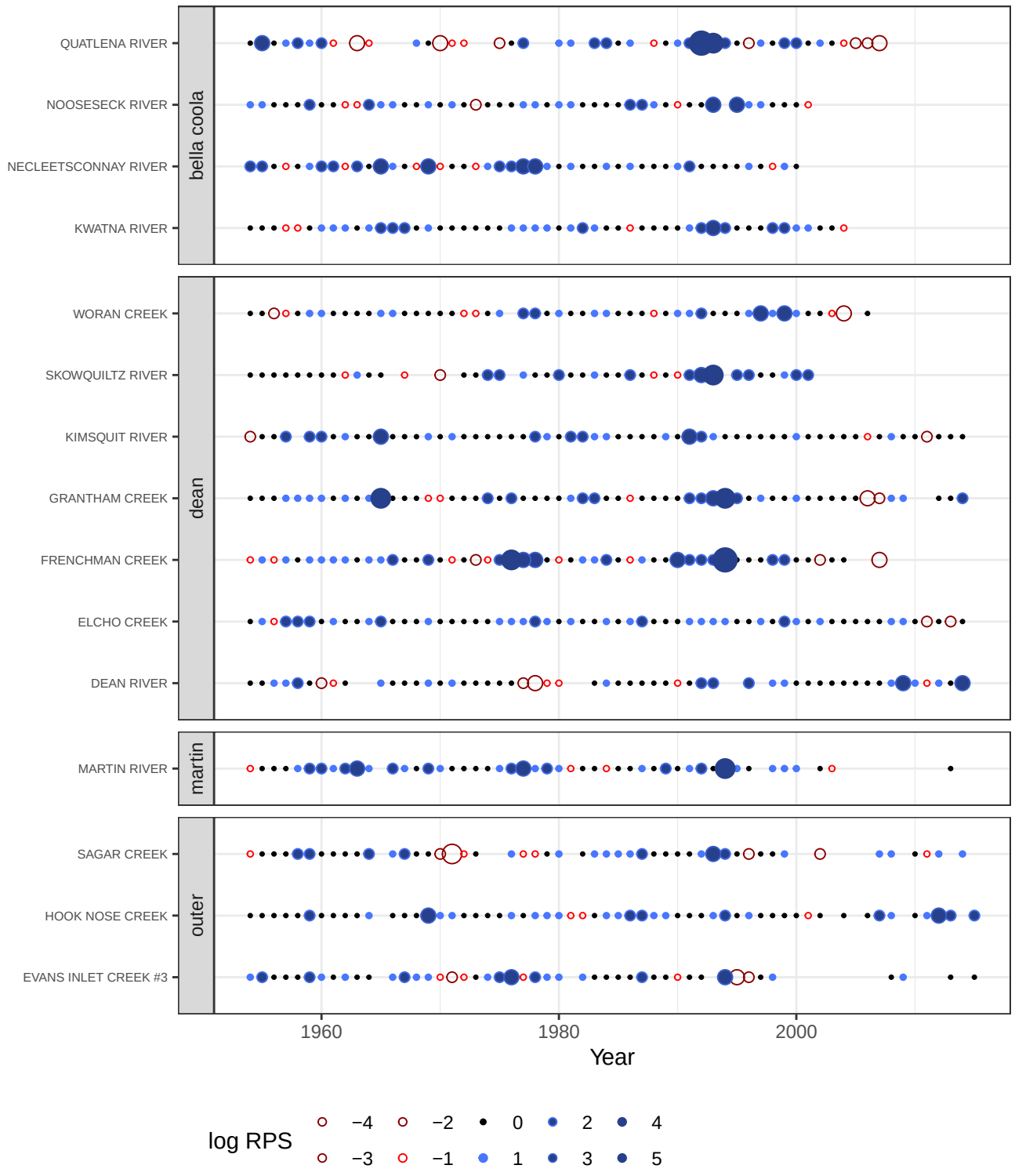


Figure 12: Log(recruits per spawner) for each system grouped by inlet. Solid blue points indicate positive values and open red circles indicate negative values. The size of the point indicates the magnitude of the metric.

Correlation analyses and Dendrograms

Cross correlation plots

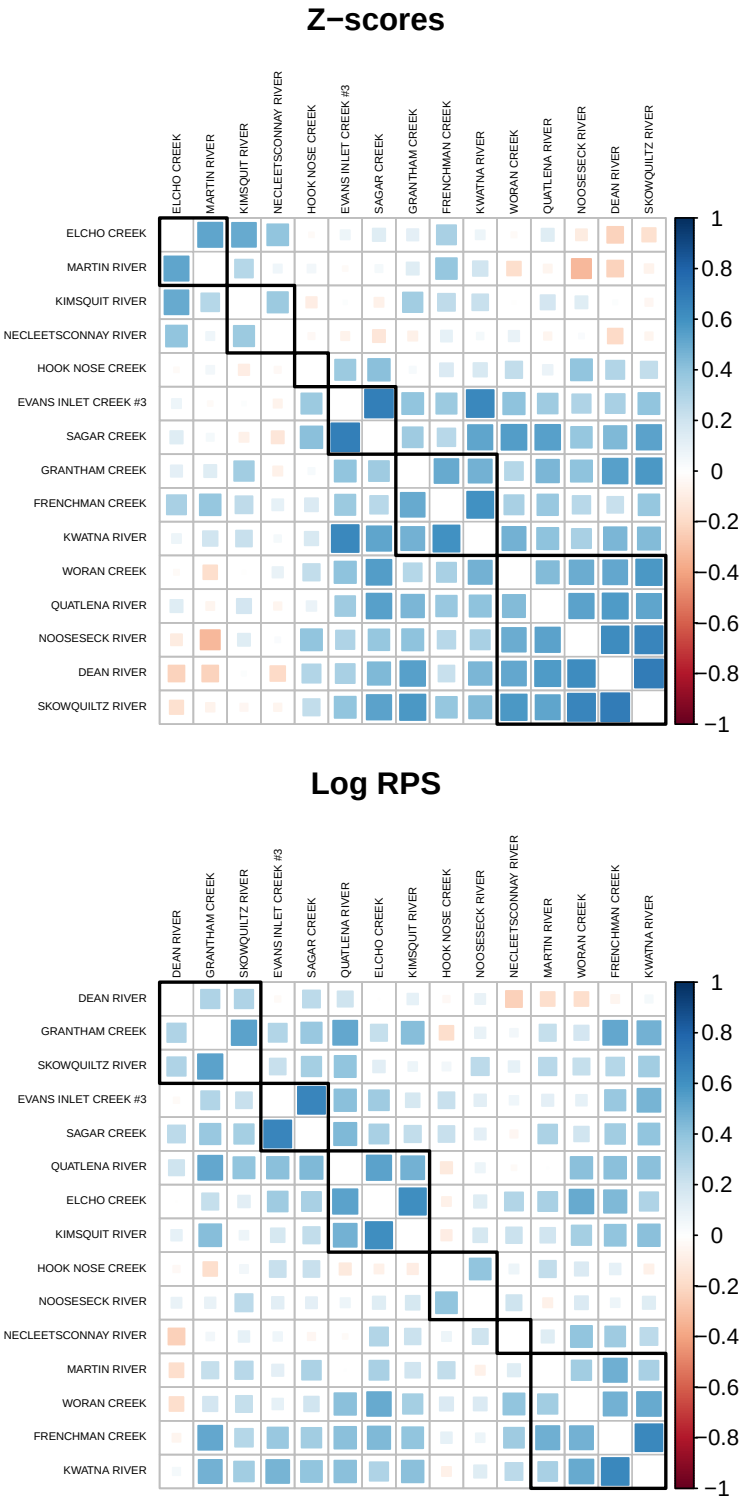
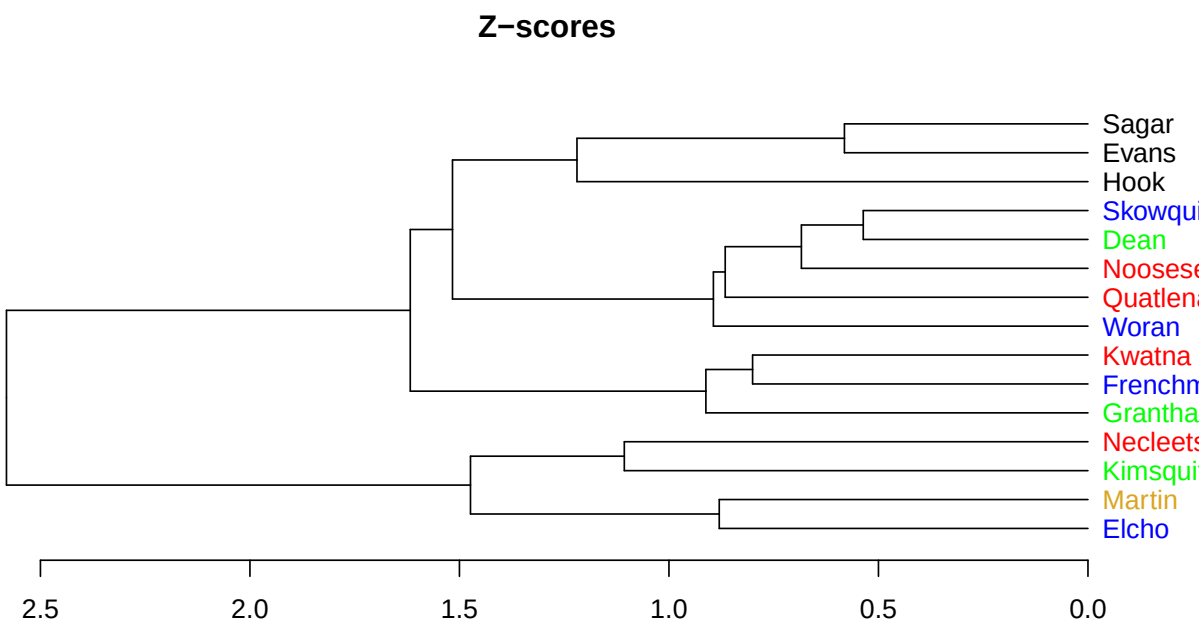


Figure 13: Cross correlation plots to compare metrics.

Dendrogram clusters analysis



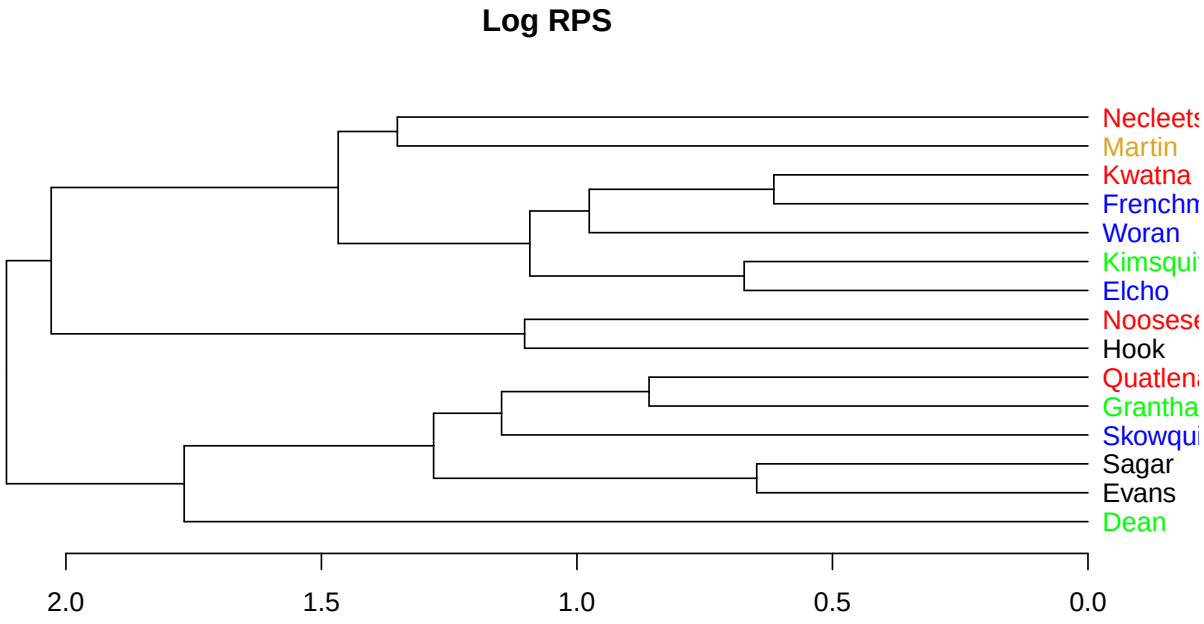


Figure 14: Dendrogram cluster analysis to compare uses of different metrics. Colours represent different subinlets; Bella Coola = red; Dean = blue; Kimsquit = green; Martin = yellow; Sagar = black

Tanglegrams to compare dendrograms

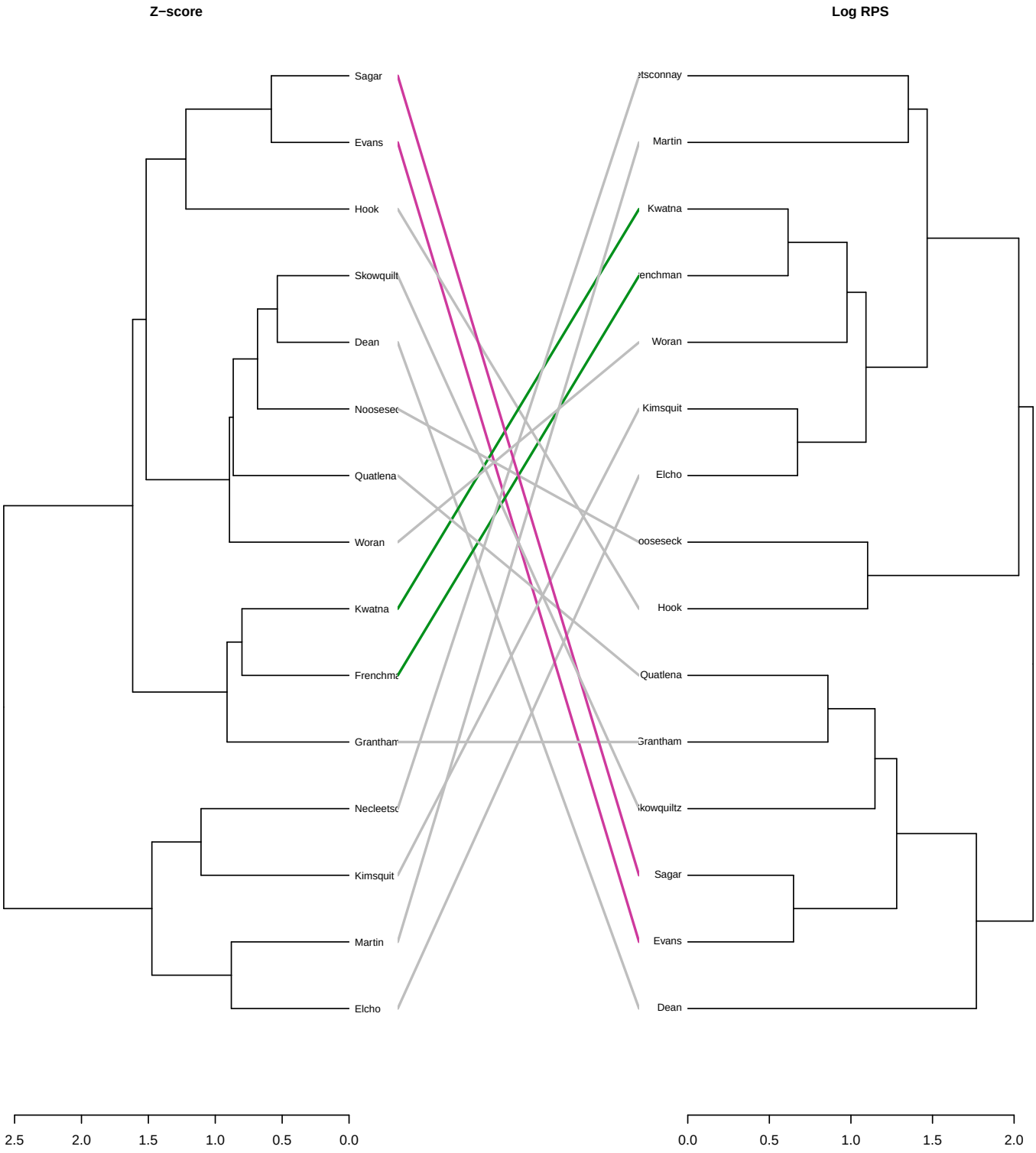


Figure 15: Tanglegram of z-score vs. log RPS

Pre- and post-1980 correlation analyses

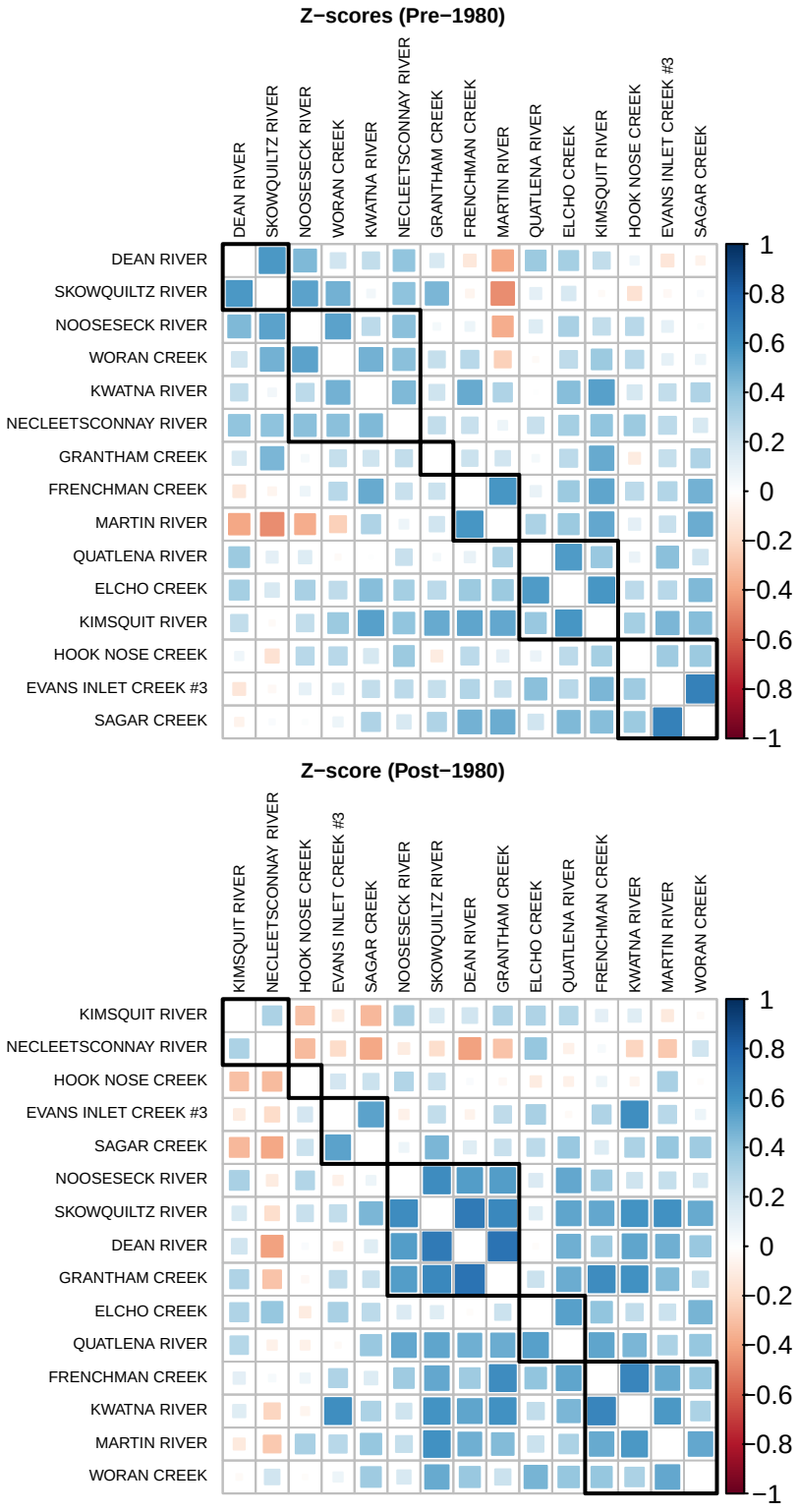


Figure 16: Cross correlation plots of z-scores to compare pre- and post-enhancement.

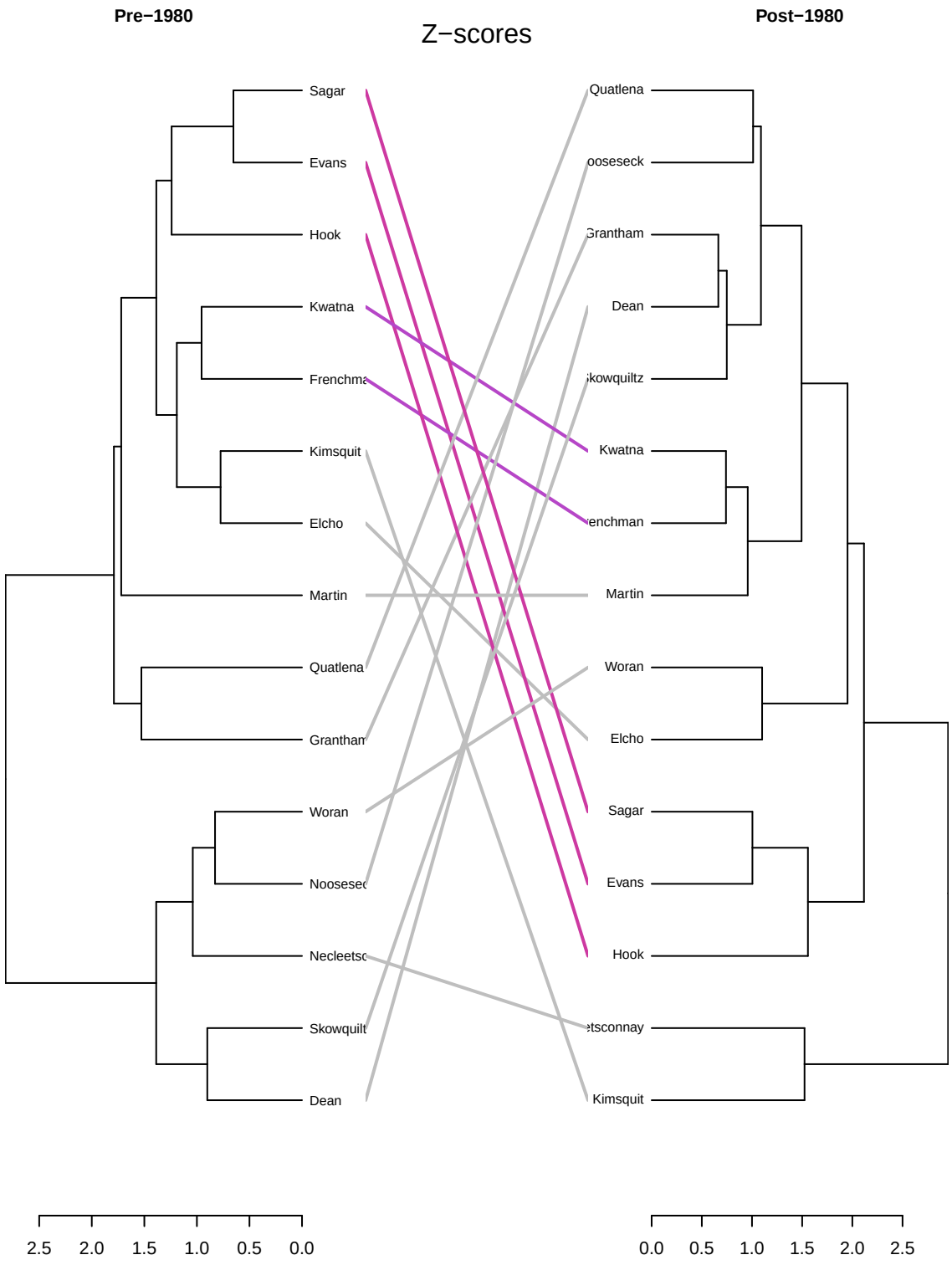


Figure 17: Tanglegram comparing z-scores pre- and post-enhancement (1980)

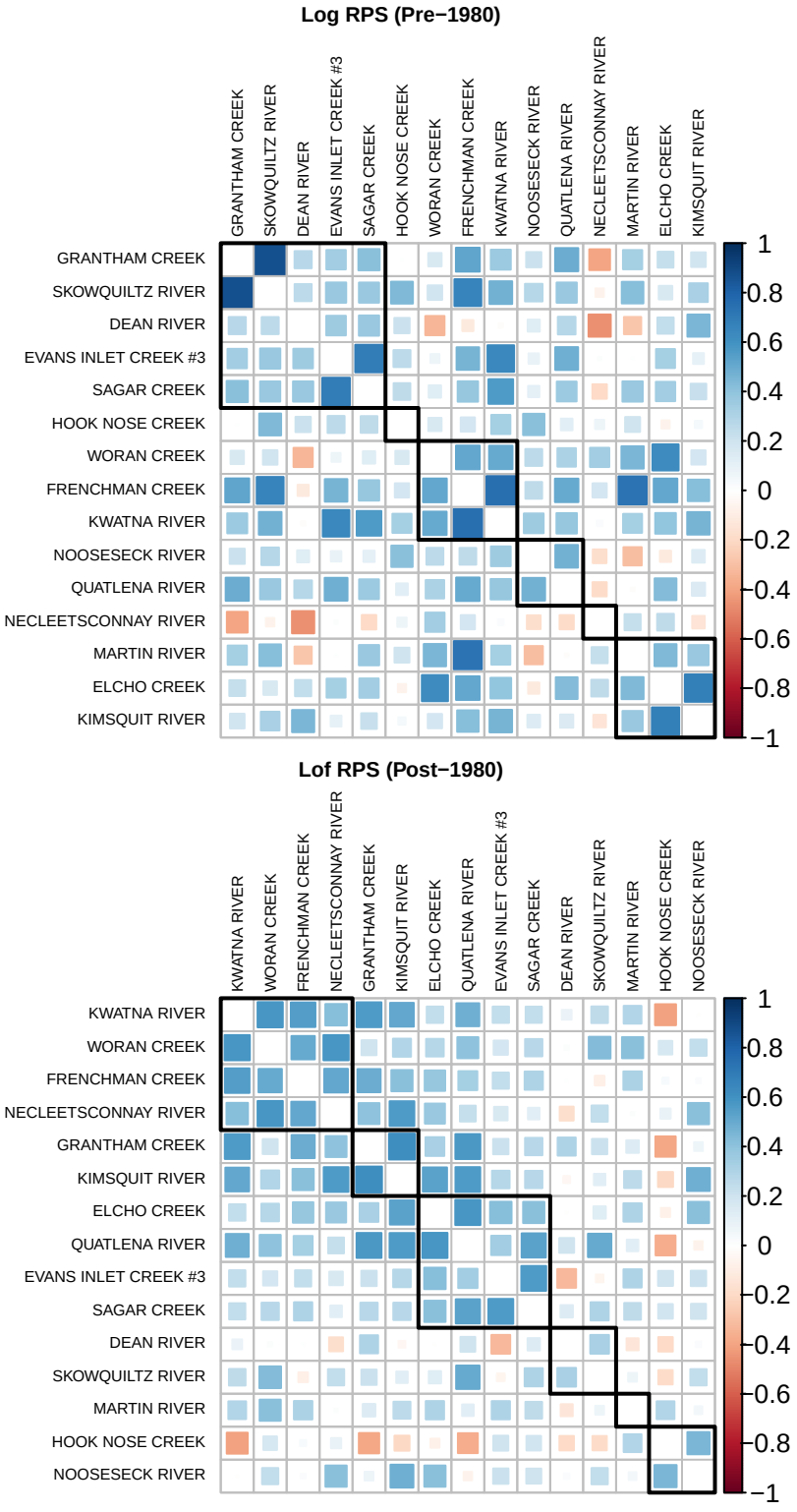


Figure 18: Cross correlation plots of Log RPS to compare pre- and post-enhancement.

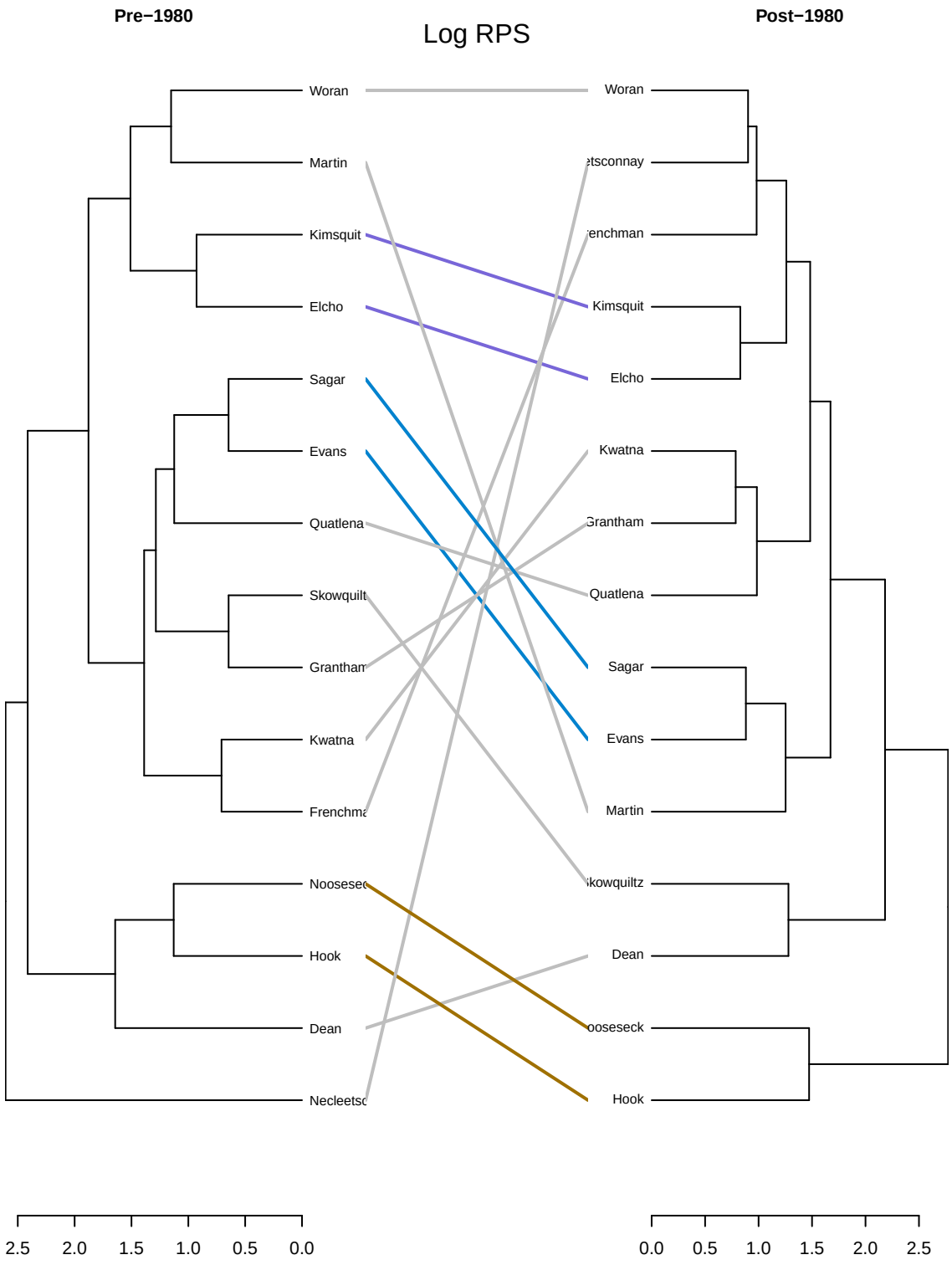


Figure 19: Tanglegram comparing Log RPS pre- and post-enhancement (1980)

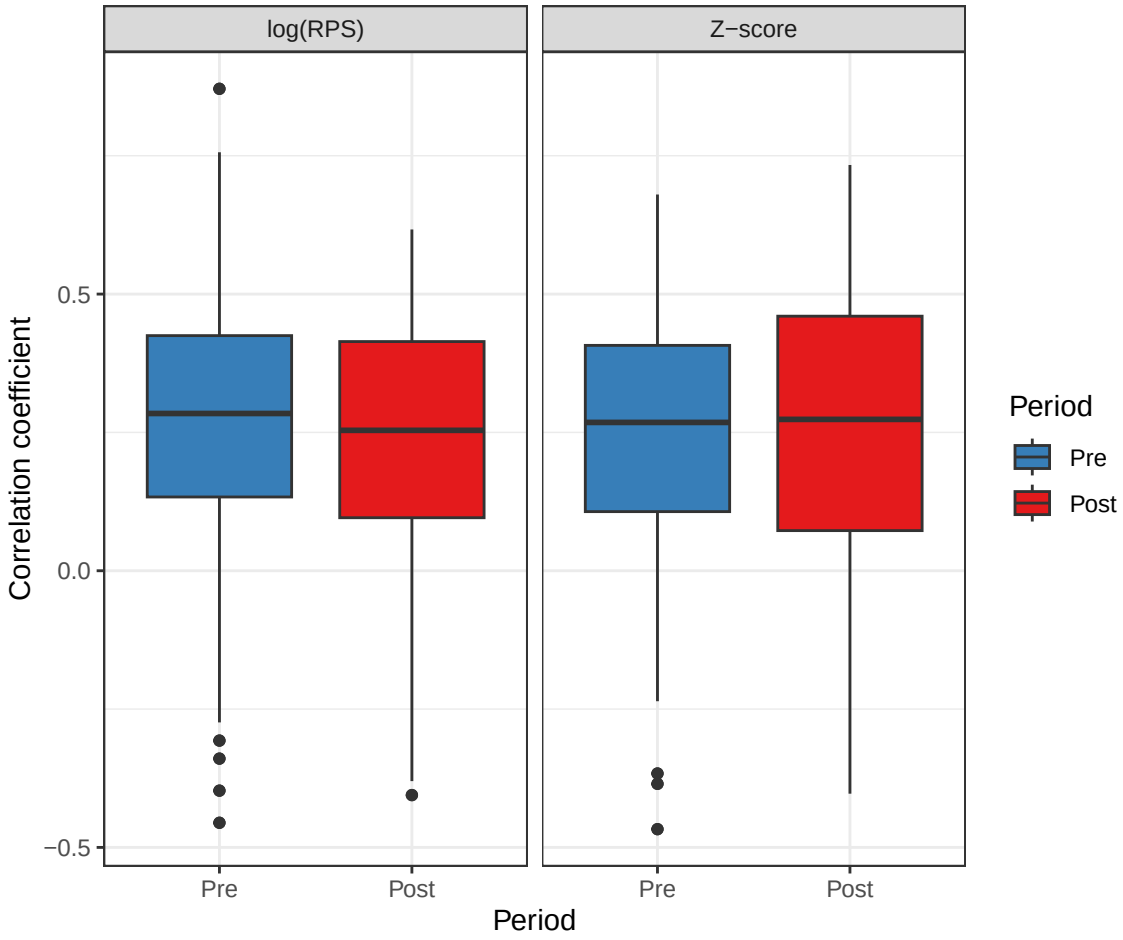


Figure 20: Comparison between correlation coefficients for all pairwise combinations of streams using Z-score and log(RPS) over the pre- and post-1980 periods.

Pairwise stream to stream correlation versus distance

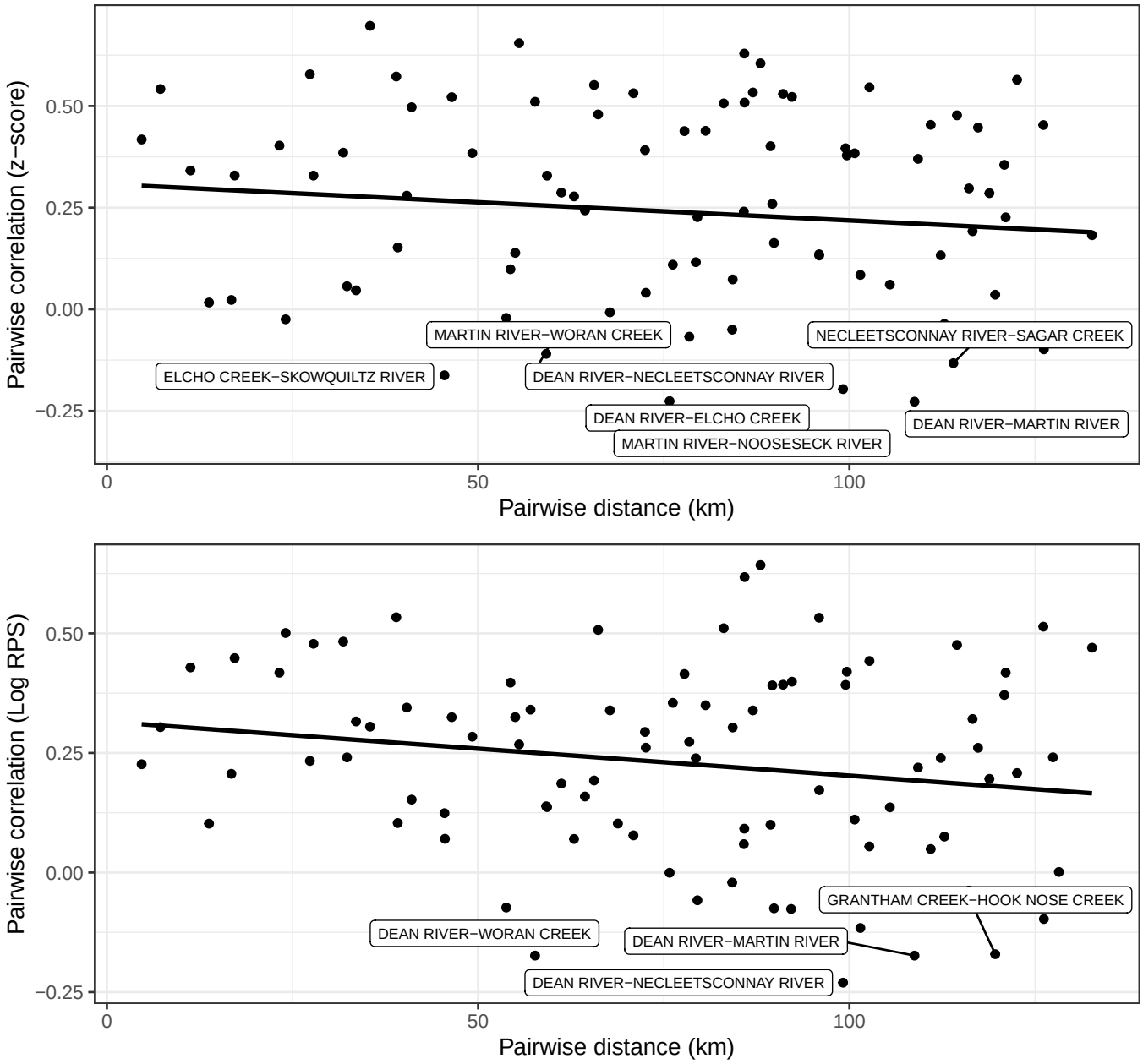


Figure 21: Pairwise stream-stream correlation of Z-score (top) and log(RPS) (bottom) against pairwise distance.

Dendrogram of pairwise distances

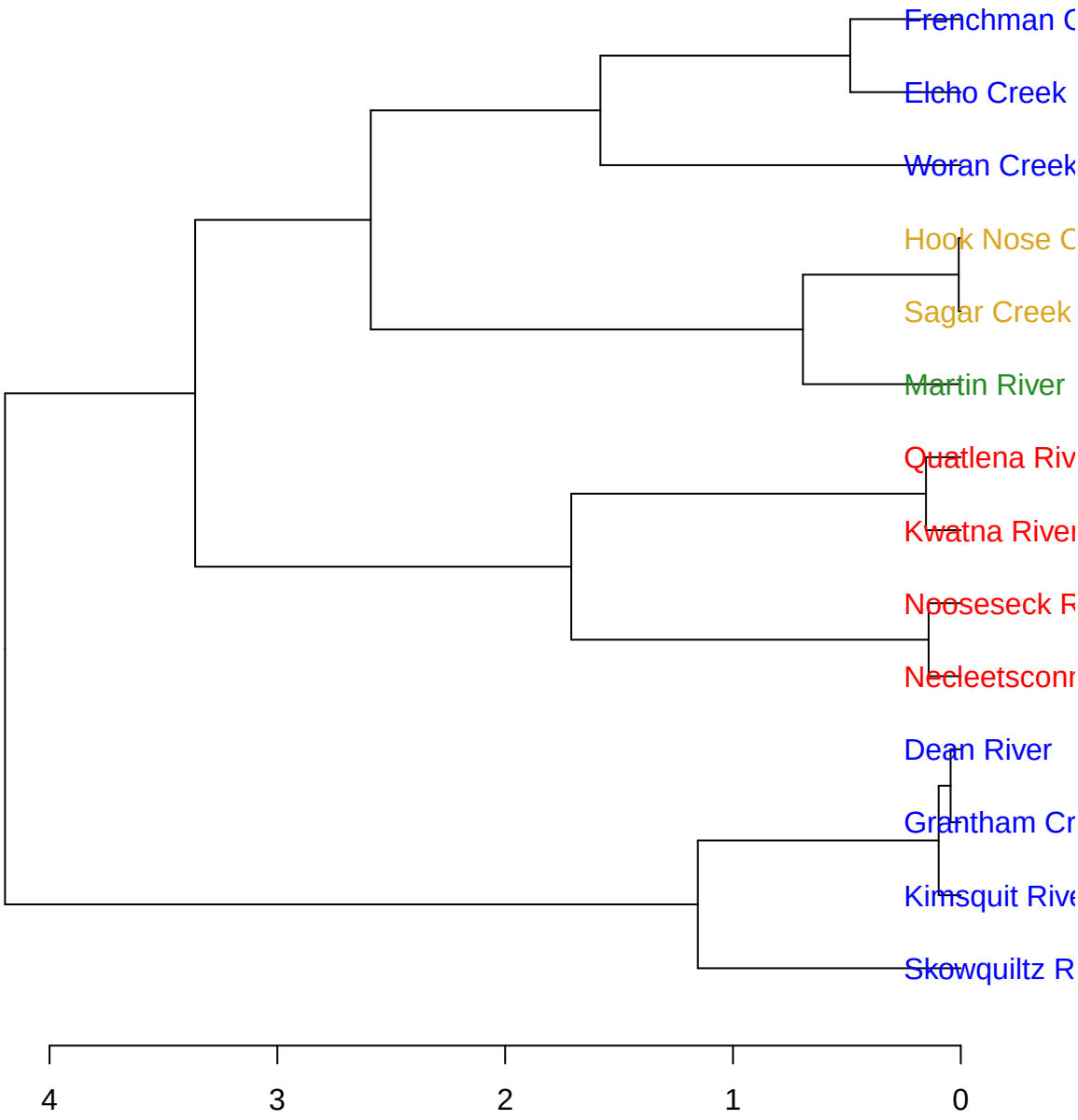


Figure 22: Dendrogram of pairwise distance between river mouths. Red labels - Bella Coola Inlet; Blue - Dean Inlet; Green - Martin Inlet; Yellow - Outer Inlet

Correlation metrics against distance, pre- and post-1980

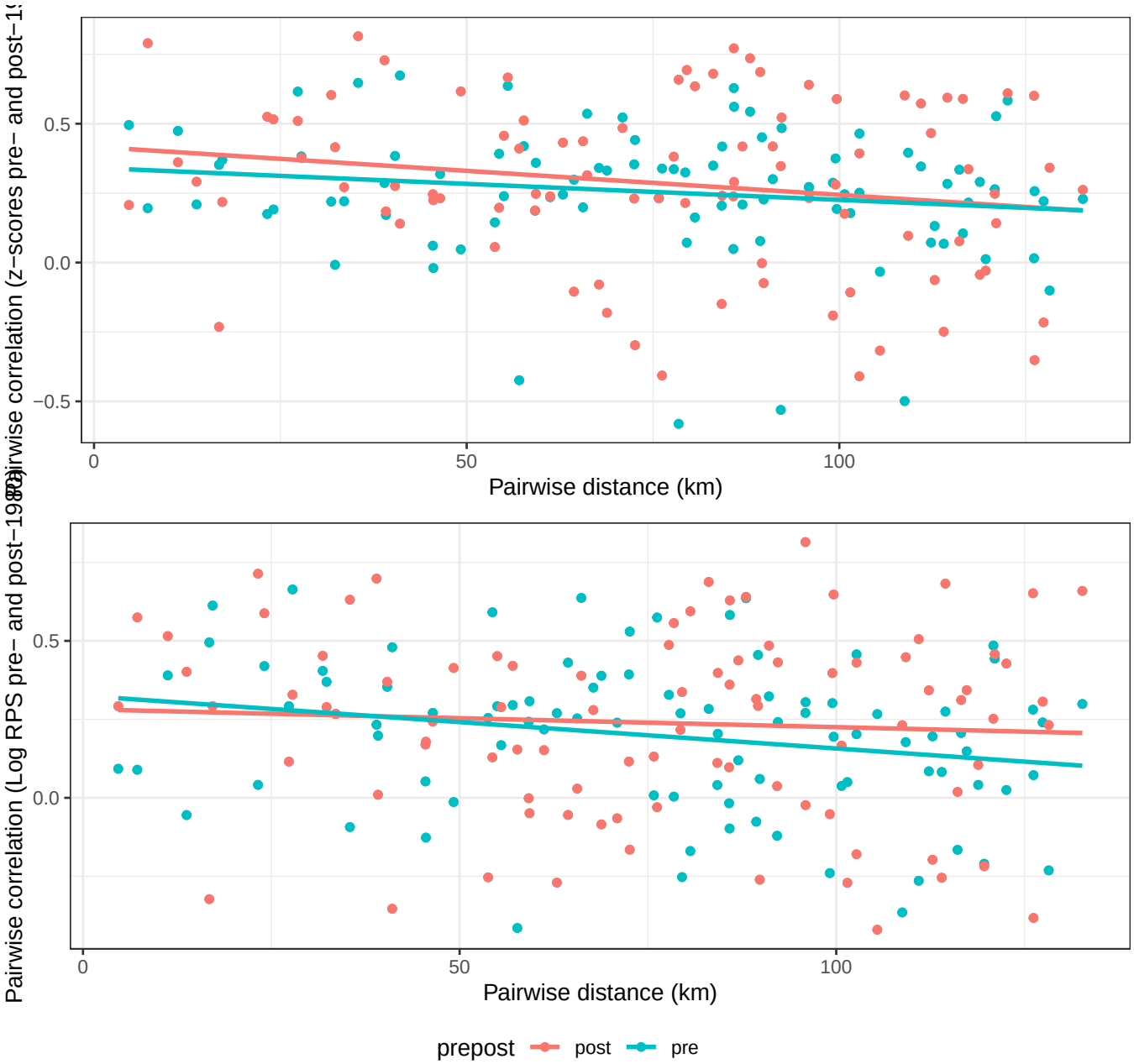


Figure 23: Pairwise stream-stream correlation of Z-score (top) and log(RPS) (bottom) against pairwise distance by period (pre-enhancement and post-enhancement.

Statistical models

Candidate Models with AIC scores for log RPS and log escapement

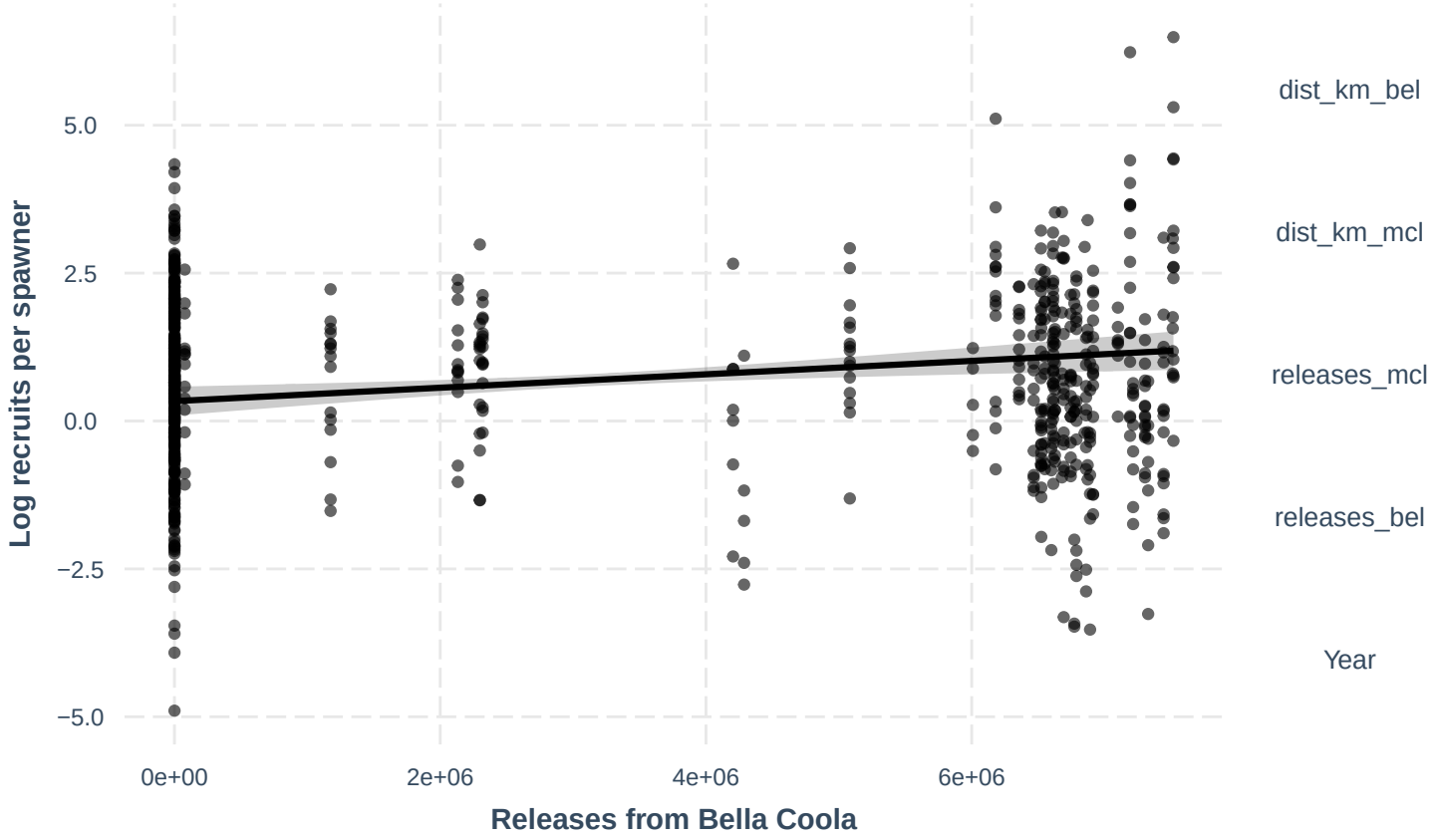
Table 2: Candidate models for log RPS and distance from enhancement (dist), total releases (totrel), and year, with AIC scores.

Candidate model	df	AIC
Log RPS ~ Wt. dist. Bella Coola + Wt. dist. McLoughlin + Rel.McLoughin + Rel.Bella Coola + Year	7	2776.004
Log RPS ~ dist from Bella Coola + dist from McLoughlin	4	2783.424
Log RPS ~ Wt. dist. from Bella Coola + Wt. dist. from McLoughlin	4	2783.424
Log RPS ~ dist from Bella Coola + dist from McLoughlin + Year	5	2785.416
Log RPS ~ Wt. dist. from Bella Coola + Wt. dist. from McLoughlin + Year	5	2785.416
Log RPS ~ dist from Bella Coola + dist from McLoughlin + Year + Subinlet	9	2790.437
Log RPS ~ Wt. dist. from Bella Coola + Wt. dist. from McLoughlin + Year + Subinlet	9	2790.437

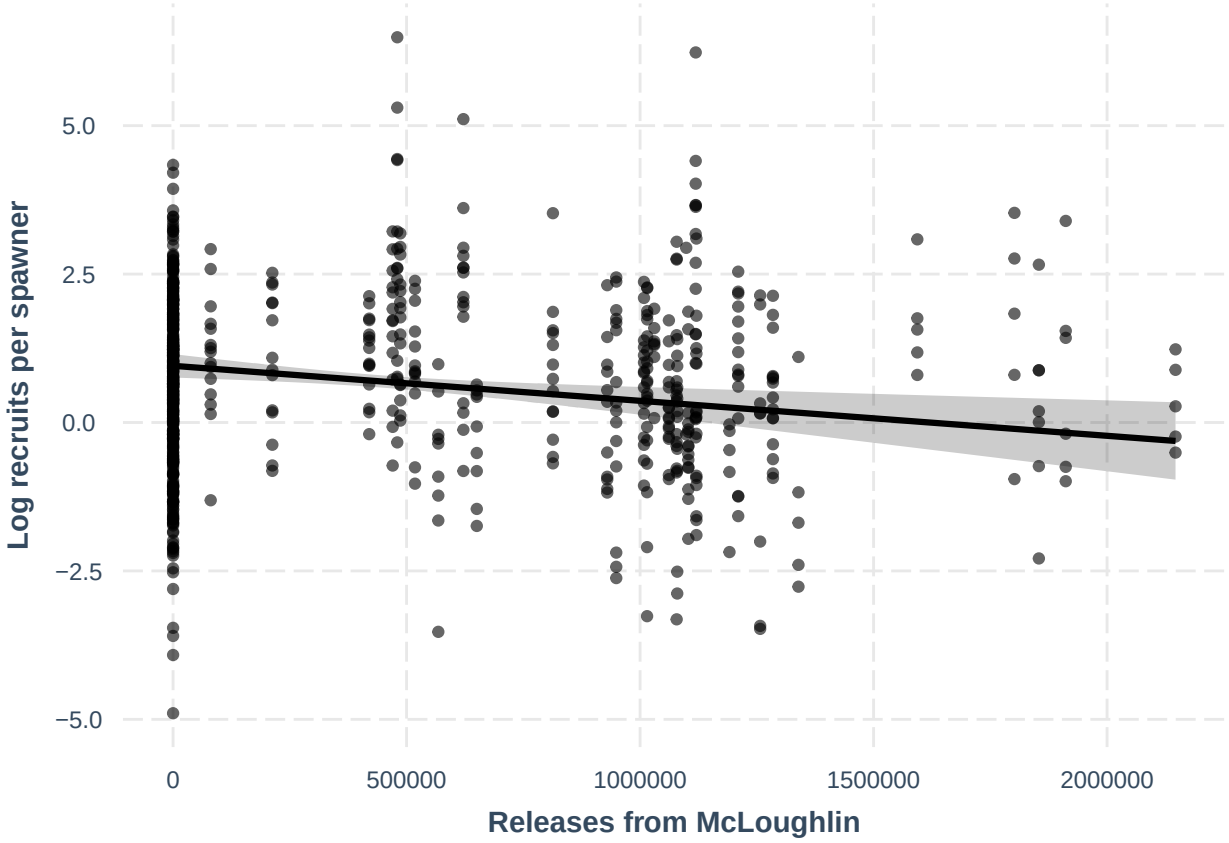
Table 3: Candidate models for log escapement and distance from enhancement (dist), total releases (totrel), and year, with AIC scores.

Candidate model	df	AIC
Log escapement ~ dist from Bella Coola + dist from McLoughlin + Year + Subinlet	9	3019.123
Log escapement ~ Wt. dist. from Bella Coola + Wt. dist. from McLoughlin + Year + Subinlet	9	3019.123
Log escapement ~ Wt.dist.BellaCoola + Wt.dist.McLoughlin + Rel.Bella Coola + Rel.McLoughlin + Year	7	3045.062
Log escapement ~ Wt. dist. from Bella Coola + Wt. dist. from McLoughlin	4	3059.479
Log escapement ~ dist from Bella Coola + dist from McLoughlin	4	3059.479
Log escapement ~ dist from Bella Coola + dist from McLoughlin + Year	5	3060.954
Log escapement ~ Wt. dist. from Bella Coola + Wt. dist. from McLoughlin + Year	5	3060.954

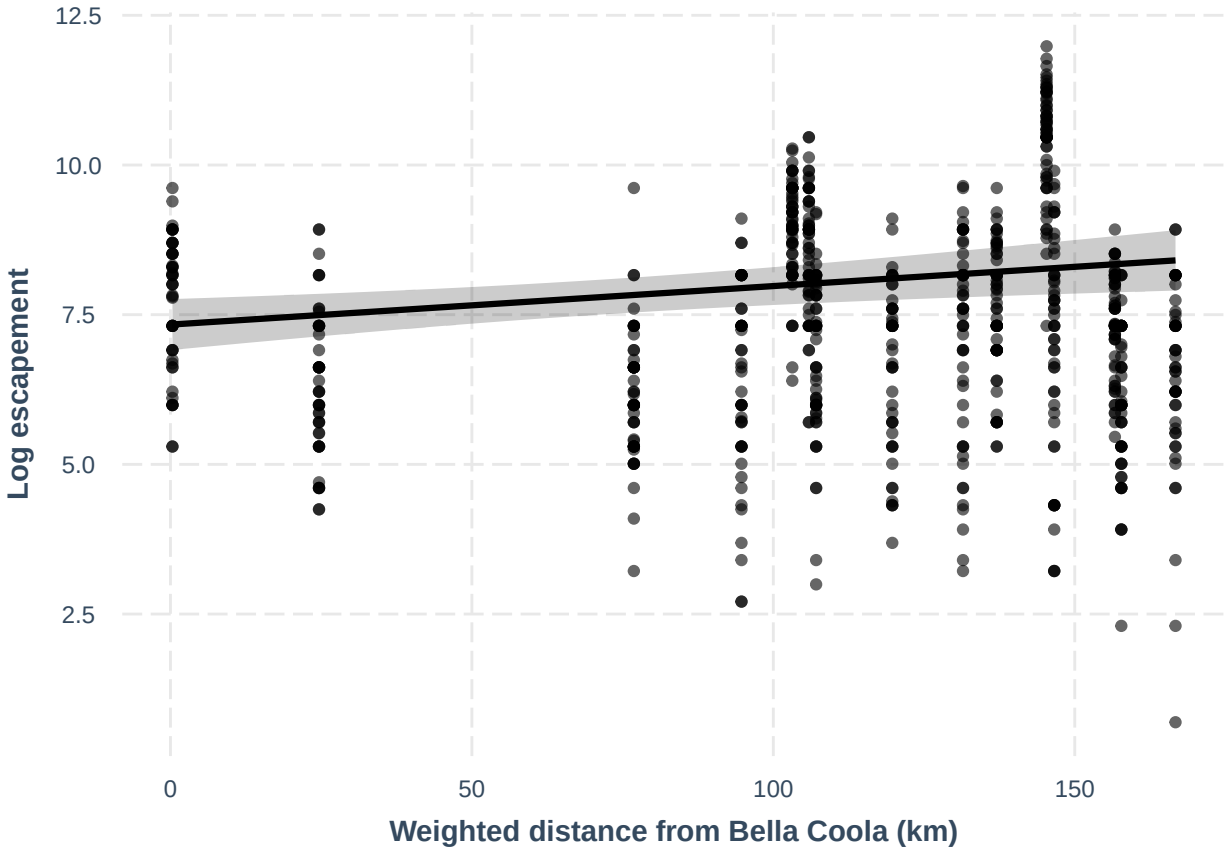
Effects plot of log RPS against releases from Bella Coola



Effects plot of log RPS against releases from McLoughlin



Effects plot of log escapements against weighted distance from Bella Coola



Effects plot of log escapements against weighted distance from McLoughlin