Appendix 1

Area 25 Chum Salmon

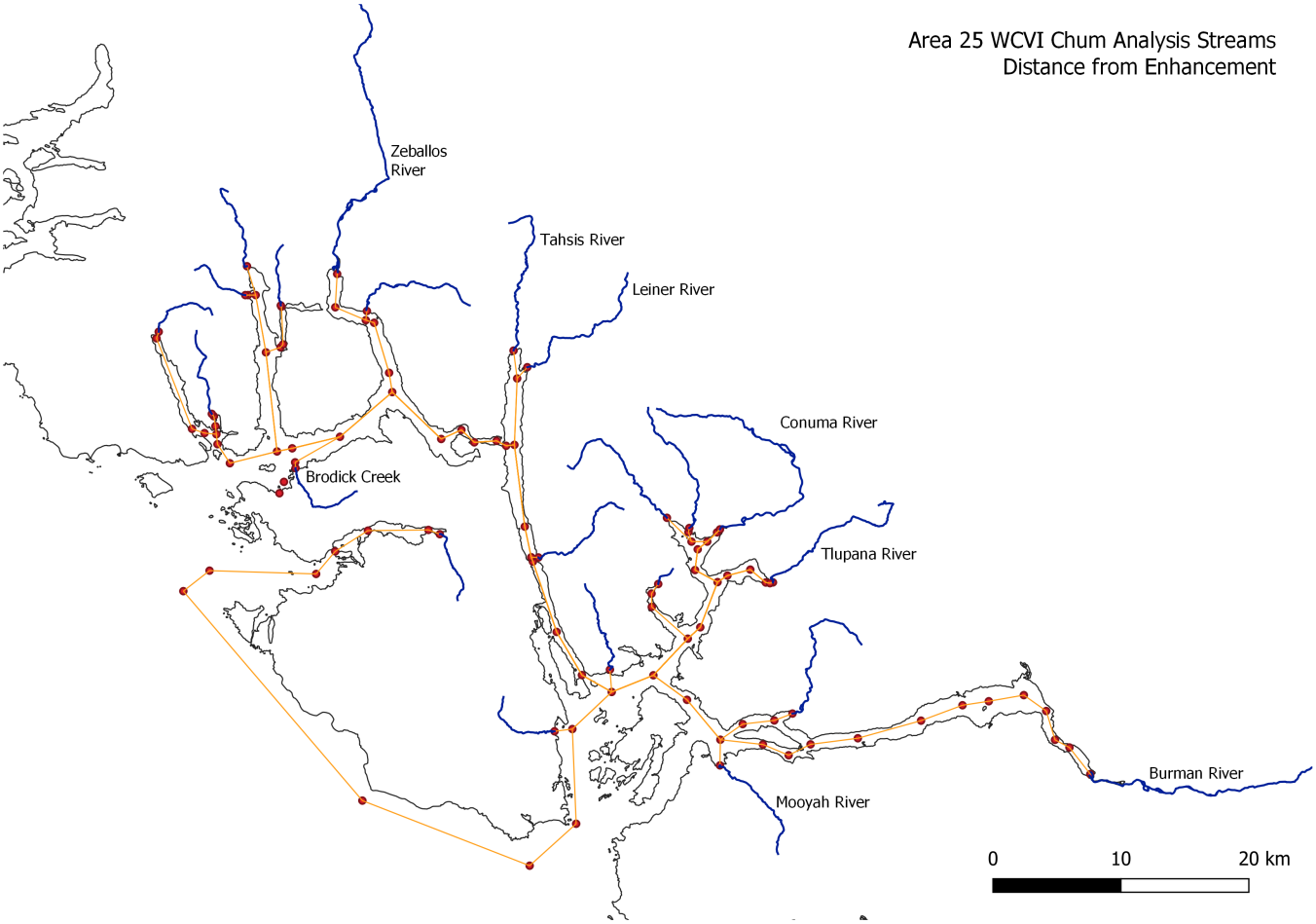
Coastland

2022-12-05

Contents

Study area

Area 25 Chum streams



Summary statistics

Bubbleplot of escapement by enhancement rank

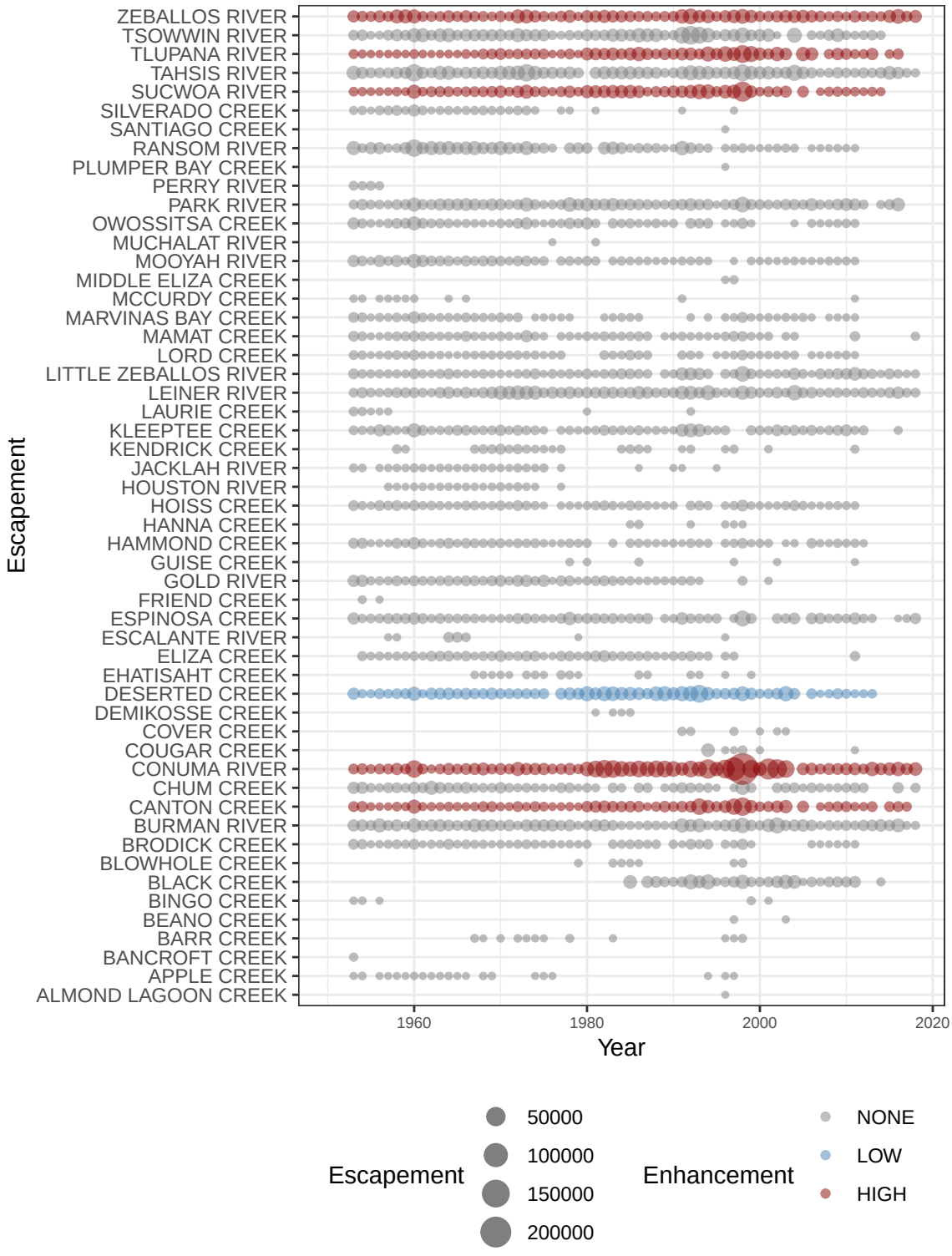


Figure 1: Escapement to area streams by enhancement rank.

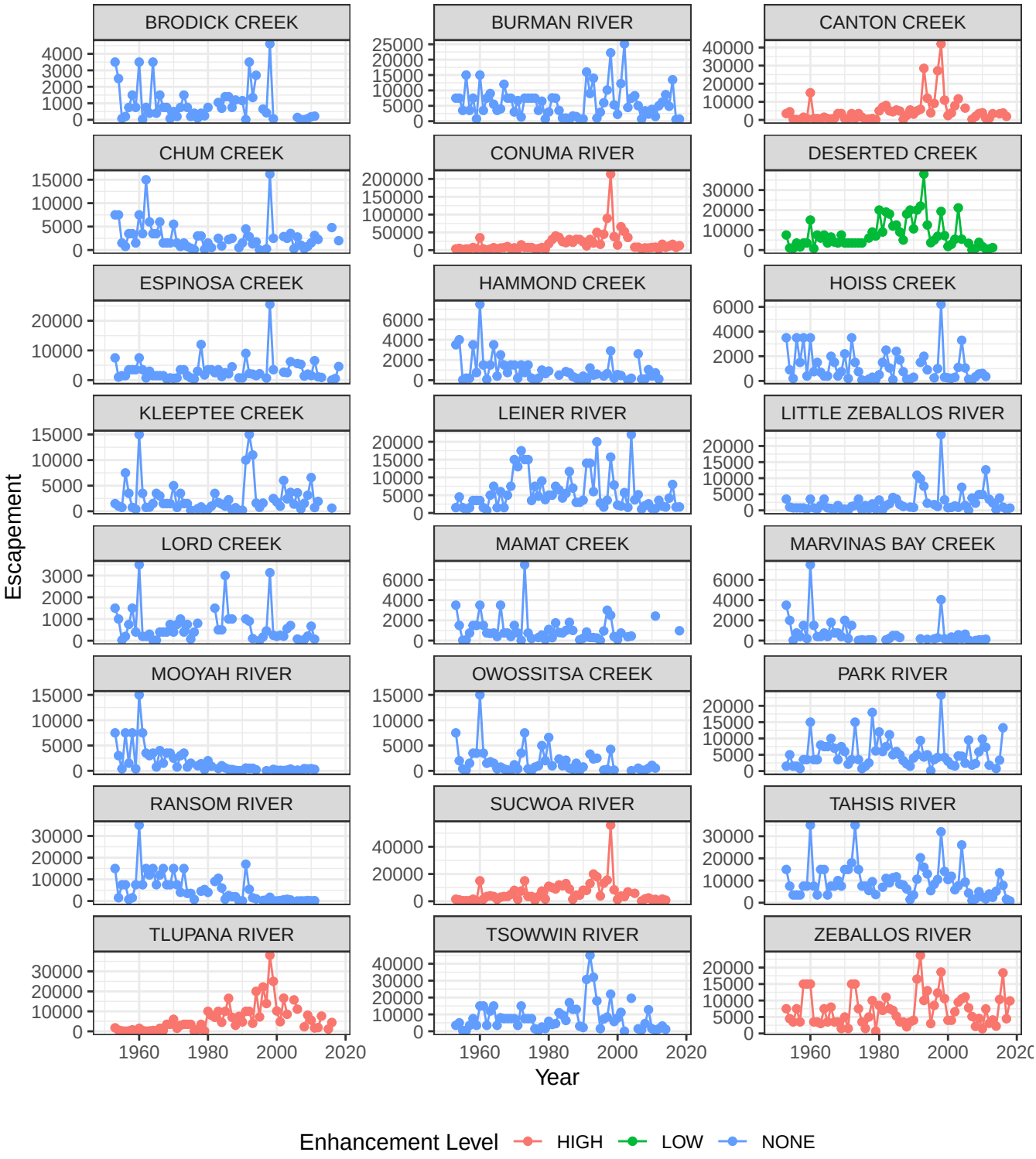


Figure 2: Escapement to area streams by enhancement rank.

Releases by system

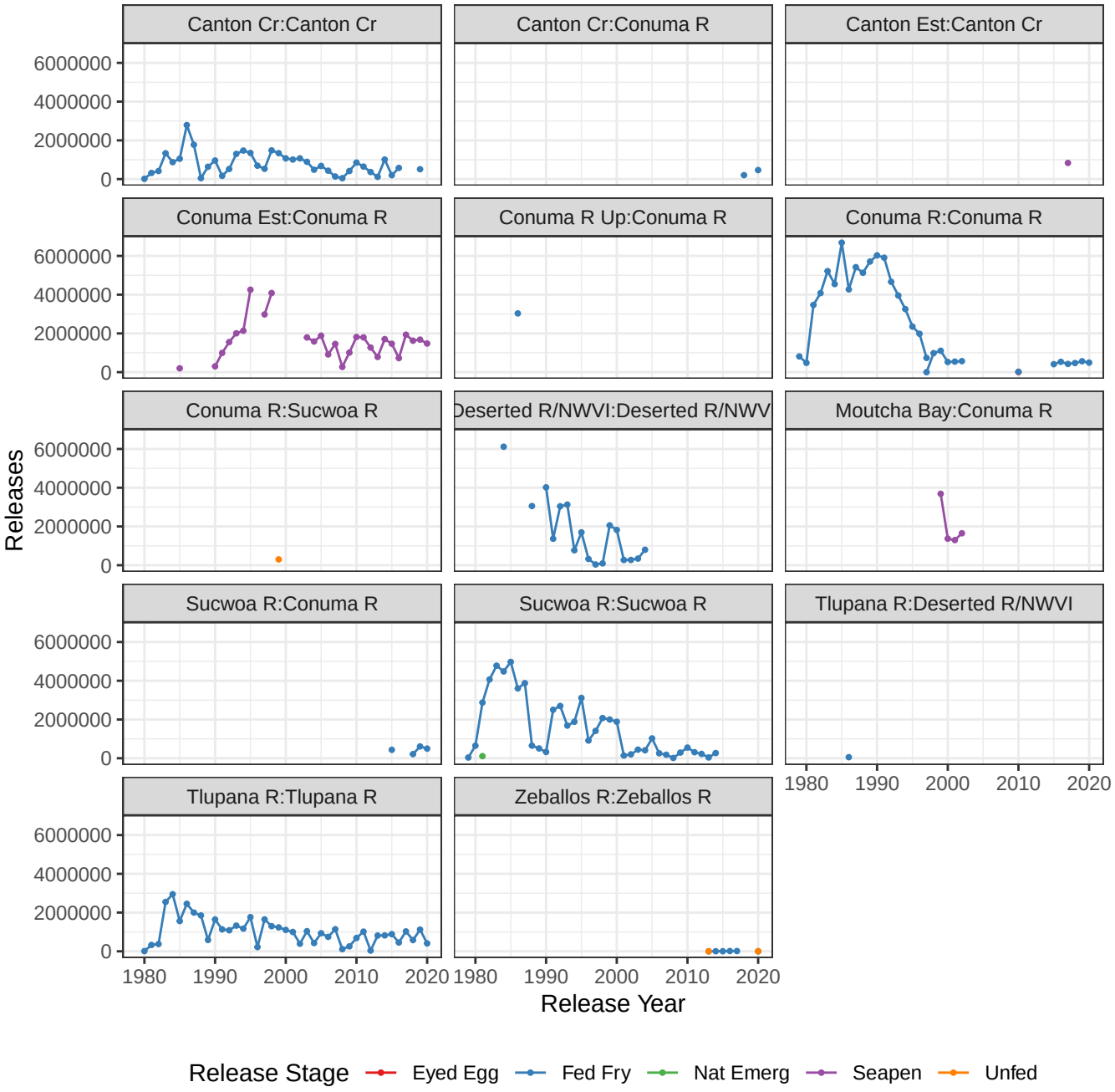


Figure 3: Chum releases to Area 25 by release site and release stage.

Table of A25 streams by inlet and distance from Conuma enhancement

System name	NOTNAS	Inlet	Subinlet	Dist. from enhancement
Brodick Creek	49	Esperanza	Esperanza	61,655
Burman River	66	Nootka	Gold	54,299
Canton Creek	62	Nootka	Conuma	3,718
Chum Creek	56	Esperanza	Espinosa	75,361
Conuma River	65	Nootka	Conuma	0
Deserted Creek	59	Nootka	Conuma	16,768
Espinosa Creek	59	Esperanza	Espinosa	76,904
Hammond Creek	54	Esperanza	Eliza	78,677
Hoiss Creek	56	Nootka	Nootka	20,255
Kleeptee Creek	58	Nootka	Gold	27,400
Leiner River	66	Tahsis	Tahsis	46,500
Little Zeballos River	64	Esperanza	Zeballos	58,802
Lord Creek	50	Esperanza	Esperanza	43,611
Mamat Creek	51	Esperanza	Espinosa	73,524
Marvinas Bay Creek	47	Nootka	Nootka	24,133
Mooyah River	54	Nootka	Gold	23,265
Owossitsa Creek	51	Esperanza	Esperanza	63,067
Park River	63	Esperanza	Eliza	70,239
Ransom River	55	Esperanza	Ransom	92,551
Sucwoa River	60	Nootka	Conuma	5,286
Tahsis River	65	Tahsis	Tahsis	46,465
Tlupana River	61	Nootka	Conuma	10,890
Tsowwin River	60	Tahsis	Tahsis	30,761
Zeballos River	66	Esperanza	Zeballos	63,279

Hatchery releases to area

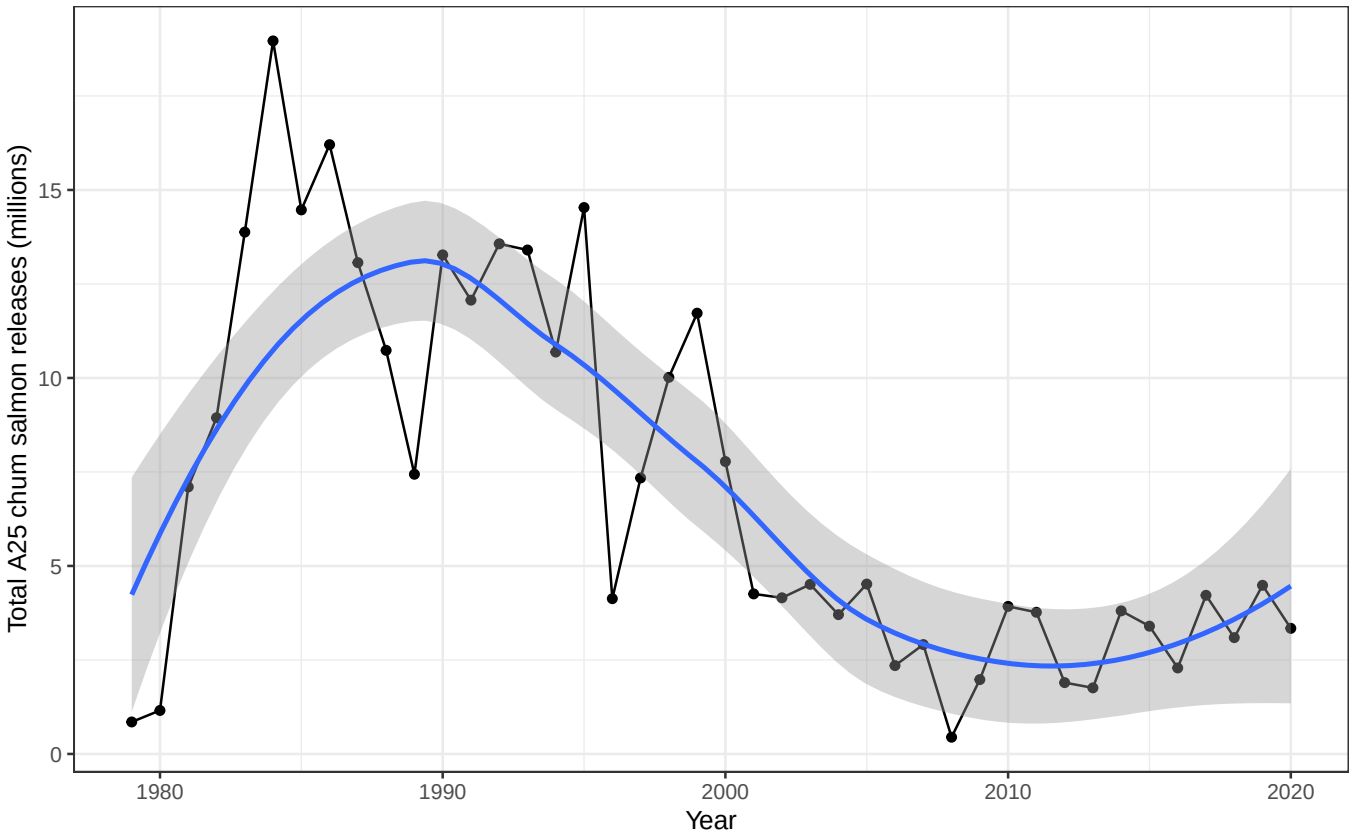


Figure 4: Total hatchery chum salmon releases in Area 25

Escapement by enhancement rank per system

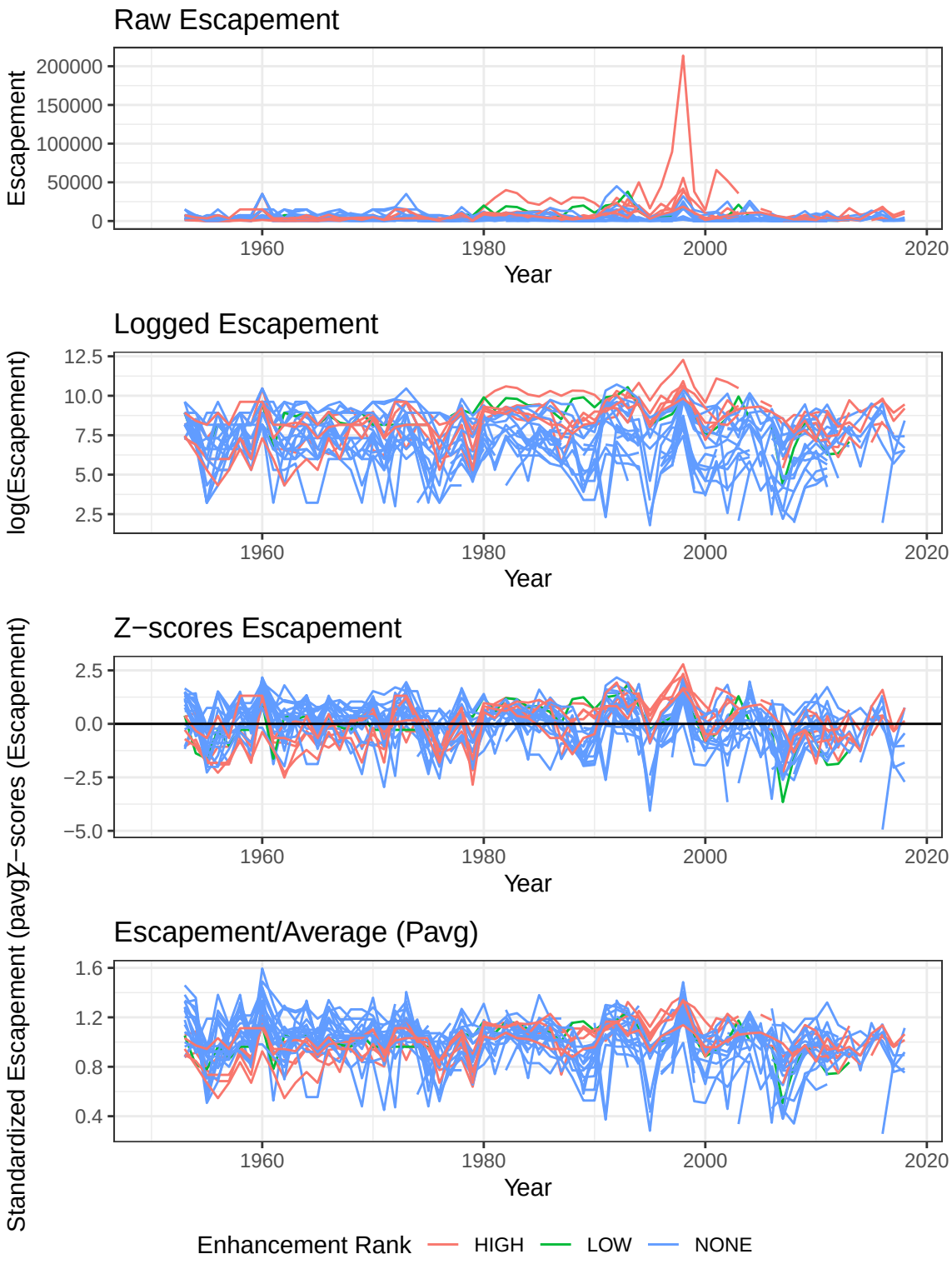


Figure 5: Various plots for escapement and transformations.

Moving average and LOESSS fit on enhancement ranking of log escapements

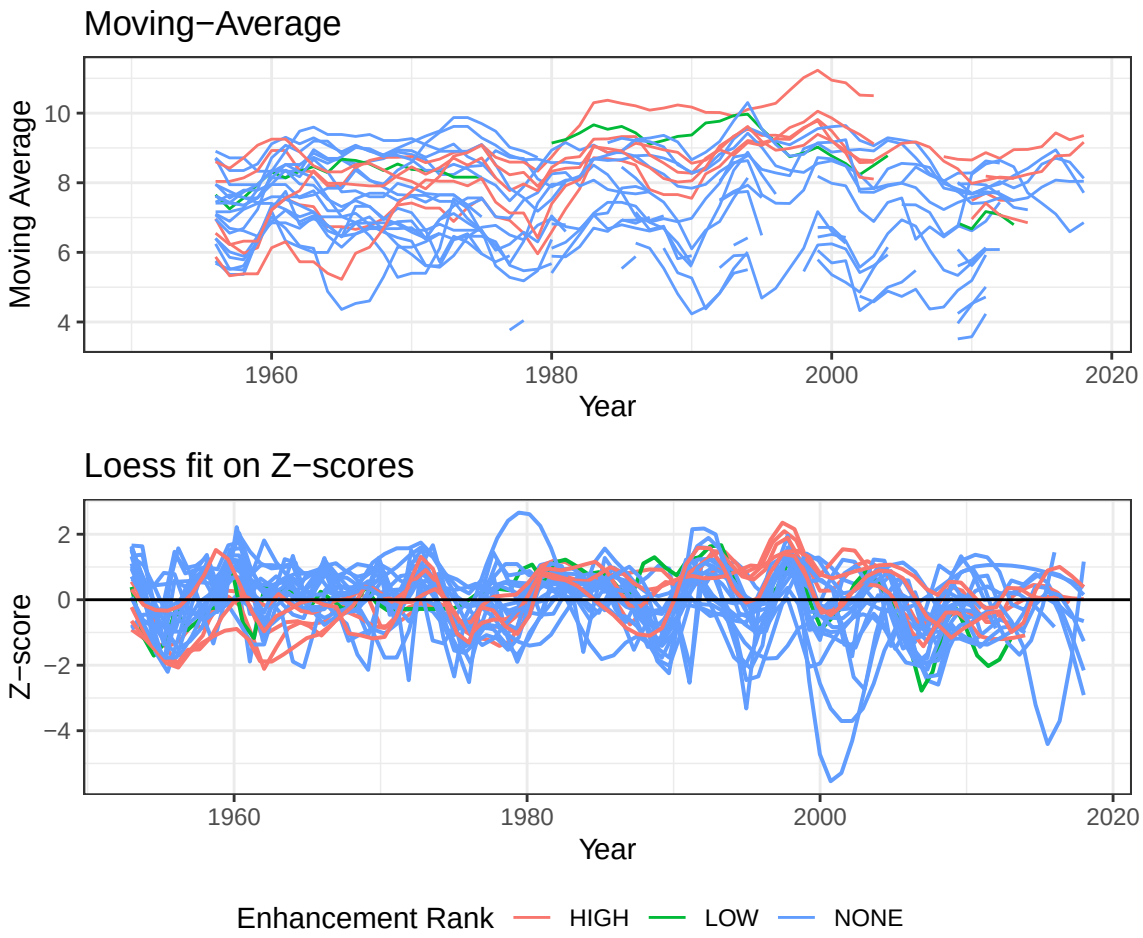


Figure 6: Moving average and LOESS fits on logged escapement by enhancement ranking.

Z-scores pre- and post-enhancement

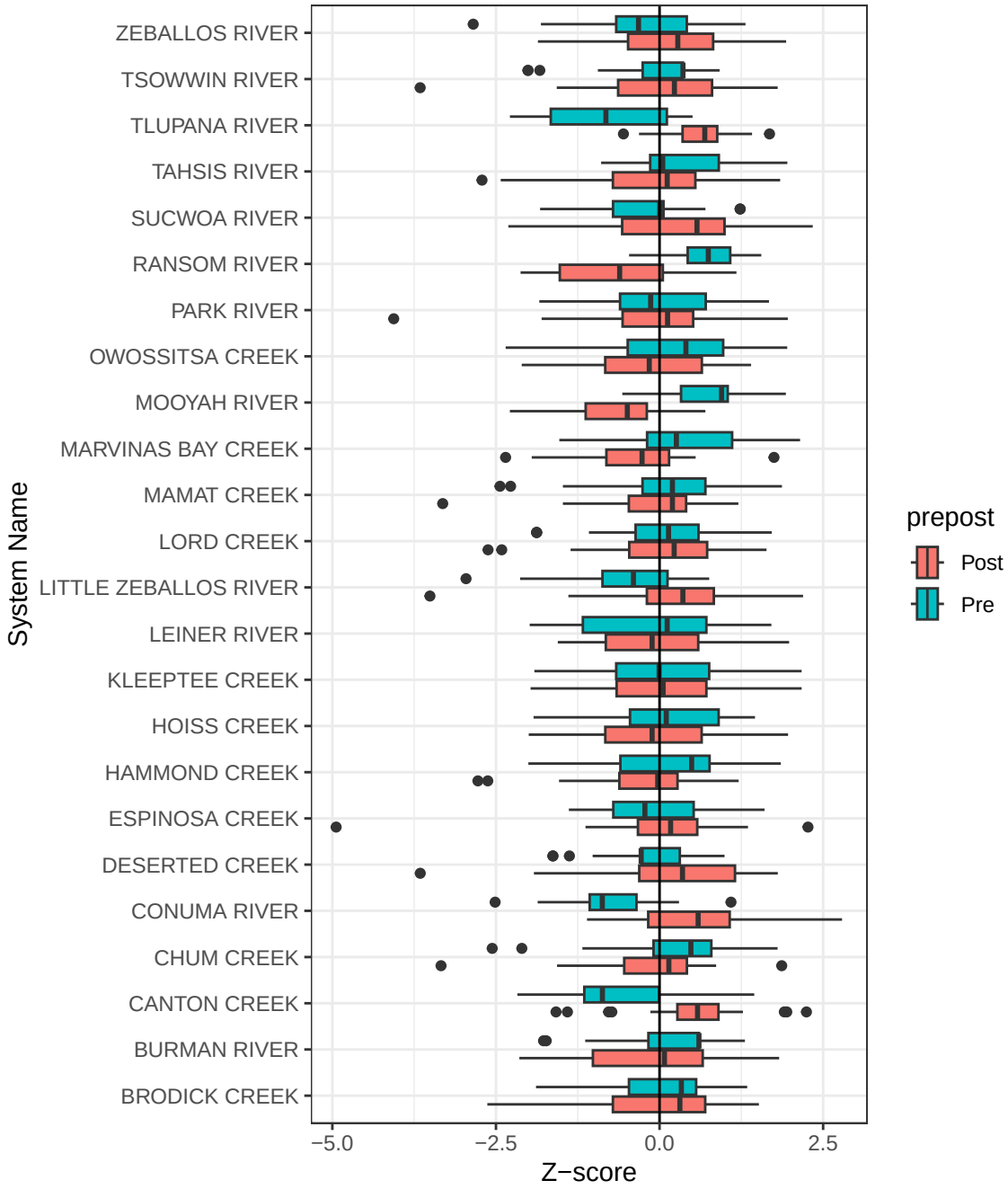


Figure 7: Z-scores pre- and post-enhancement.

Log RPS by stream

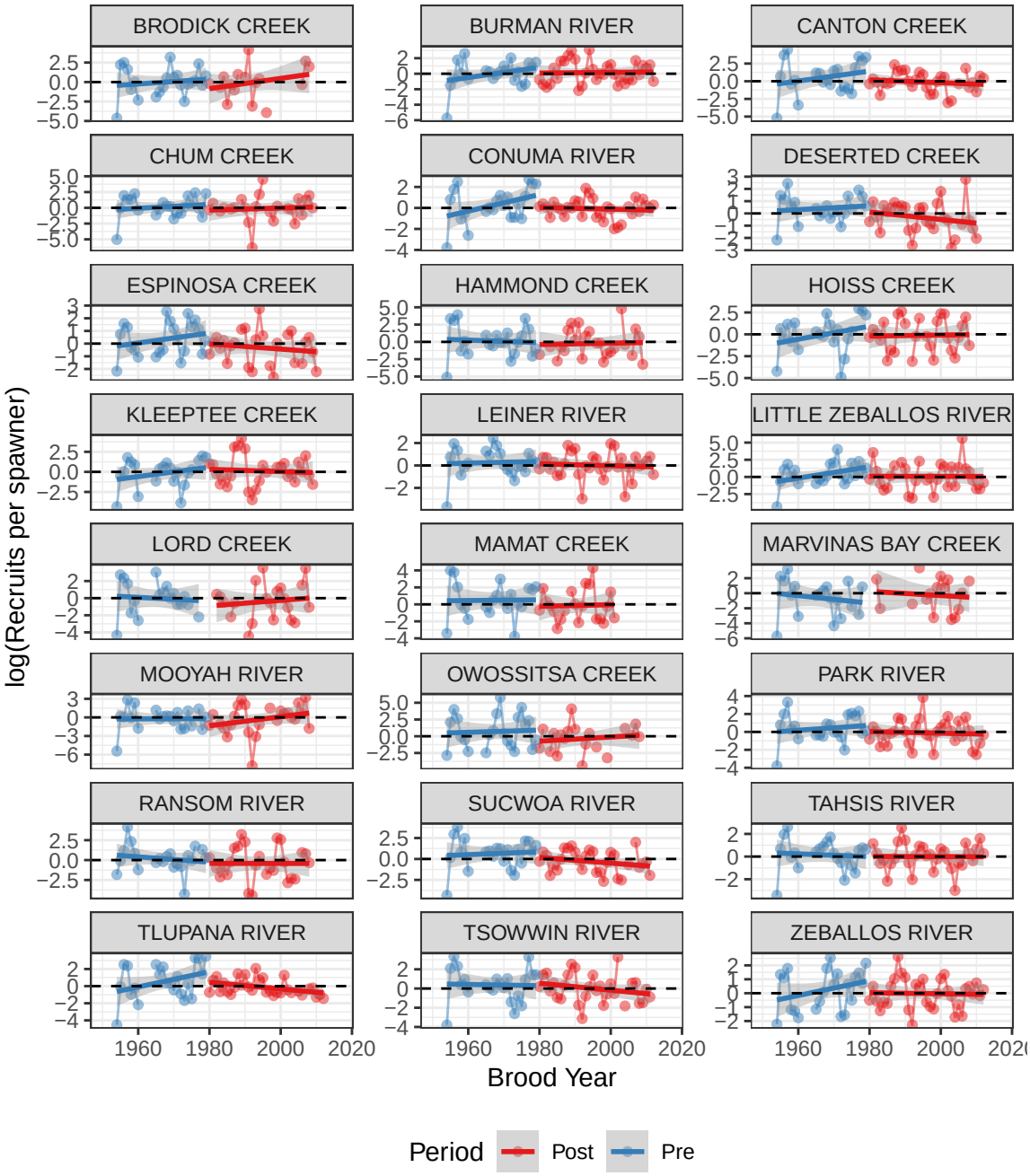


Figure 8: Log RPS by stream with linear regression fits pre- and post-first year of enhancement.

Log RPS by stream boxplot

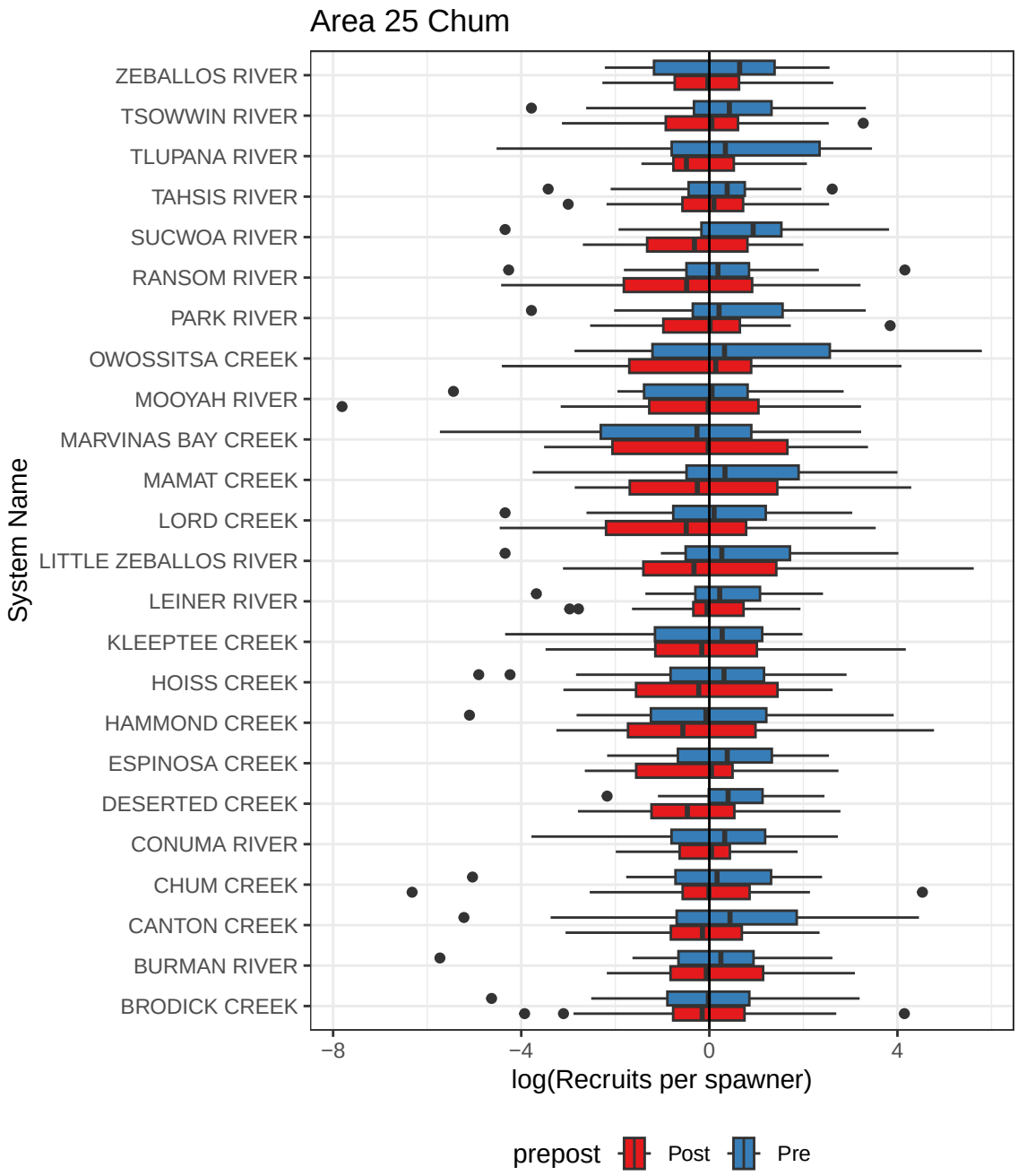


Figure 9: Log RPS by stream boxplot for pre- and post-start of enhancement period.

Correlation analyses

Correlation plots by metric

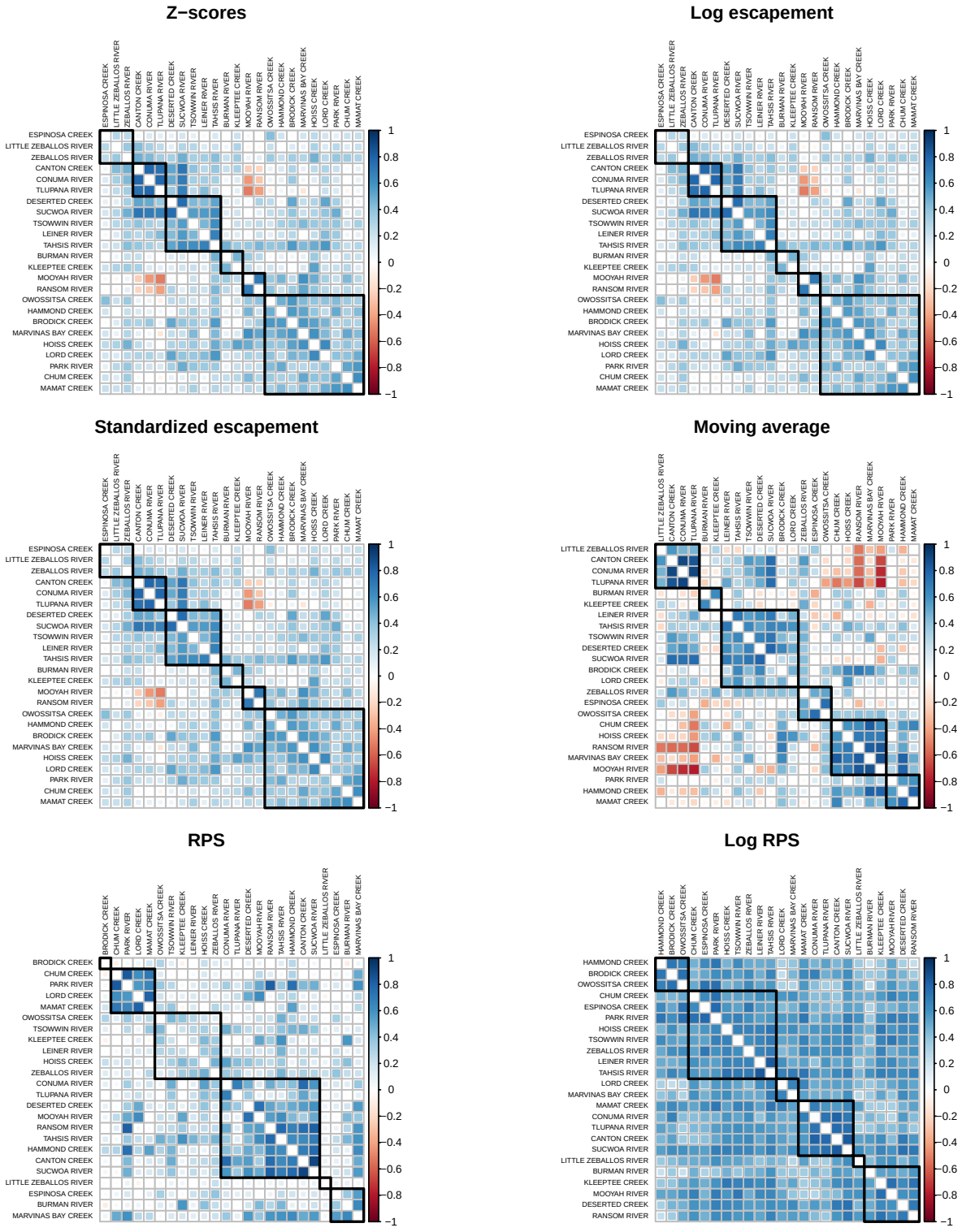


Figure 10: Cross correlation plots to compare metrics.

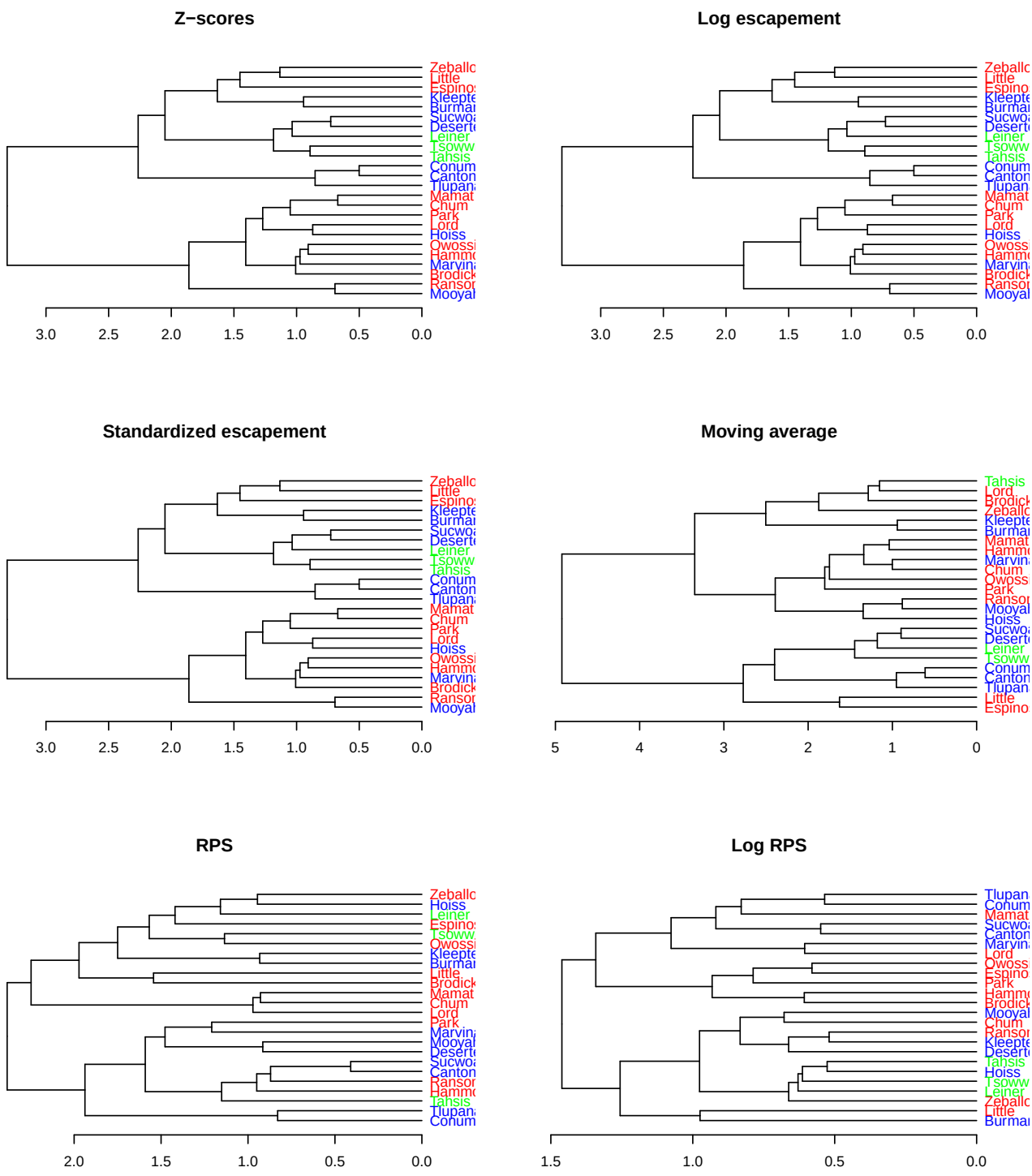


Figure 11: Dendrograms by metric. Red labels are from Esperanza inlet, blue are from Nootka inlet, and green are from Tahsis inlet.

Tanglegrams comparing effect of metric choice on cluster analysis

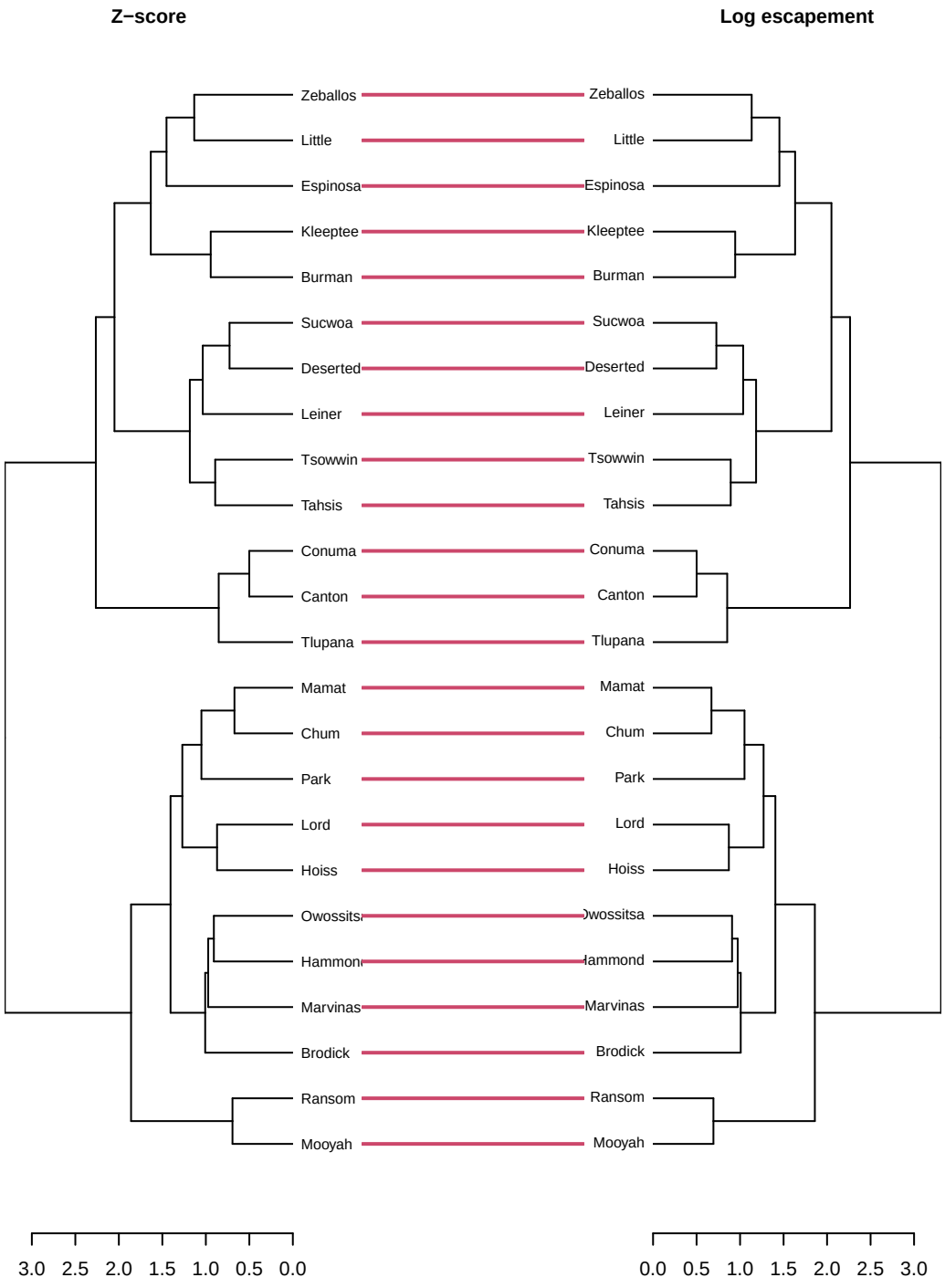


Figure 12: Tanglegram comparing the use of z-score against the use of log escapements on cluster analysis outputs.

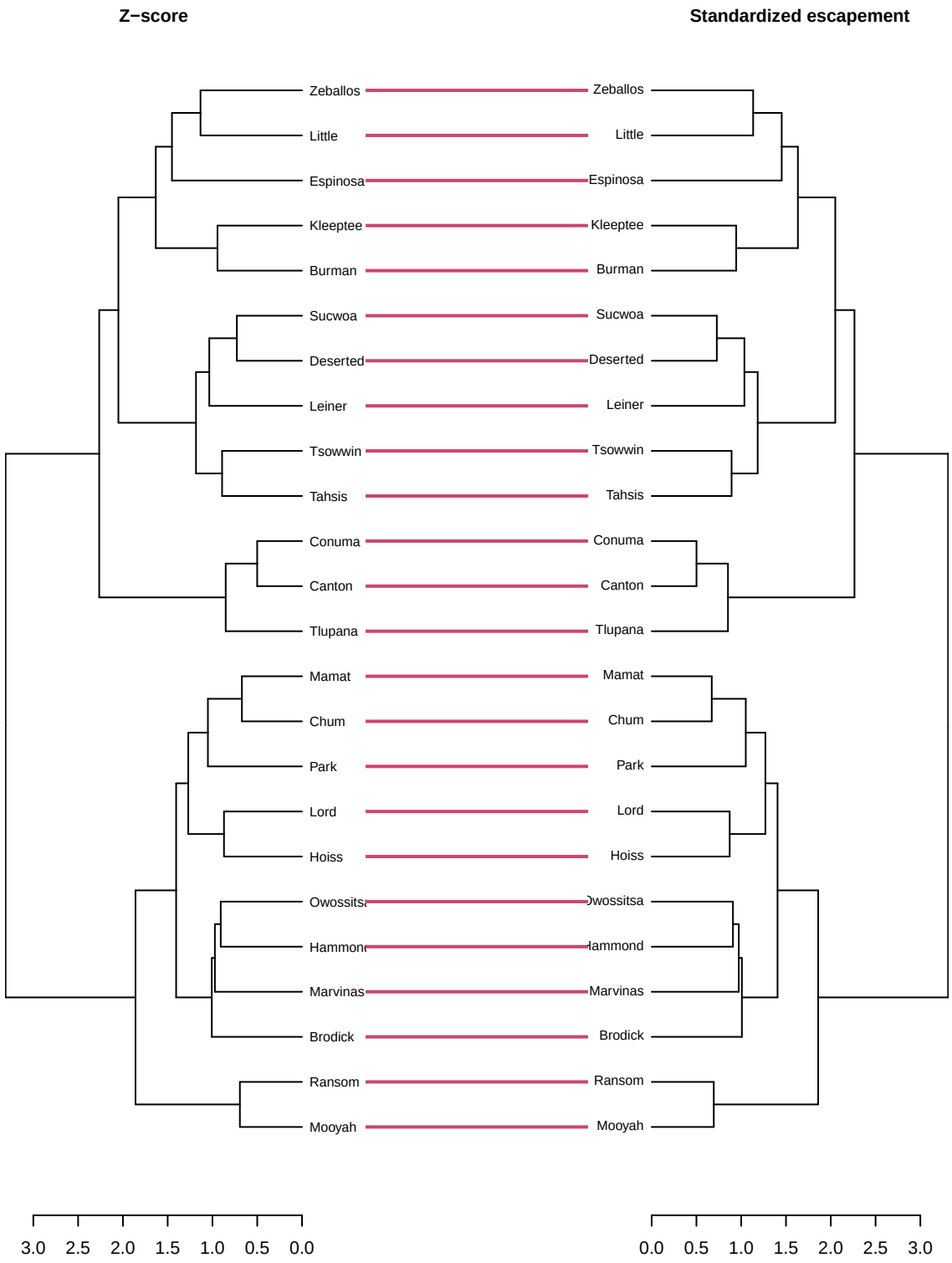


Figure 13: Tanglegram comparing the use of z-score against the use of standardized escapements on cluster analysis outputs.

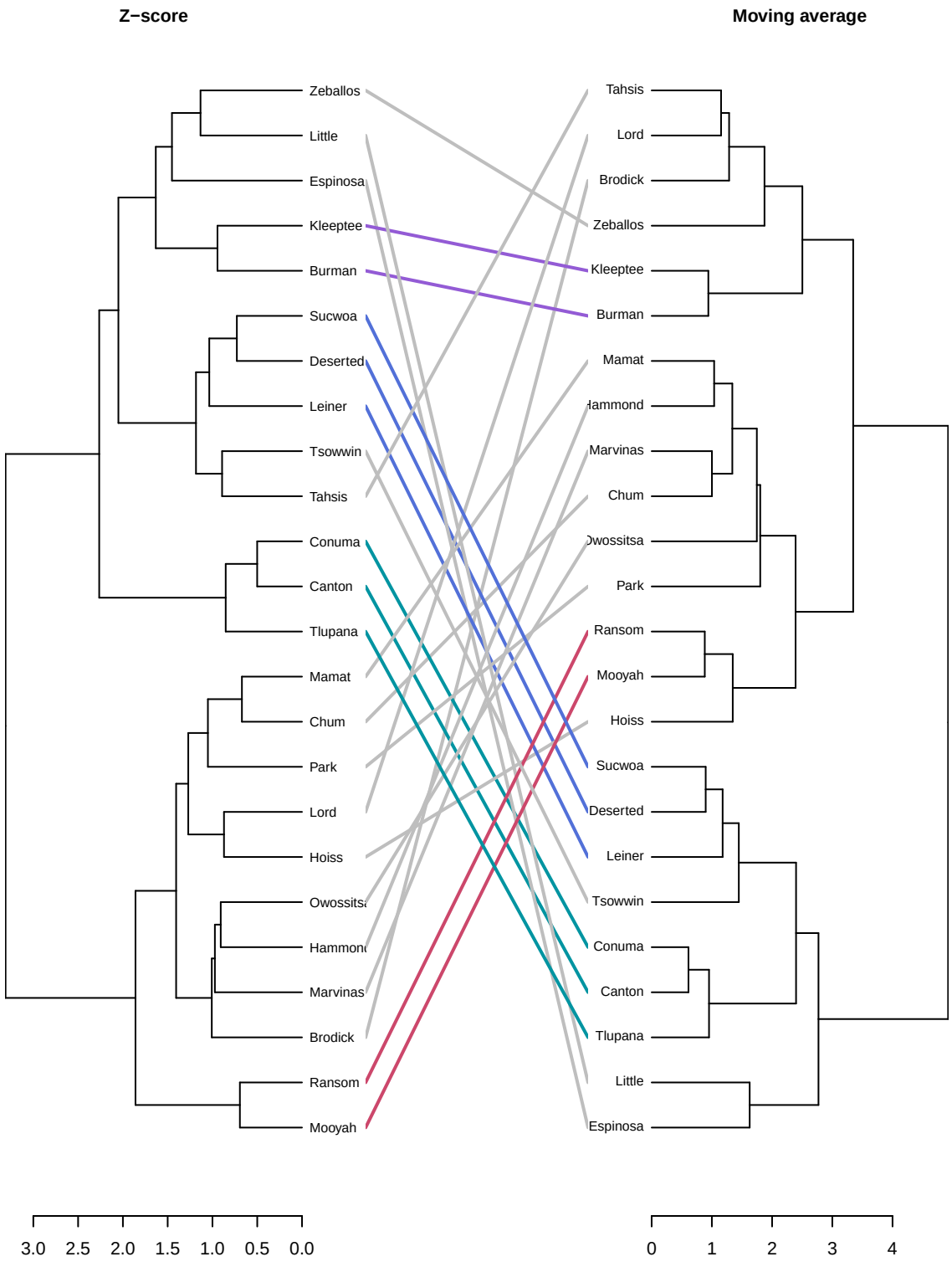


Figure 14: Tanglegram comparing the use of z-score against the use of moving average on cluster analysis outputs.

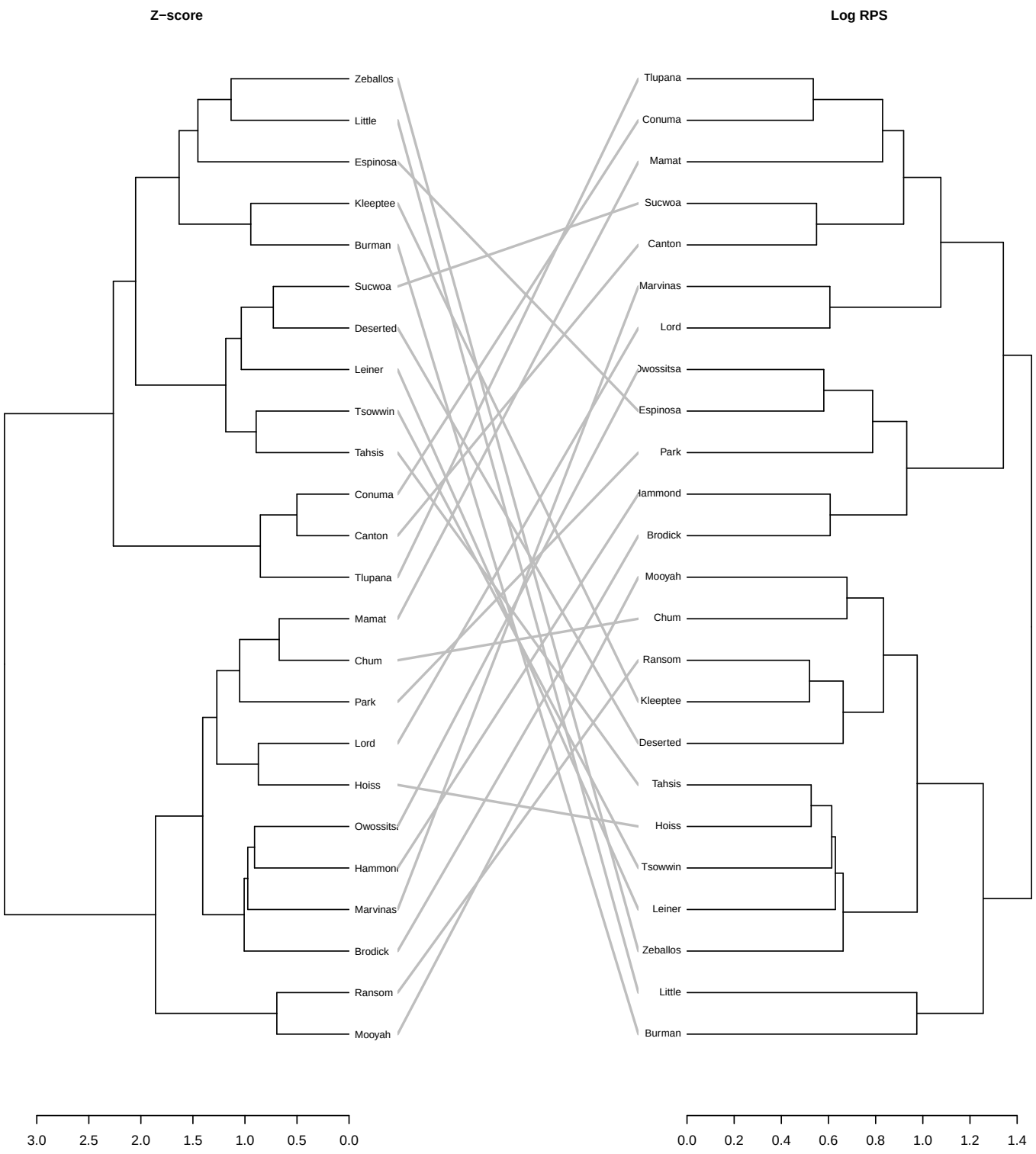


Figure 15: Tanglegram of z-score vs. Log RPS

Analyses by pre- and post-enhancement

Correlation plots

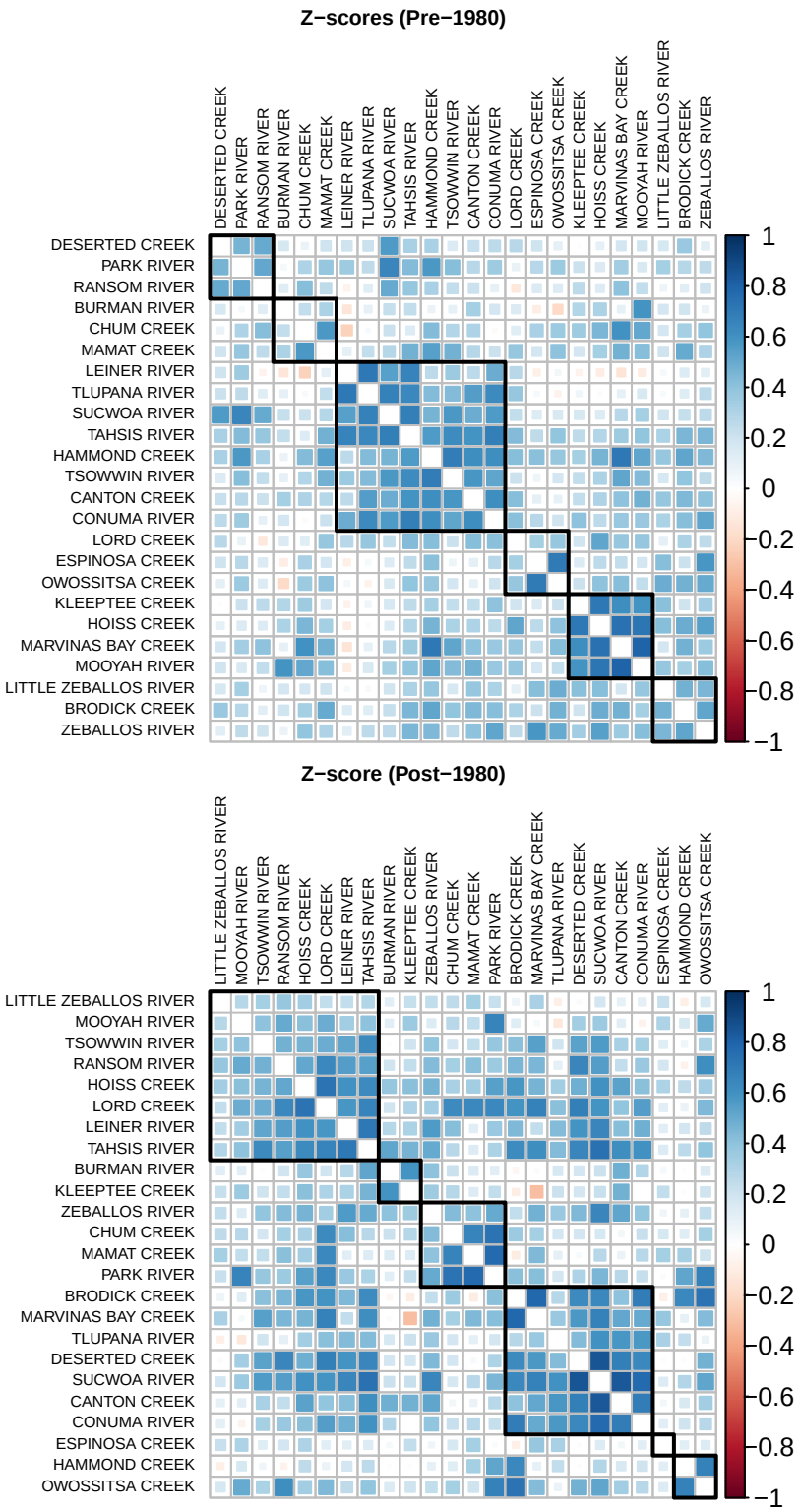


Figure 16: Cross correlation plots of z-scores to compare pre- and post-enhancement.

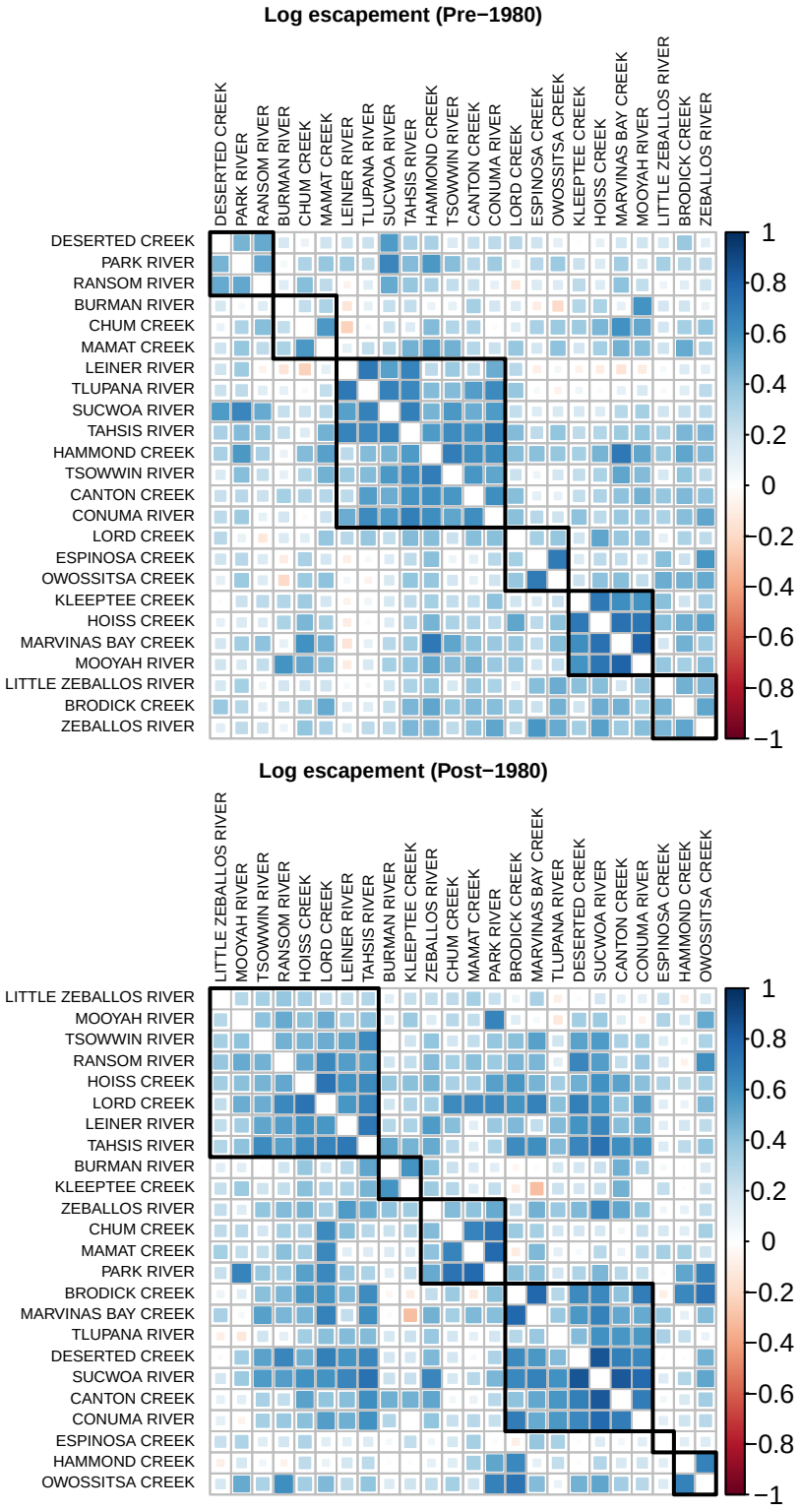


Figure 17: Cross correlation plots to compare log escapements pre- and post-enhancement.

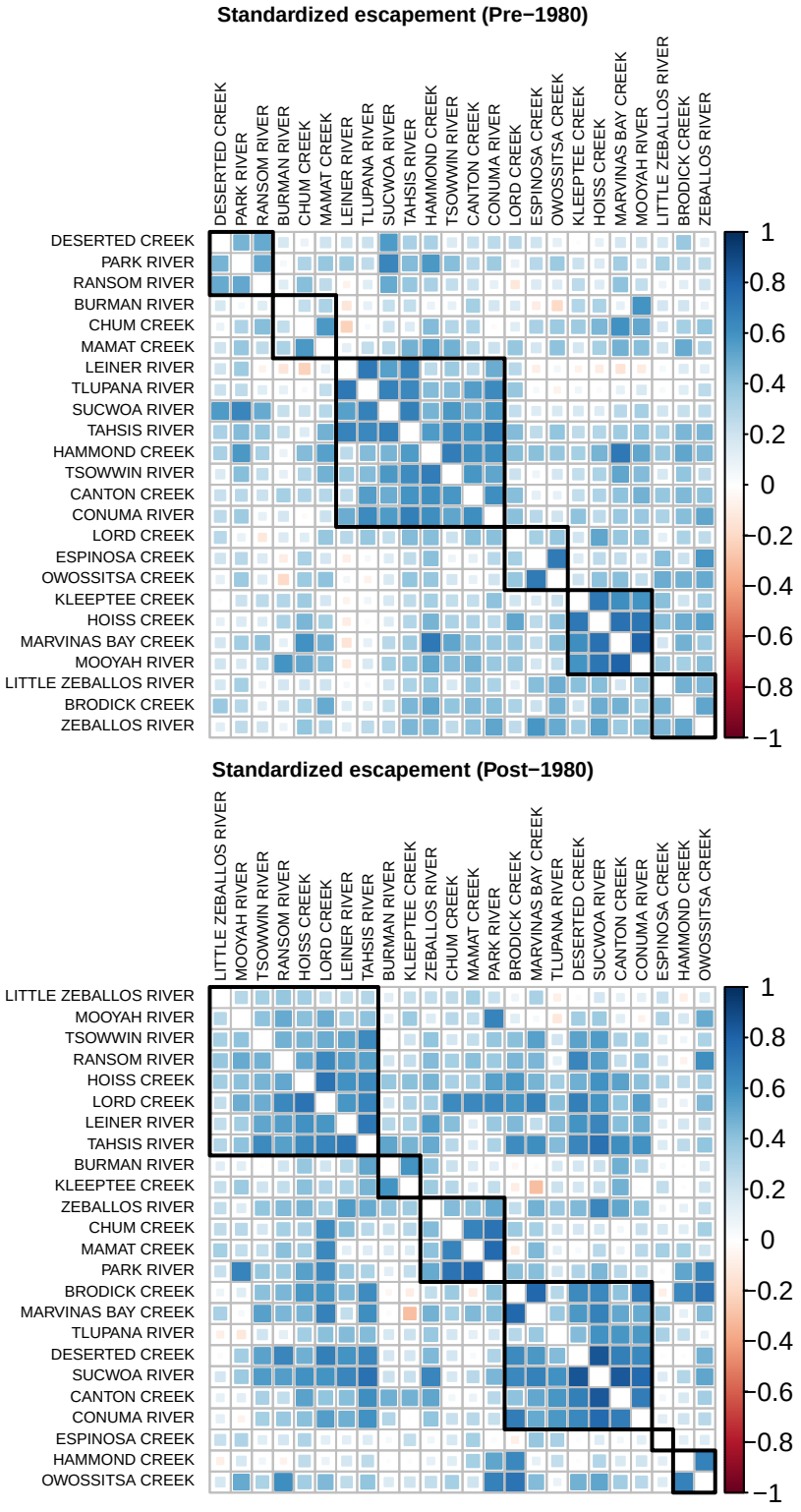


Figure 18: Cross correlation plots to compare standardized escapements pre- and post-enhancement.

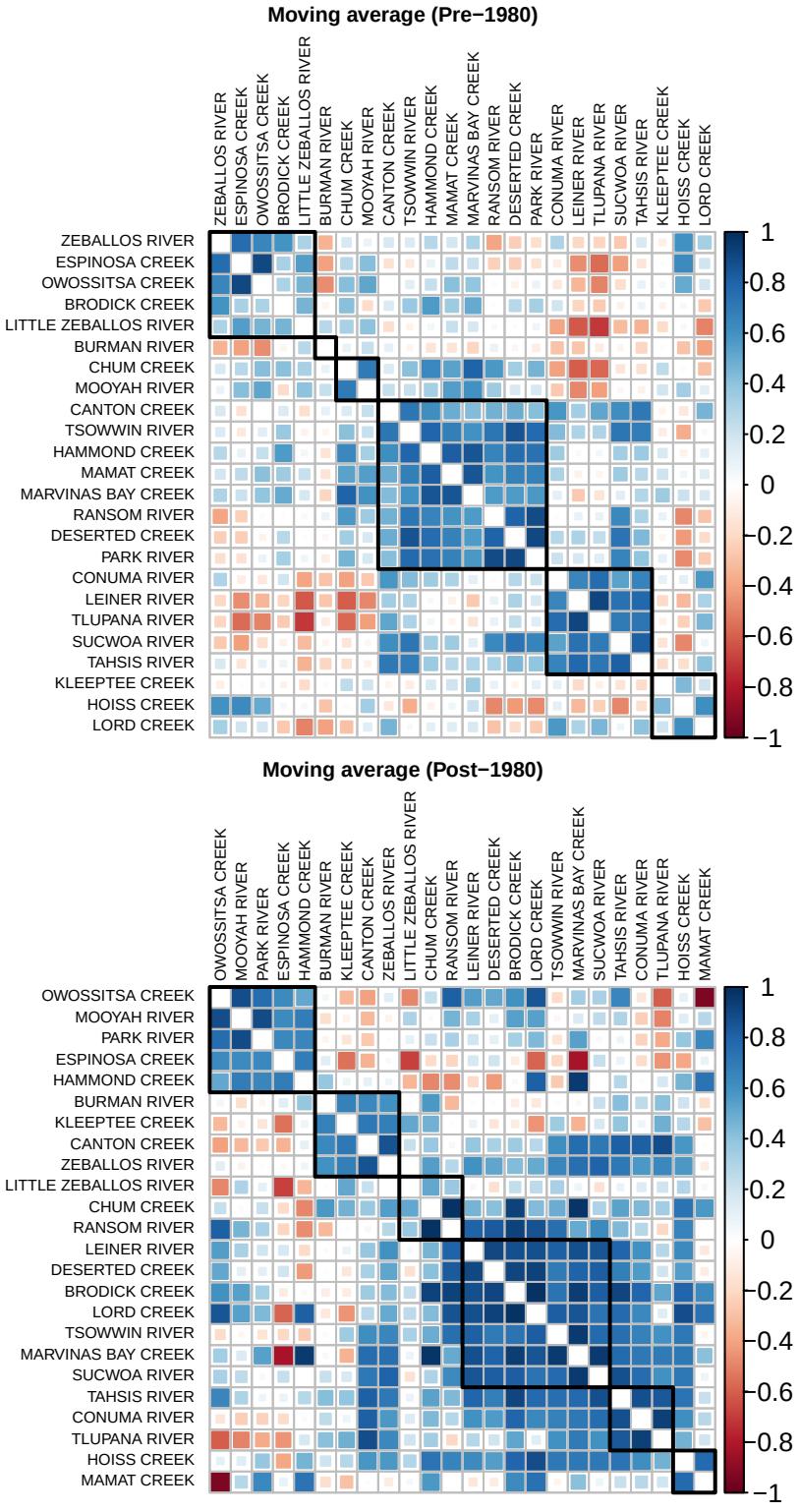


Figure 19: Cross correlation plots to compare moving average pre- and post-enhancement.

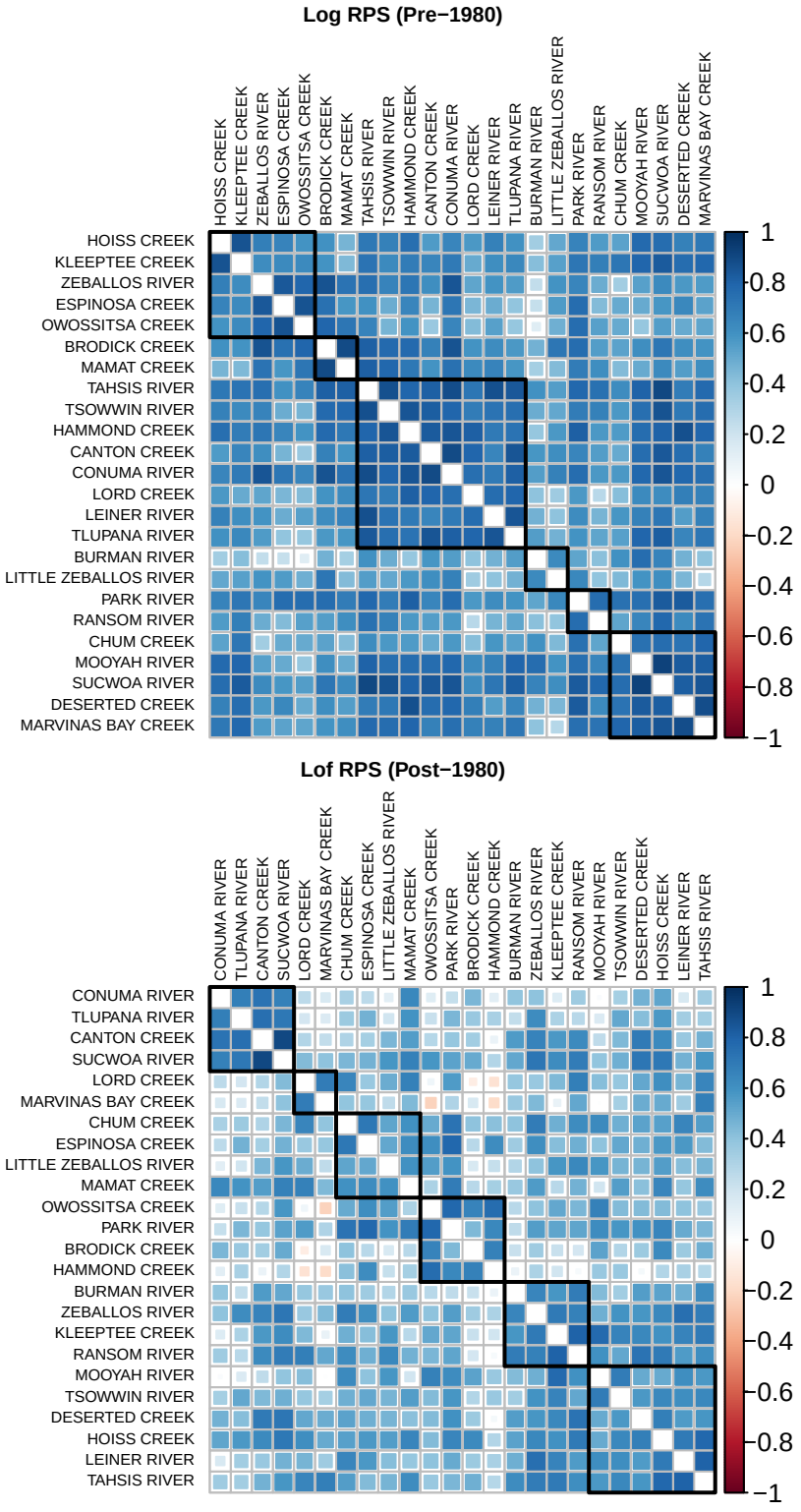


Figure 20: Cross correlation plots of Log RPS to compare pre- and post-enhancement.

Tanglegrams

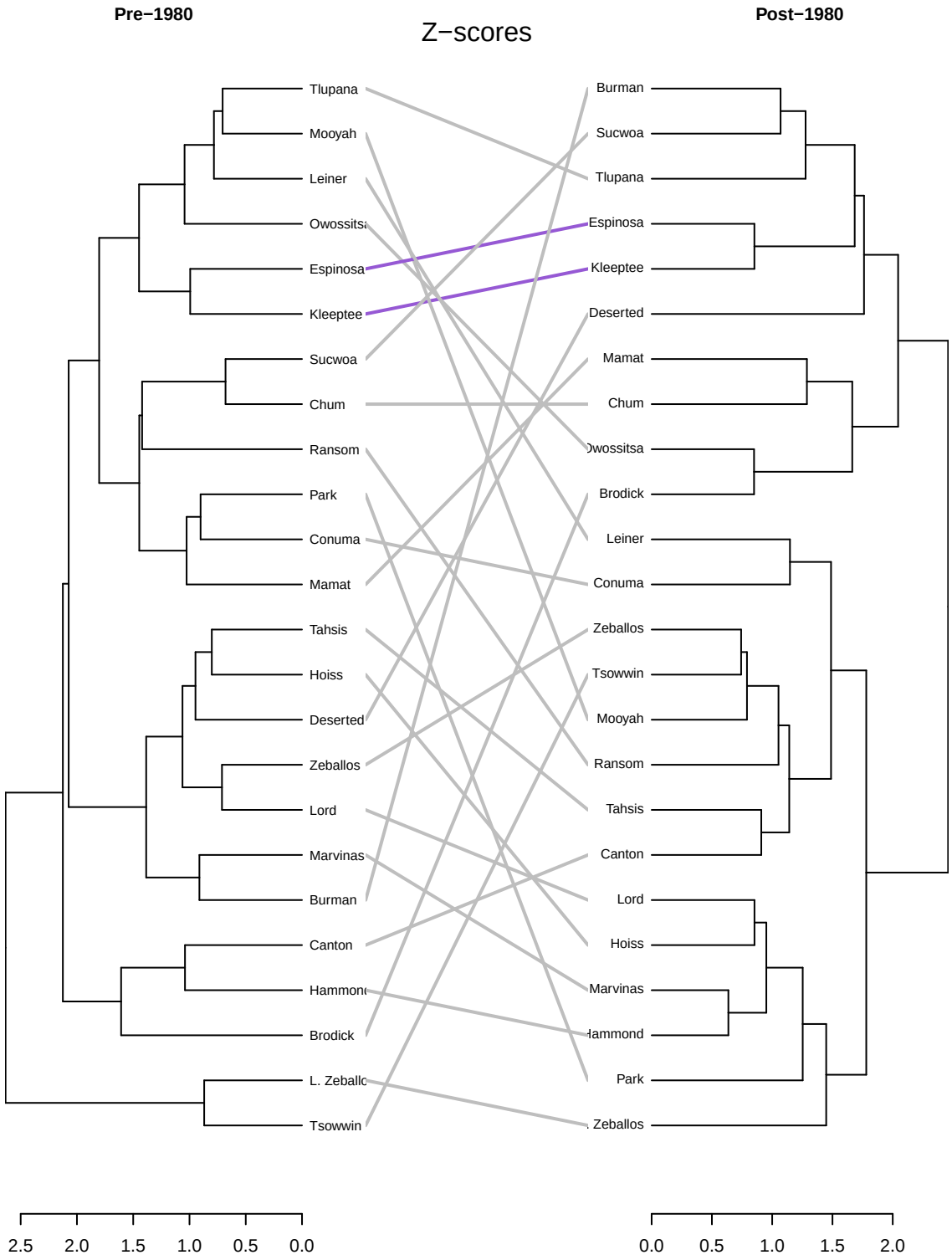


Figure 21: Tanglegram comparing z-scores pre- and post-enhancement (1980)

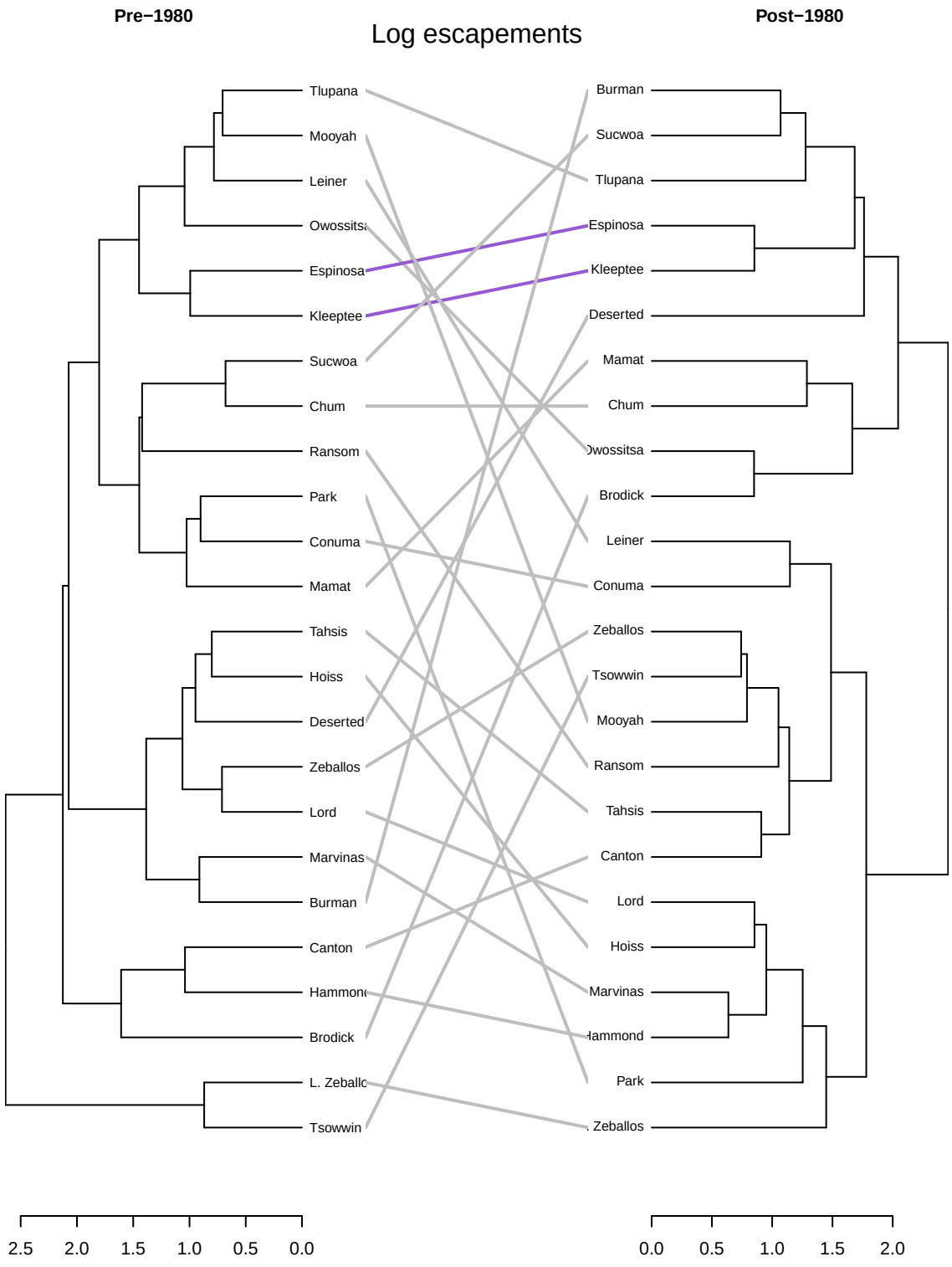


Figure 22: Tanglegram comparing log escapements pre- and post-enhancement (1980)

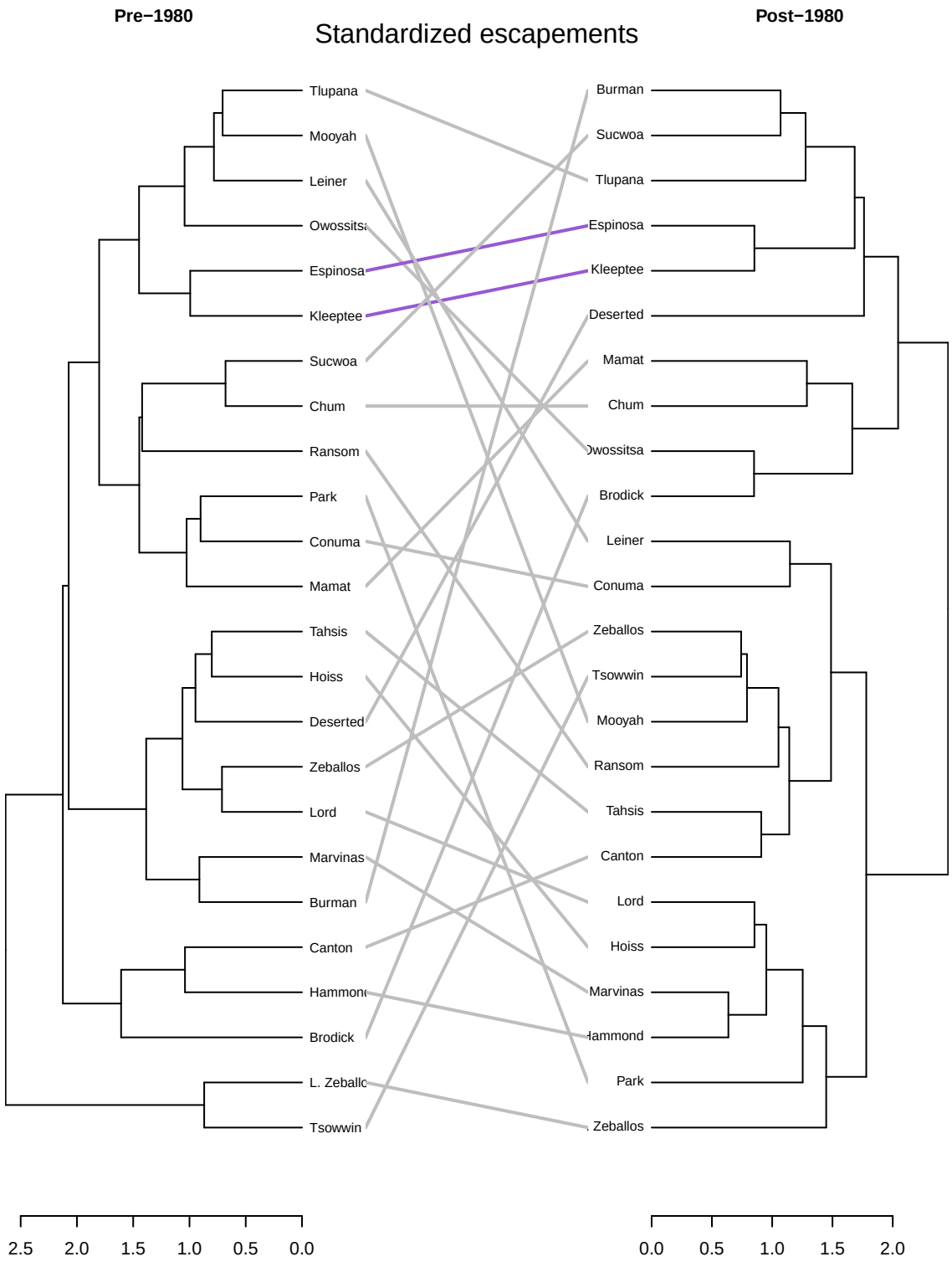


Figure 23: Tanglegram comparing log escapements pre- and post-enhancement (1980)

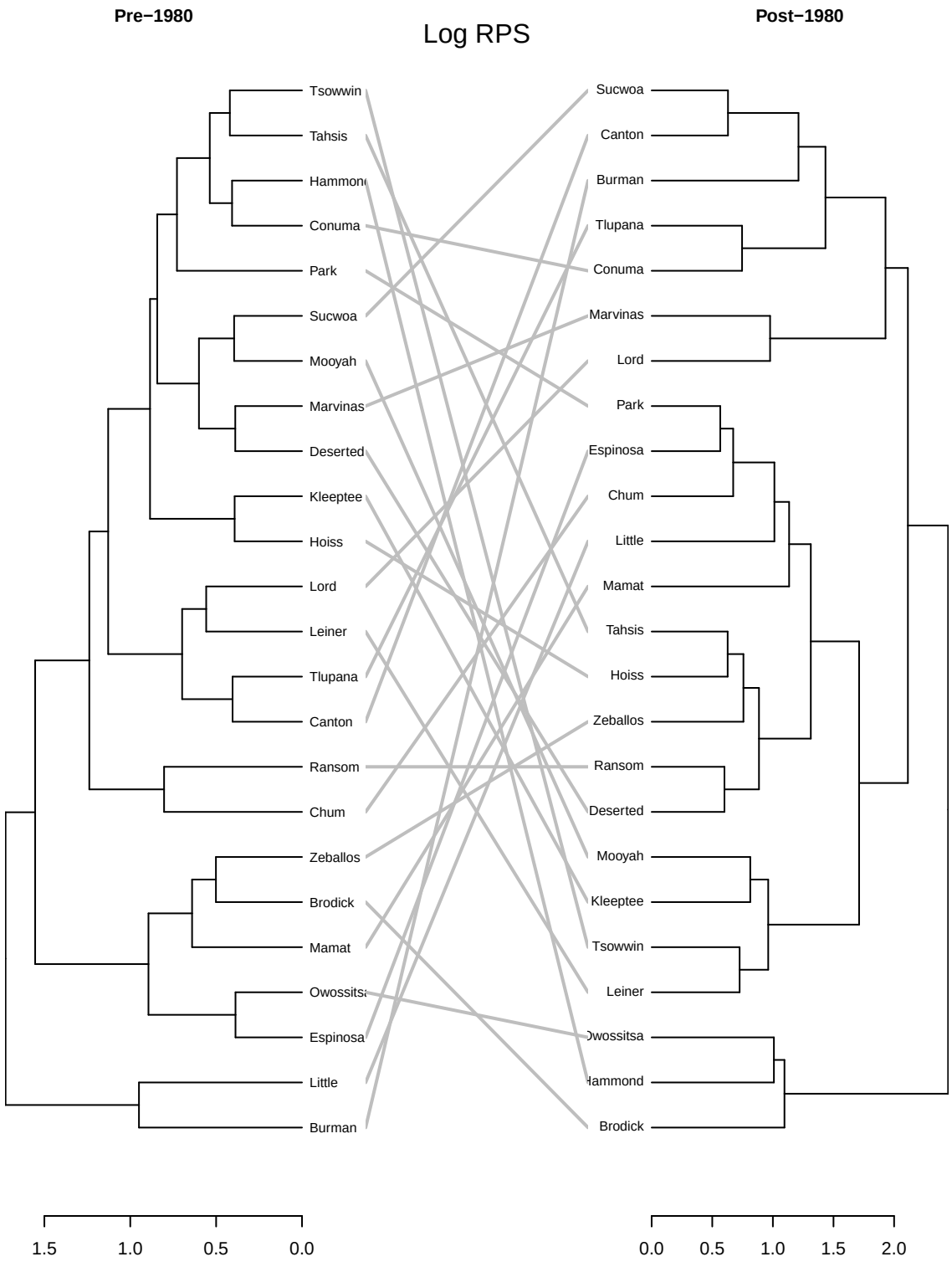


Figure 24: Tanglegram comparing Log RPS pre- and post-enhancement (1980)

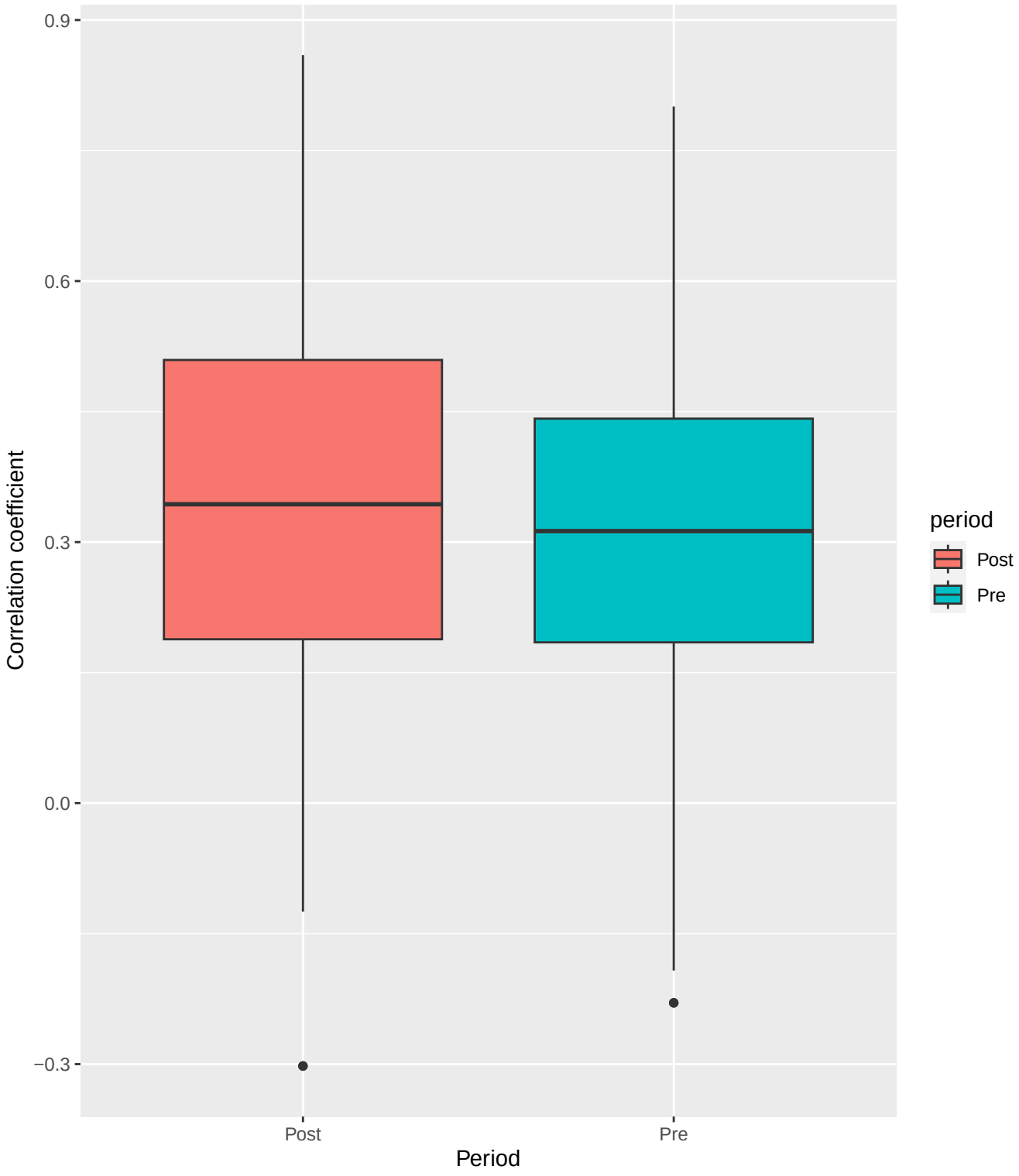


Figure 25: Boxplot comparing Z-score pre- and post-1980.

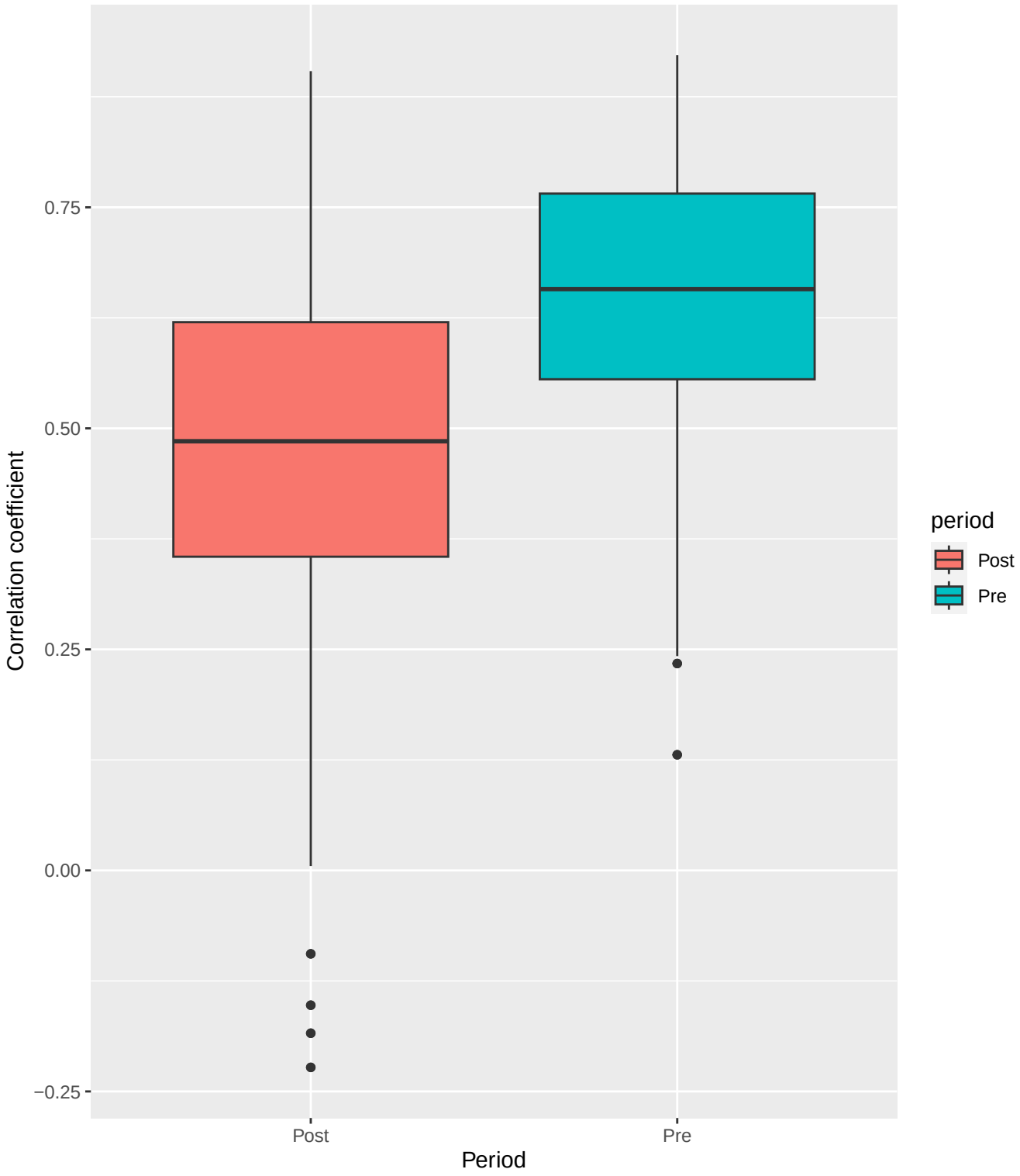


Figure 26: Boxplot comparing log RPS pre- and post-1980.

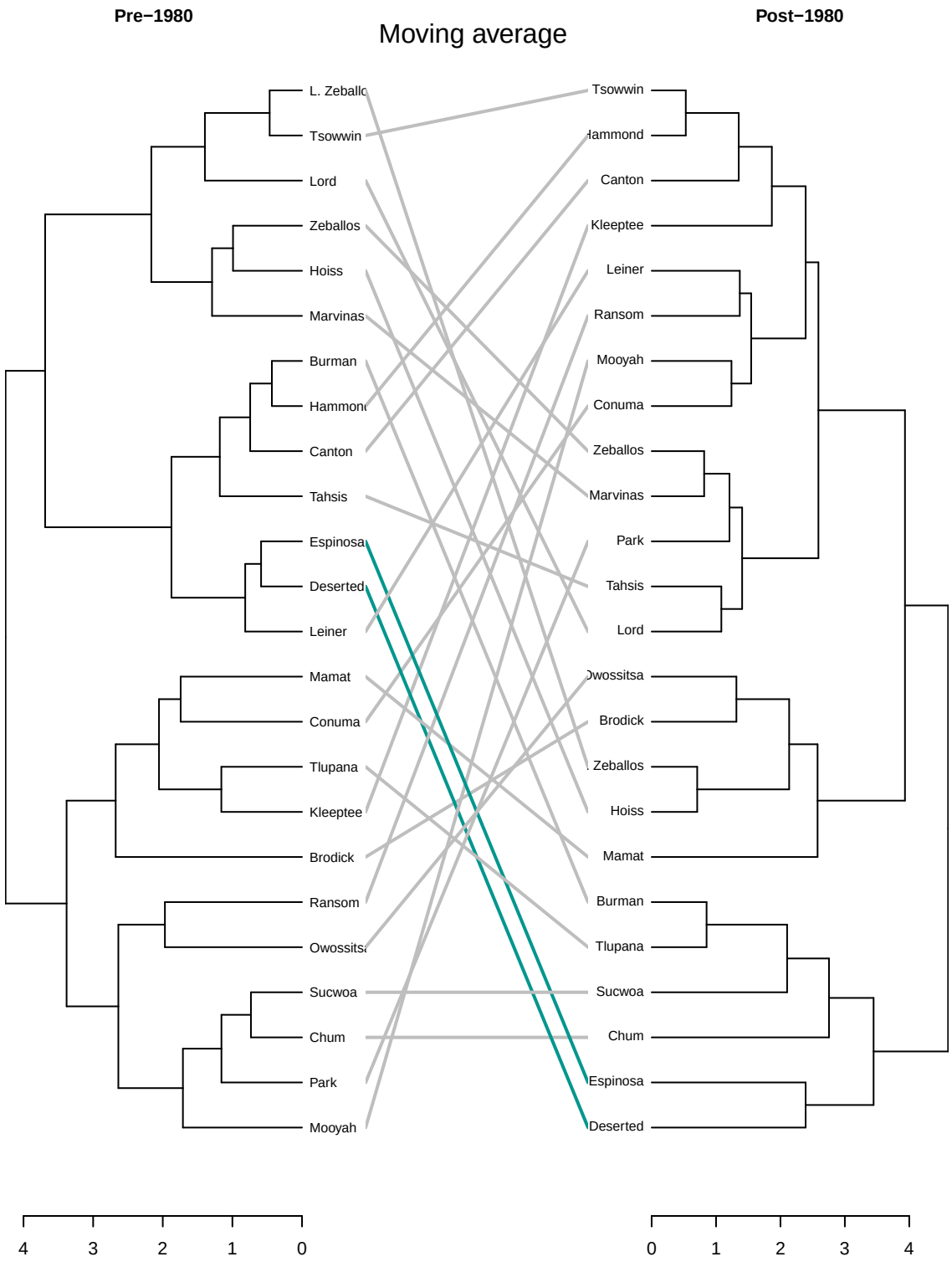


Figure 27: Tanglegram comparing moving averages pre- and post-enhancement (1980)

Statistical models

Table of Recruits per spawner candidate models

Candidate model
log rps ~ distance from enhancement + year
log rps ~ distance from enhancement + total releases + year
log rps ~ total releases + year
logrps ~ total releases + factor(year)
logrps ~ total releases + factor(year) + year
logrps ~ total releases + year + system name
logrps ~ total releases + year + subinlet
logrps ~ correlation coefficient + year
logrps ~ correlation coefficient + year + system name
logrps ~ correlation coefficient + year + total releases

Table of Escapement candidate models

Candidate models
log escapement ~ distance from enhancement + year
log escapement ~ distance from enhancement + total releases + year
log escapement ~ correlation coefficient + total releases + year
log escapement ~ correlation coefficient + total releases + inlet + year
log escapement ~ correlation coefficient + total releases + subinlet + year
log escapement ~ correlation coefficient + distance from enhancement + total releases + year

AIC Table for RPS candidate models

Candidate model	Degrees of freedom	AIC
log rps ~ distance from enhancement + year	4	1724.998
log rps ~ distance from enhancement + total releases + year	5	1722.590
log rps ~ total releases + year	4	1720.592
logrps ~ total releases + factor(year)	33	1360.448
logrps ~ total releases + factor(year) + year	33	1360.448
logrps ~ total releases + year + system name	27	1756.327
logrps ~ total releases + year + subinlet	12	1730.376
logrps ~ correlation coefficient + year	4	1722.756
logrps ~ correlation coefficient + year + system name	26	1758.053
logrps ~ correlation coefficient + year + total releases	5	1720.627

AIC Table for Escapement candidate models

Candidate models	Degrees of freedom	AIC
log escapement ~ distance from enhancement + year	4	2991.802
log escapement ~ distance from enhancement + total releases + year	5	2982.832
log escapement ~ correlation coefficient + total releases + year	5	2934.982
log escapement ~ correlation coefficient + total releases + inlet + year	7	2896.195
log escapement ~ correlation coefficient + total releases + subinlet + year	13	2651.303
log escapement ~ correlation coefficient + distance from enhancement + total releases + year	14	2645.411

Effects plot of log RPS by year

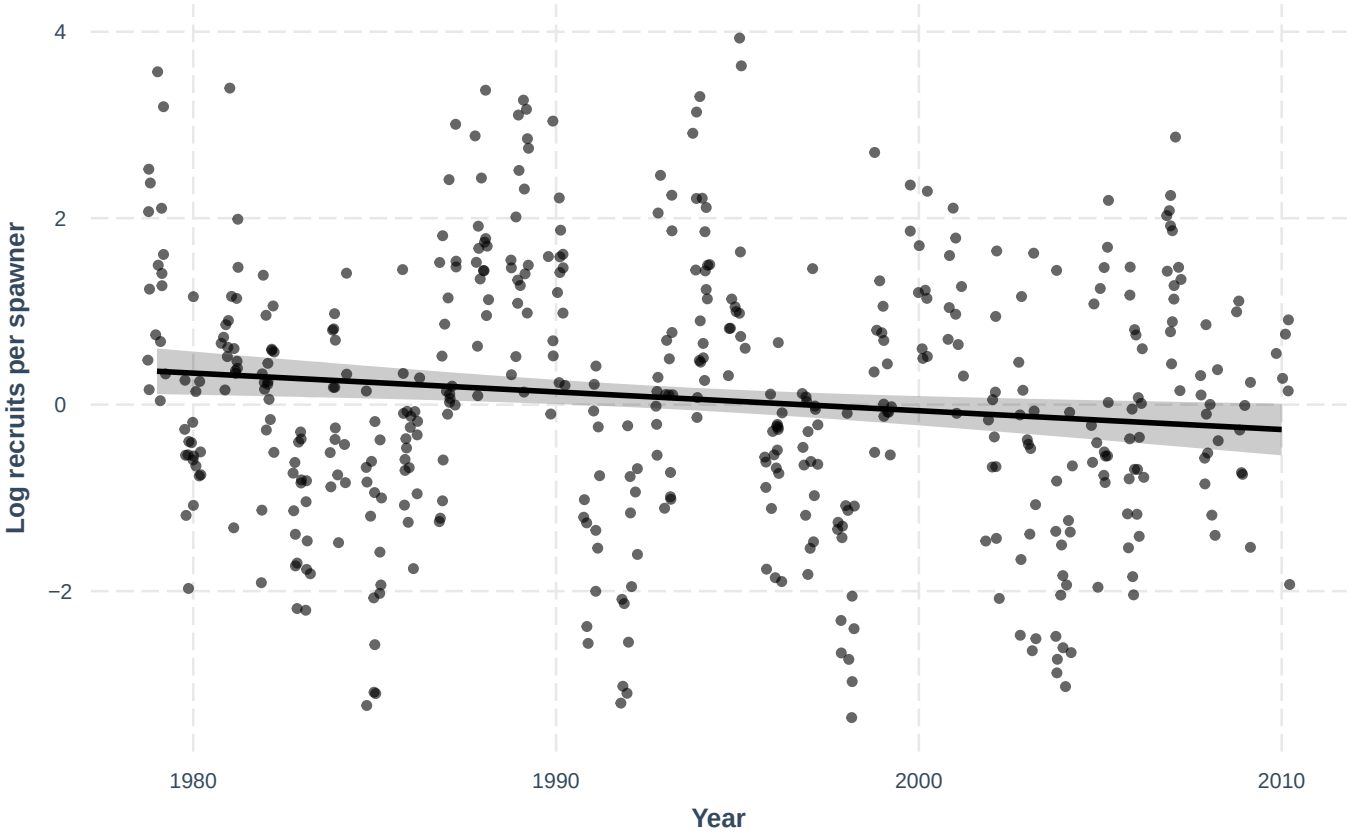


Figure 28: Effects plots of Recruits per spawner by year

Effects plot of log RPS by total releases

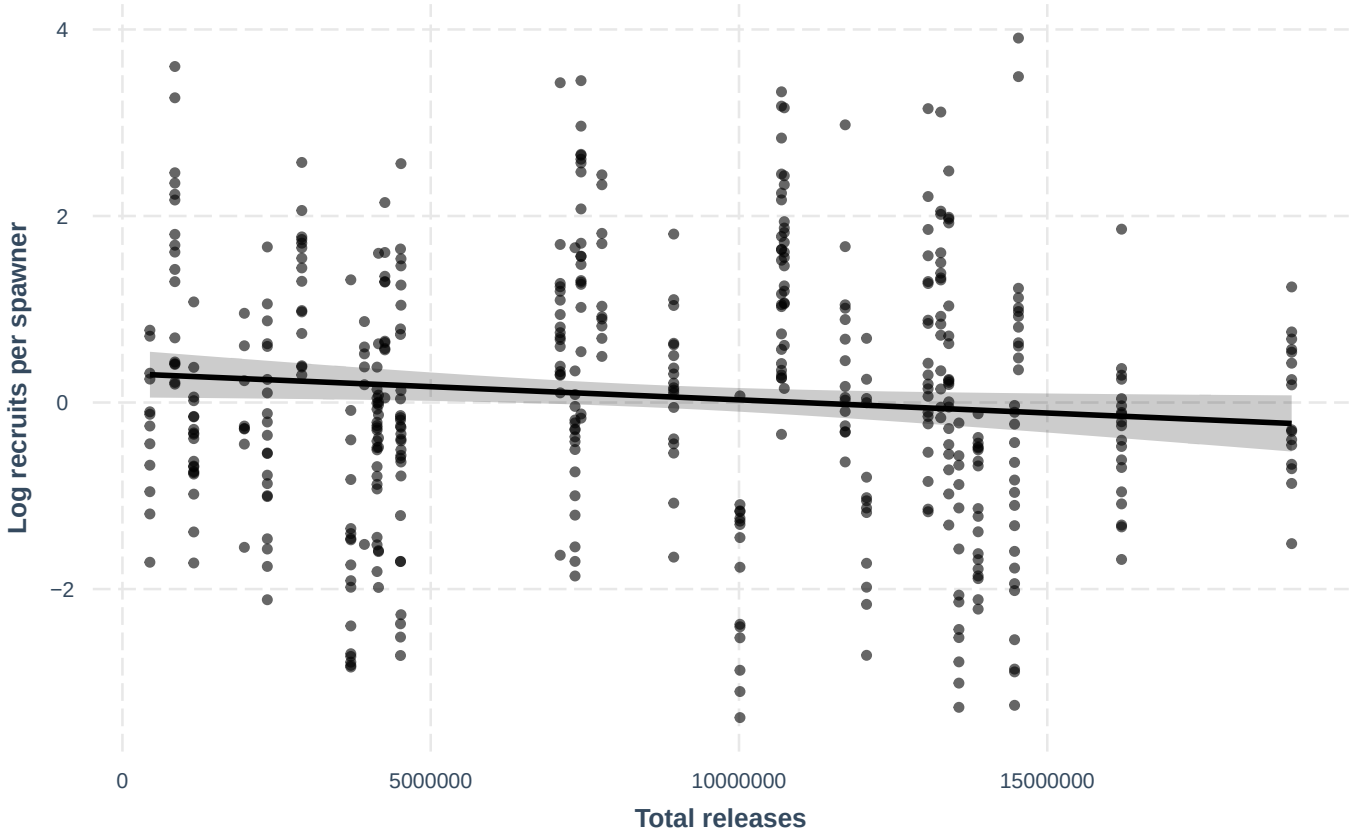


Figure 29: Effects plots of Recruits per spawner by total releases

Effects plot of escapement by correlation coefficient

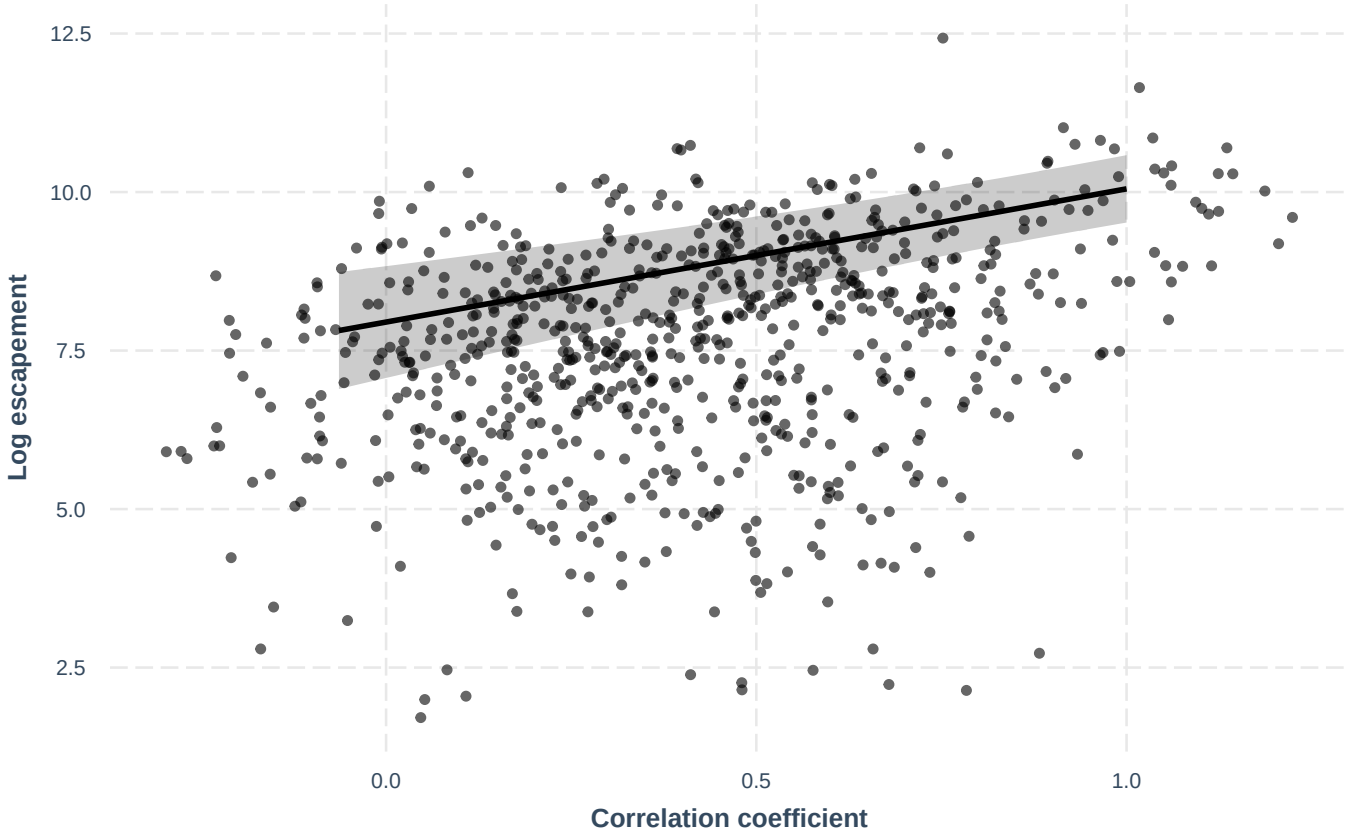


Figure 30: Effects plots of Escapement by correlation coefficient

Effects plot of escapement by distance from enhancement

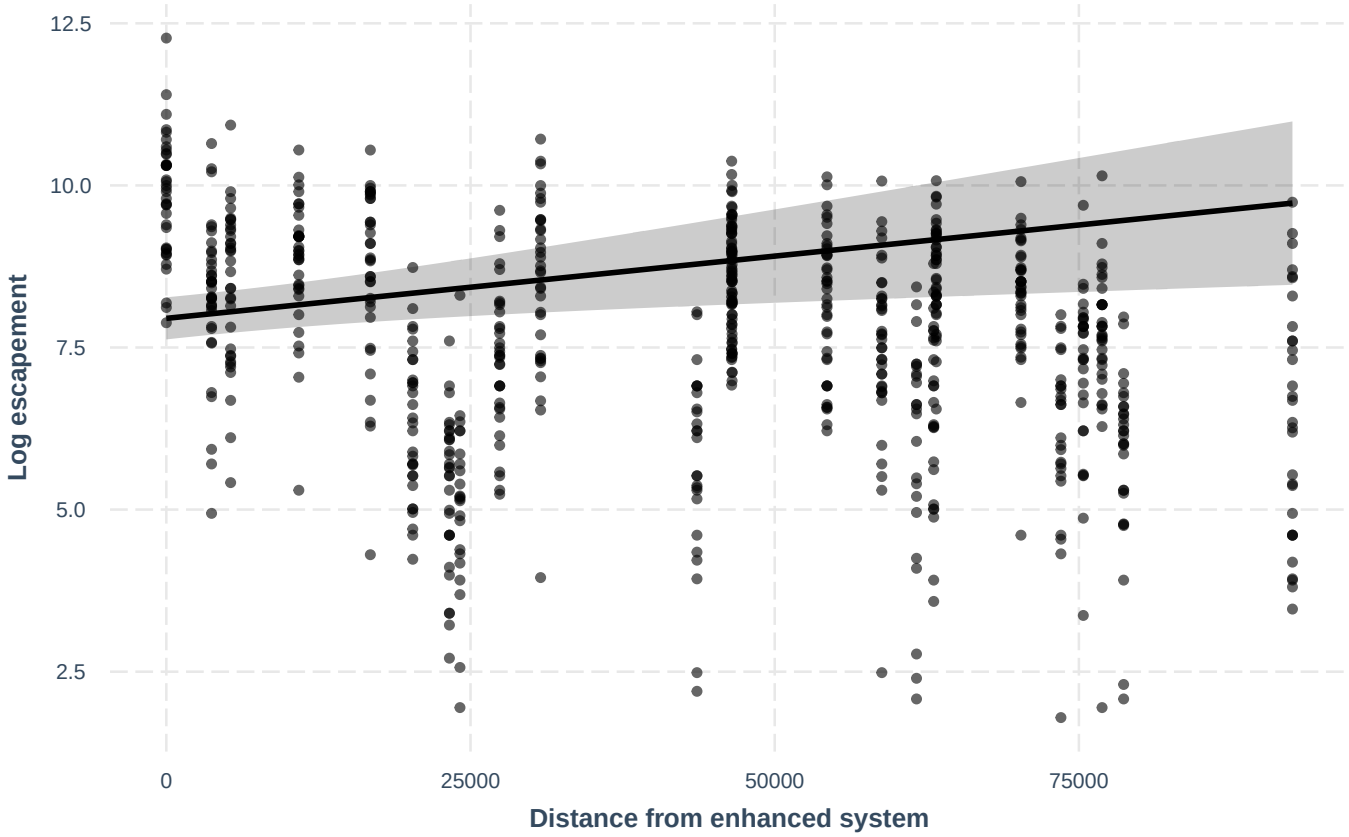


Figure 31: Effects plots of Escapement by distance from enhancement

Effects plot of escapement by total hatchery releases

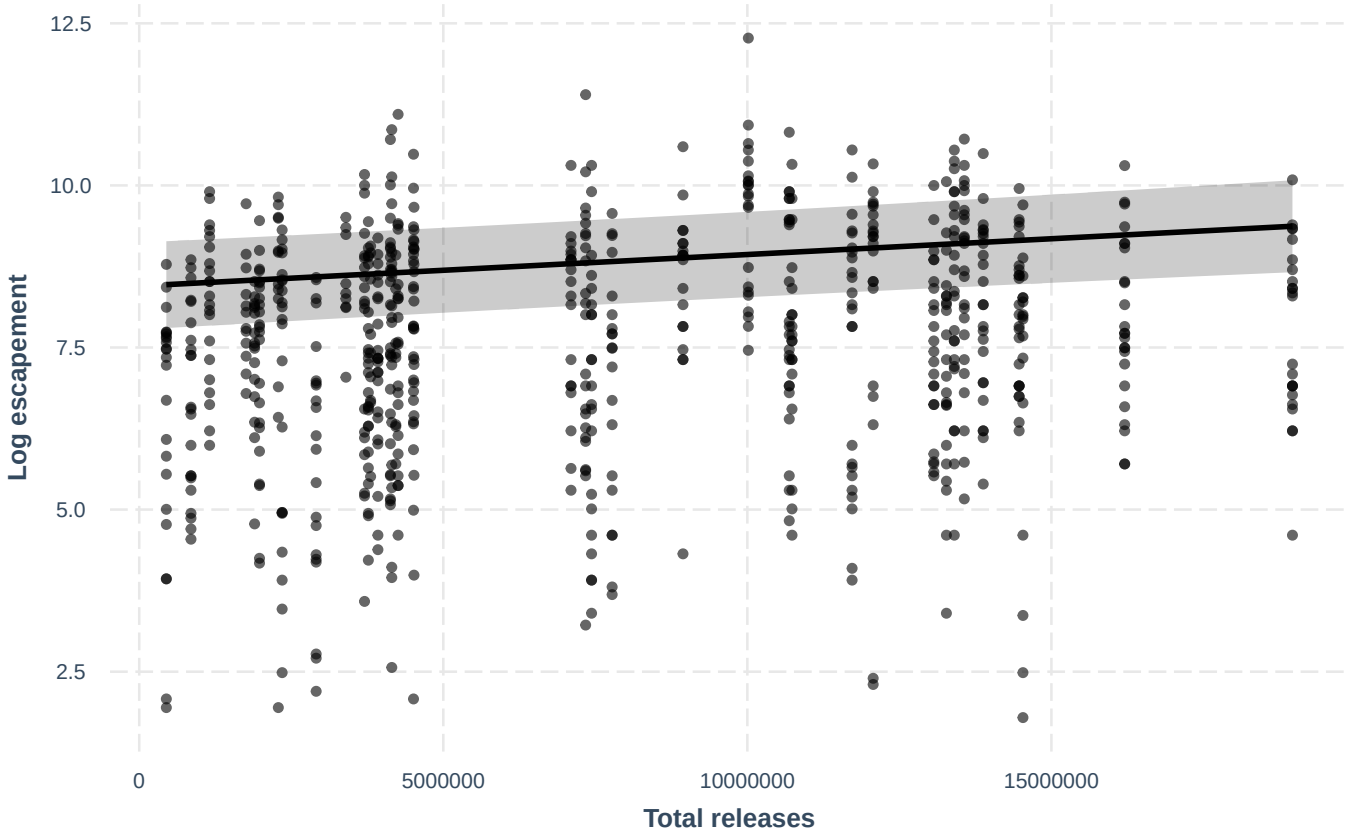


Figure 32: Effects plots of Escapement by correlation coefficient