Model fitting script for meta-analysis

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Contents

Summary

In this version rows with SD = 0 are kept, and resulting weights are manually assigned to be able to keep these rows in further analysis.

This script is used to run statistics on the meta-analyis effect size data. First data is loaded and some variables are re-factored (e.g. slicedepth). Focusing on organic carbon measures and chl a as variables of interest, we first assess the significance of the effects individual predictor variables (factors and continuous) may have on the log response ratios found in different studies. Then, we determine the best predictive models for the different sets of observations using two methodologies: stepwise model selection and multimodel predictions. Throughout this data exploration the observations on OC and chl are divided into different subsets: the immediate response (=< 24 h after disturbance), recovery (all known times) and all available data (contains observations where time since last disturbance is unknown).

Throughout this document some code is shown, some not, for legibility purposes.

First, wilcoxon tests on all data subsets indicate a statistically significant difference of the mean lnRR to 0, with estimates all below 0 (ranging from -0.134 to -0.234). Meaning that, throughout our dataset, the response to trawling is a decrease in TOC and Chl a.

Below, the significant/non-significant predictors are mentioned for each tested subset of data. The full results can be found further below.

OCshort

- sOC: Significant difference in means for habitat type: lower lnRR in mud.
- sOCcont: significant variables are current velocity, and surface pp.
- Best model stepwise: current velocity + habitat type + bottom water oxygen.
- Best model multimodel: current velocity.

OC recovery

- rOC: No statistical significant differences in means of factor levels.
- rOCcont: Significant linear correlation with current velocity, hours fished, surface pp.

- Best model stepwise: current velocity + slice-depth.
- Best model multimodel: current velocity.

OC all data

- aOC: No statistically significant differences in means of factor levels.
- aOCcont: Significant linear correlation with current velocity, hours fished, water depth, surface pp. These predictors (barring hours fished) are also significantly correlated, cannot use all in model fitting.
- Best model stepwise: current velocity, habitat type, water depth, bottom water O2.
- Best model multimodel: urrent velocity, habitat type, water depth, bottom water O2, season.

CHshort

- sCH: Significant difference in means for season: higher lnRR in winter.
- sCHcont: significant variable is surface pp.
- Best model stepwise: current velocity + surface pp + hours fished.
- Best model multimodel: water depth + surface pp + hours fished.

CH recovery

- rCH: Significant factor effects for slice depth, historically fished, and habitat type.
- rCHcont: Significant linear correlation with current velocity, surface pp, O2 bottom water, distance to shore.
- Best model stepwise: slice-depth + water depth + bottom water O2 + surface pp + time since trawling.
- Best model multimodel: time since trawling (low r2: 8.15%, 2nd best model selected 27%).
- 2nd model multimodel: habitat type + water depth + surface pp + bottom water O2 + distance to shore.

CH all data

- aCH: Significant factor effects for slice depth and habitat type.
- aCHcont: Significant linear correlation with current velocity and surface pp.
- Best model stepwise: slice-depth + water depth + habitat type + current velocity + water depth + O2 bottom water.
- Best model multimodel: slice-depth + water depth + habitat type + current velocity + O2 bottom water

Read data / subsetting

Read and change title

Input functions for plots and calculations - shows edits to the original effect size dataframe (df) which includes combining certain categories, and fixing details for individual studies.

```
# load("../r_objects/Exp-Obs.rda")
# get(load("../dataset/dataset.rdata"))
load("../r_objects/Exp-Obs_041122.rda")

# Edit column names for to facilitate modelling.
```

```
colnames(df)[colnames(df) == "Response.variable"]                     <- "respvar"
colnames(df)[colnames(df) == "Sample.core.depth.slice"]               <- "slicedepth"
colnames(df)[colnames(df) == "Study.type"]                            <- "stype"
colnames(df)[colnames(df) == "Harmonized_study.type"]                 <- "hstype"
colnames(df)[colnames(df) == "Water.depth..m."]                       <- "watdepth"
colnames(df)[colnames(df) == "Trawling.effort_numerical_harmonized"]  <- "heffortnum"
colnames(df)[colnames(df) == "Trawling_effort_GFW"]                   <- "effortGFW"
colnames(df)[colnames(df) == "Model_Chl_bottom..mg.m3"]               <- "chlabot"
colnames(df)[colnames(df) == "Model_Current_velocity..m.s."]          <- "cvel"
colnames(df)[colnames(df) == "Model_Dissolved_Oxygen..mol.m3."]       <- "O2bot"
colnames(df)[colnames(df) == "Model_NO3_bottom..mol.m3."]             <- "nitbot"
colnames(df)[colnames(df) == "Model_PO4_bottom..mol.m3."]             <- "phosbot"
colnames(df)[colnames(df) == "Model_Sal_bottom"]                      <- "salbot"
colnames(df)[colnames(df) == "Model_Silicate_bottom..mol.m3."]        <- "silbot"
colnames(df)[colnames(df) == "Model_Temp_bottom"]                     <- "tempbot"
colnames(df)[colnames(df) == "Model_NPP_surface..g.m3.day."]          <- "nppsurf"
colnames(df)[colnames(df) == "dist_shore..m."]                        <- "shoredist"
colnames(df)[colnames(df) == "Time.since.trawl..days."]               <- "timesincetrawl"
colnames(df)[colnames(df) == "Time.since.first.disturbance..years."]  <- "timefirstdist"
colnames(df)[colnames(df) == "Habitat.type_harmonized"]               <- "hhabtype"
colnames(df)[colnames(df) == "Seasonality_harmonized"]                <- "hseason"
colnames(df)[colnames(df) == "Trawling.gear.type_harmonized"]         <- "gear"
colnames(df)[colnames(df) == "Historically.fished"]                   <- "histfished"
colnames(df)[colnames(df) == "Trawling.effort_categorical"]           <- "effortcat"
colnames(df)[colnames(df) == "Trawling.effort_units_harmonized"]      <- "heffortunits"
colnames(df)[colnames(df) == "Control_historically_trawled"]          <- "CTRLhisttrawled"
```

Refactoring slicedepth

```
# Refactoring data: combining categories

## Depth slices --> I think there's still something wrong here.
## I'm going with 0-1, 1-2, 2-5, 5-10, 10+ as classes for lowest common denominator.
## For the categories 0-x it is more difficult but al least the number of categories has been
## brought down drastically already.
df$sslicedepth <- df$slicedepth
df$sslicedepth[df$sslicedepth=="0-0.3"]   = "0-1"
df$sslicedepth[df$sslicedepth=="0-0.5"]   = "0-1"
df$sslicedepth[df$sslicedepth=="0-1"]     = "0-1"
df$sslicedepth[df$sslicedepth=="0.5-1"]   = "0-1"
df$sslicedepth[df$sslicedepth=="Surface"] = "0-1"

df$sslicedepth[df$sslicedepth=="1-1.5"] = "1-2"
df$sslicedepth[df$sslicedepth=="1.5-2"] = "1-2"
df$sslicedepth[df$sslicedepth=="1-3"]   = "1-2" #ranks

df$sslicedepth[df$sslicedepth=="2-2.5"] = "2-5"
df$sslicedepth[df$sslicedepth=="2.5-3"] = "2-5"
df$sslicedepth[df$sslicedepth=="2-3"]   = "2-5"
df$sslicedepth[df$sslicedepth=="3-4"]   = "2-5"
df$sslicedepth[df$sslicedepth=="4-5"]   = "2-5"
```

```
df$sslicedepth[df$sslicedepth=="3-5"]   = "2-5"
df$sslicedepth[df$sslicedepth=="3-3.5"] = "2-5"
df$sslicedepth[df$sslicedepth=="3.5-4"] = "2-5"
df$sslicedepth[df$sslicedepth=="4-4.5"] = "2-5"
df$sslicedepth[df$sslicedepth=="4.5-5"] = "2-5"
df$sslicedepth[df$sslicedepth=="2-4"]   = "2-5"
df$sslicedepth[df$sslicedepth=="4-6"]   = "2-5"

df$sslicedepth[df$sslicedepth=="5-6"]  = "5-10"
df$sslicedepth[df$sslicedepth=="6-7"]  = "5-10"
df$sslicedepth[df$sslicedepth=="7-8"]  = "5-10"
df$sslicedepth[df$sslicedepth=="8-9"]  = "5-10"
df$sslicedepth[df$sslicedepth=="9-10"] = "5-10"
df$sslicedepth[df$sslicedepth=="5-7"]  = "5-10"
df$sslicedepth[df$sslicedepth=="7-9"]  = "5-10"
df$sslicedepth[df$sslicedepth=="7-10"] = "5-10"
df$sslicedepth[df$sslicedepth=="5-10"] = "5-10"
df$sslicedepth[df$sslicedepth=="4-8"]  = "5-10"
df$sslicedepth[df$sslicedepth=="6-10"] = "5-10"

df$sslicedepth[df$sslicedepth=="10-11"] = "10+"
df$sslicedepth[df$sslicedepth=="11-12"] = "10+"
df$sslicedepth[df$sslicedepth=="12-13"] = "10+"
df$sslicedepth[df$sslicedepth=="13-14"] = "10+"
df$sslicedepth[df$sslicedepth=="14-15"] = "10+"
df$sslicedepth[df$sslicedepth=="15-16"] = "10+"
df$sslicedepth[df$sslicedepth=="16-17"] = "10+"
df$sslicedepth[df$sslicedepth=="17-18"] = "10+"
df$sslicedepth[df$sslicedepth=="18-19"] = "10+"
df$sslicedepth[df$sslicedepth=="19-20"] = "10+"
df$sslicedepth[df$sslicedepth=="20-21"] = "10+"
df$sslicedepth[df$sslicedepth=="21-22"] = "10+"
df$sslicedepth[df$sslicedepth=="22-23"] = "10+"
df$sslicedepth[df$sslicedepth=="23-24"] = "10+"
df$sslicedepth[df$sslicedepth=="24-25"] = "10+"
df$sslicedepth[df$sslicedepth=="25-26"] = "10+"
df$sslicedepth[df$sslicedepth=="26-27"] = "10+"
df$sslicedepth[df$sslicedepth=="27-28"] = "10+"
df$sslicedepth[df$sslicedepth=="28-29"] = "10+"
df$sslicedepth[df$sslicedepth=="29-30"] = "10+"
df$sslicedepth[df$sslicedepth=="30-31"] = "10+"
df$sslicedepth[df$sslicedepth=="31-32"] = "10+"
df$sslicedepth[df$sslicedepth=="32-33"] = "10+"
df$sslicedepth[df$sslicedepth=="33-34"] = "10+"
df$sslicedepth[df$sslicedepth=="34-35"] = "10+"
df$sslicedepth[df$sslicedepth=="35-36"] = "10+"
df$sslicedepth[df$sslicedepth=="36-37"] = "10+"
df$sslicedepth[df$sslicedepth=="37-38"] = "10+"
df$sslicedepth[df$sslicedepth=="38-39"] = "10+"
df$sslicedepth[df$sslicedepth=="39-40"] = "10+"
df$sslicedepth[df$sslicedepth=="40-41"] = "10+"
df$sslicedepth[df$sslicedepth=="41-42"] = "10+"
df$sslicedepth[df$sslicedepth=="42-43"] = "10+"
```

```
df$sslicedepth[df$sslicedepth=="10-12"] = "10+"
df$sslicedepth[df$sslicedepth=="10-15"] = "10+"
df$sslicedepth[df$sslicedepth=="15-20"] = "10+"

df$sslicedepth[df$sslicedepth=="Grab sample"] = "0-5"
df$sslicedepth[df$sslicedepth=="Full core"]   = "0-5"

# Other edits (Sarah suggests not removing these).
# df = df[-c(659:670),]  # remove 1cm sediment samples from Tiano et al 2022 as 1-10 cm used for analys
```

Subsetting

We subset the dataset:

- short: immediate trawling impact measurements: =< 1 day impact assessment.
- recovery: trawling + recovery for all known trawling times.
- All: all samples
- UN: unknown sampling time since trawl ==> Not used in the end.

The logic of subsetting is to facilitate making regressions with different known times.

- Short term is considered as assessed within 1 day of disturbing.
- Recovery is a more long-term assessment.
- all is all data, and in this dataset we do not focus on recovery time.

Retrieve data (to skip above steps)

Summary statistics

```
a <- wilcox.test(OCshort$lnRR, mu = 0, conf.int = TRUE)
b <- wilcox.test(OCrec$lnRR, mu = 0, conf.int = TRUE)
c <- wilcox.test(OCall$lnRR, mu = 0, conf.int = TRUE)

d <- wilcox.test(CHshort$lnRR, mu = 0, conf.int = TRUE)
e <- wilcox.test(CHrec$lnRR, mu = 0, conf.int = TRUE)
f <- wilcox.test(CHall$lnRR, mu = 0, conf.int = TRUE)

wttable <- data.frame("difference means" = c(a$estimate,b$estimate, c$estimate, d$estimate, e$estimate,
                      "pvalue" = c(a$p.value, b$p.value, c$p.value, d$p.value, e$p.value, f$p.value))

row.names(wttable) <- c("OC-short", "OC-recovery", "OC-all",
                        "CH-short", "CH-recovery", "CH-all")

knitr::kable(wttable, caption = "Results Wilcox test")
```

Table 1: Results Wilcox test

	difference.means	pvalue
OC-short	-0.1375264	4.7e-05
OC-recovery	-0.1376721	1.0e-07
OC-all	-0.1632601	0.0e+00
CH-short	-0.2343957	3.4e-06
CH-recovery	-0.1605023	1.1e-06
CH-all	-0.1342354	1.1e-05

Note on use of rma.uni with the full dataset:

- Restricted maximum likelihood estimator (REML) is used as it is apparently the most robust estimator for our type of data, and it can deal with our instances where VarLnRR = 0.
  - However it gives a warning, and it cannot perform the QE test or compute Iˆ2 and Hˆ2.
- We stick to a weighted analysis, given previous steps taken to ensure a weight is available.
  - This is the default so no need to specify, however I provide the weights because otherwise they are calculated again without the corrections in 2_EF_calculation.

Factors: - Habitat type - Historically fished - Season - Slice depth

Continuous - Water depth - Fishing effort (h) - Current velocity - Salinity bottom - Oxygen bottom - Time since trawling

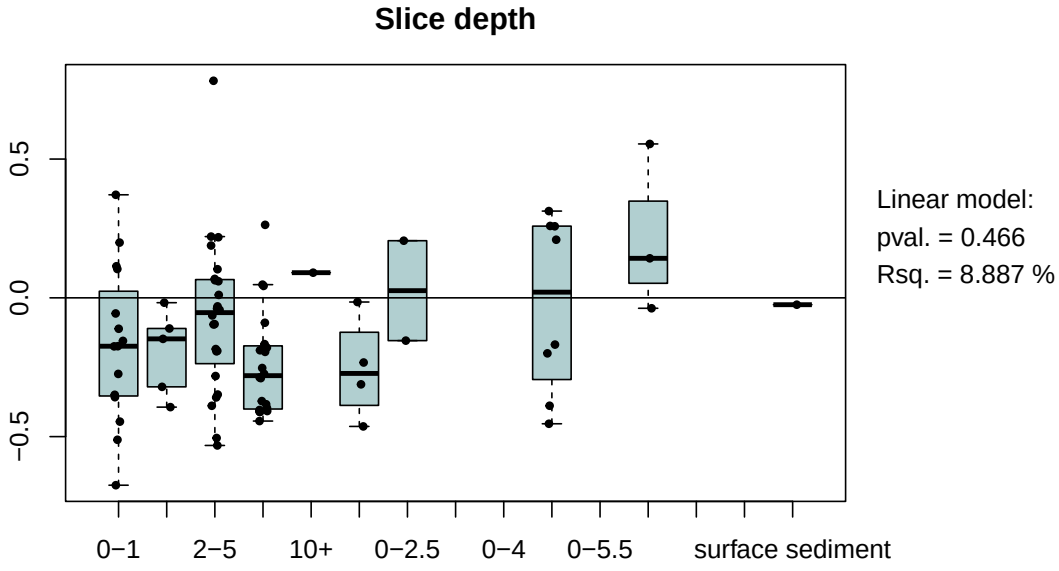
Fitted models overview

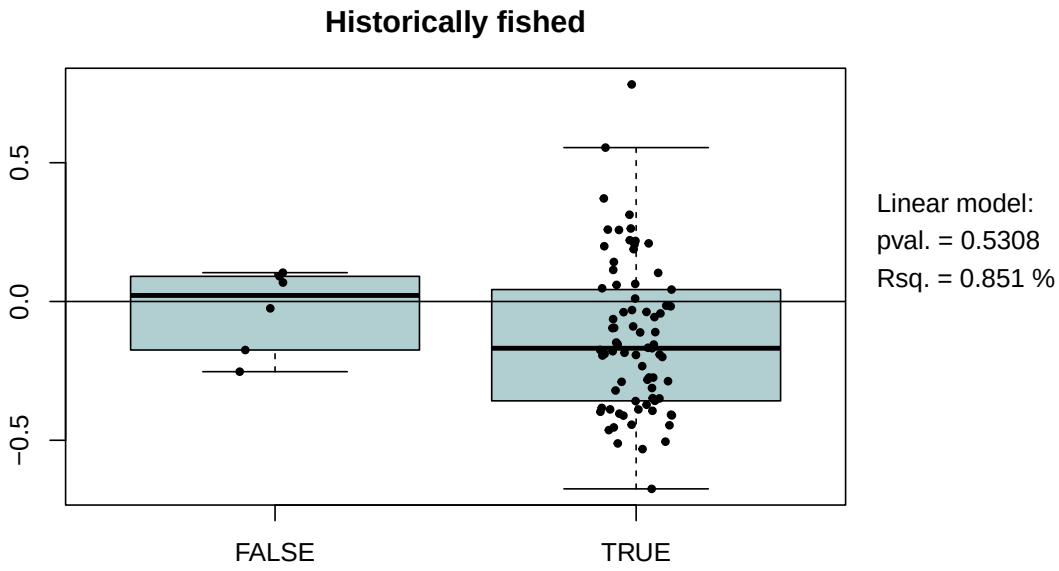
—- MODELLING OC ——

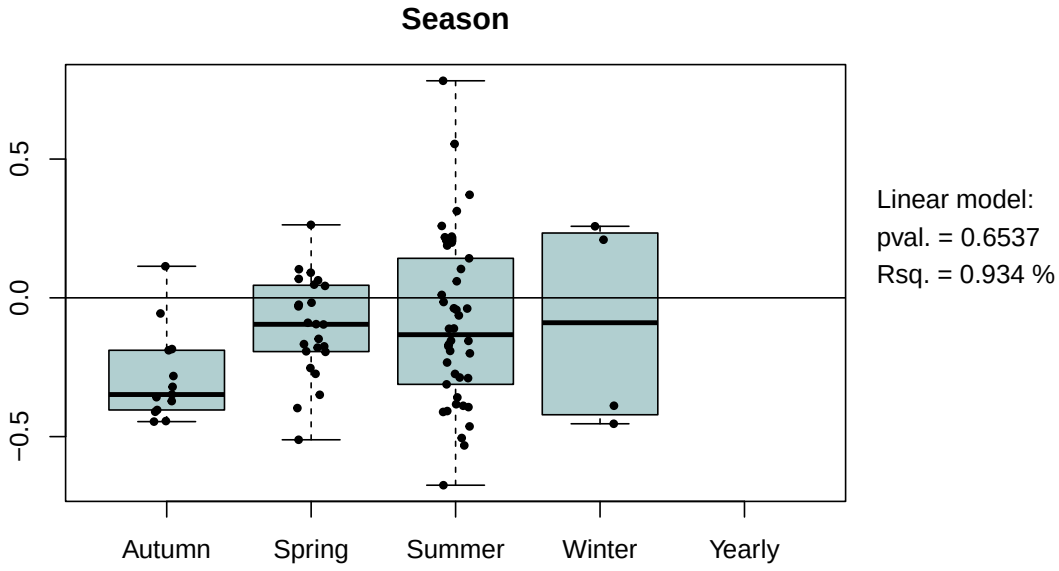
SHORT TERM

Individual variables

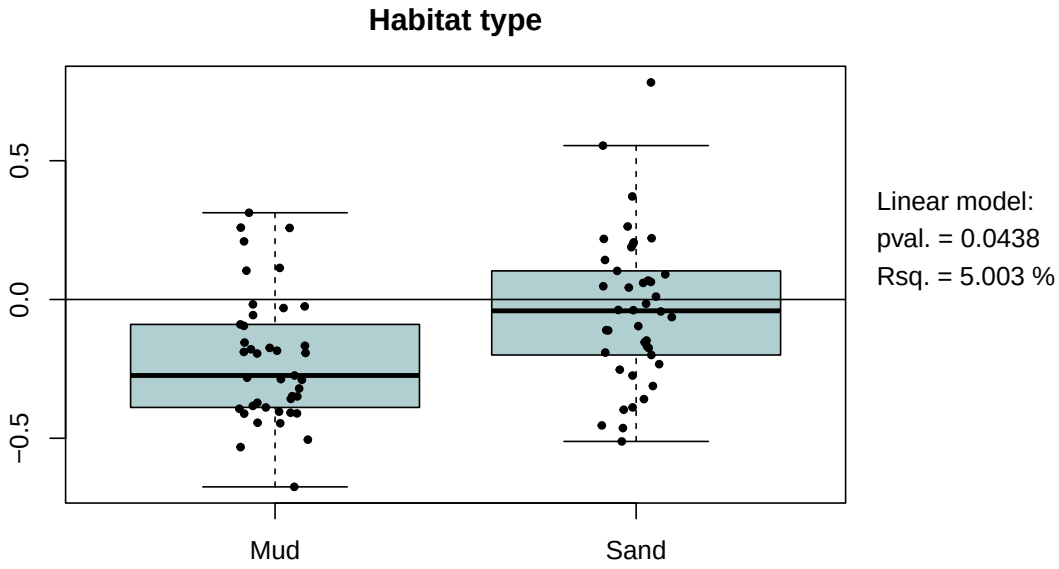
Mods	Rsquared	Pvalue
Slice depth	8.8871831	0.4659583
Historically fished	0.8505775	0.5307506
Season	0.9343762	0.6536957
Sediment	5.0027461	0.0438344


Slice depth
0.5
0.0
−0.5
0−1
2−5
10+
0−2.5
0−4
0−5.5
surface sediment
Linear model:
pval. = 0.466
Rsq. = 8.887 %


Historically fished
0.5
0.0
−0.5
FALSE
TRUE
Linear model:
pval. = 0.5308
Rsq. = 0.851 %



Linear model:
pval. = 0.6537
Rsq. = 0.934 %

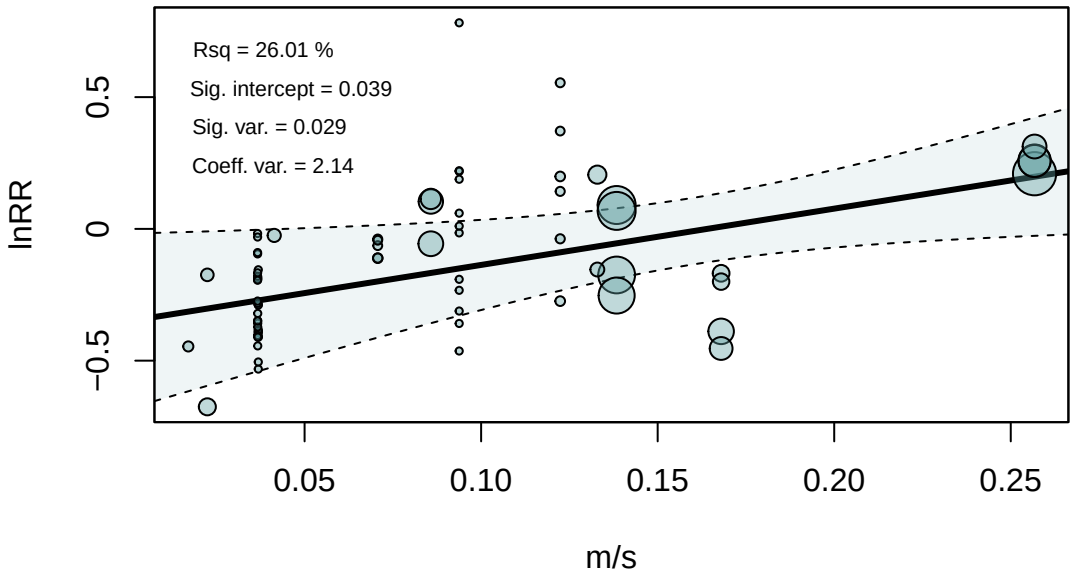


Linear model:
pval. = 0.0438
Rsq. = 5.003 %

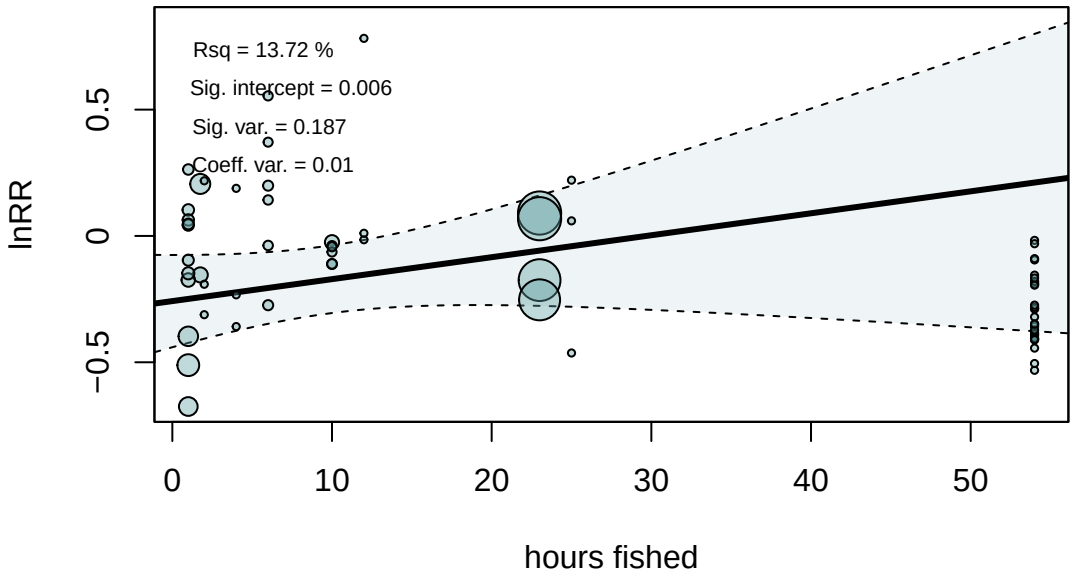
Continuous variables

Mods	Rsquared	Pvalue
Current velocity	26.011224	0.0291809
Hours fished	13.723416	0.1869533
Depth	20.676006	0.6103524
NPP surf.	11.188113	0.0636054
O2 bottom	13.733671	0.4383260
Dist. shore	4.033551	0.6187014

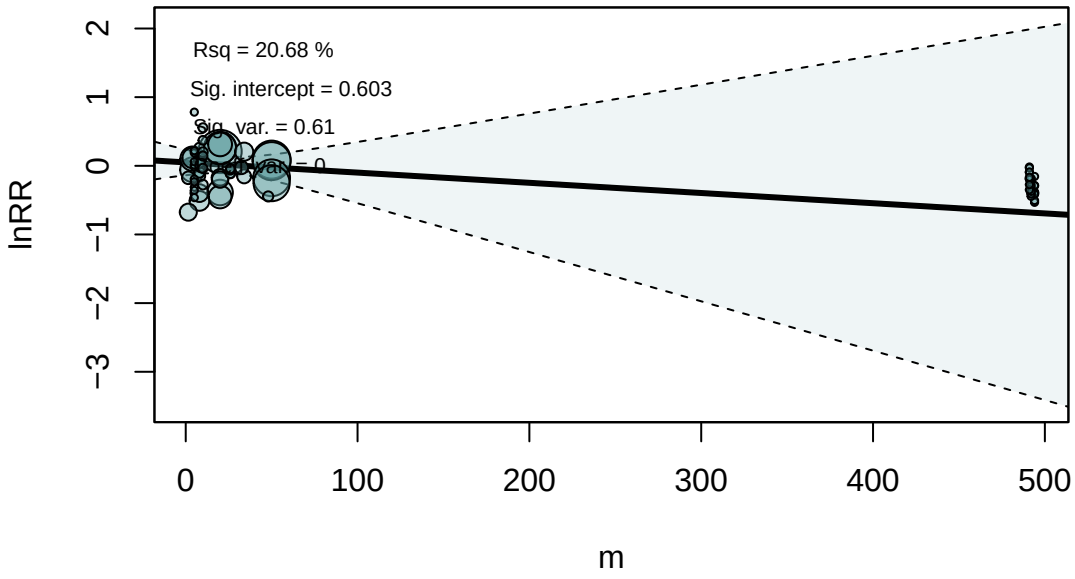
Current velocity



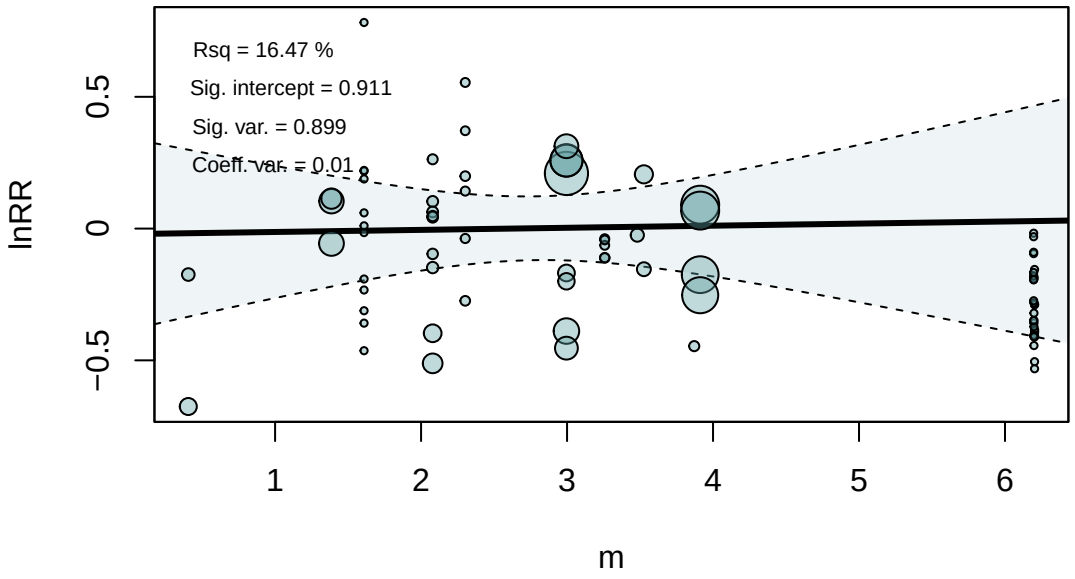
Fishing effort



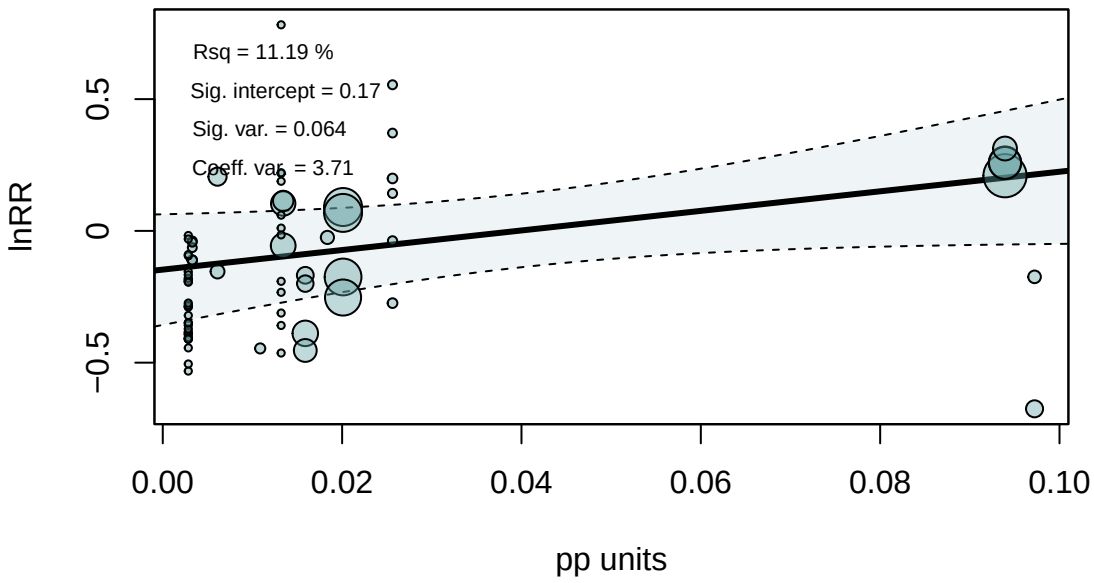
Water depth



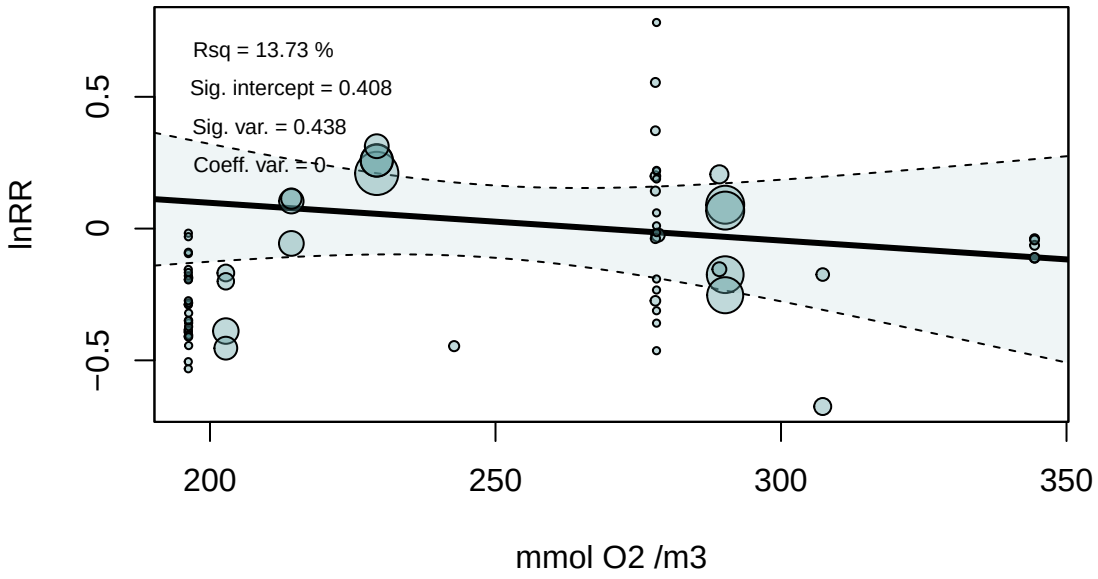
Water depth (log)

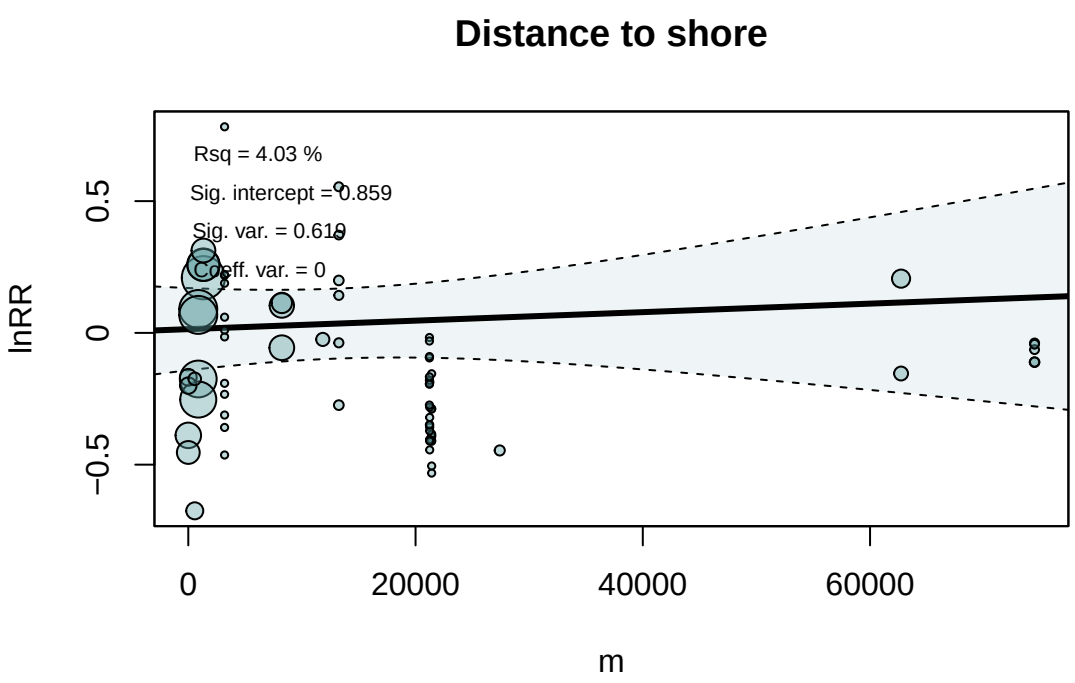


Primary productivity



Bottom water oxygen





Full model selection

–> Cannot use heffortnum, too many datapoints missing and very biased.

OCshort[, c(20, 21, 24, 25, 31, 32)]

Stepwise

```
##
## Mixed-Effects Model (k = 73; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
##  -1.8904    3.7807   13.7807   24.9513   14.7331
##
## tau^2 (estimated amount of residual heterogeneity):     0.0443 (SE = 0.0085)
## tau (square root of estimated tau^2 value):             0.2106
## R^2 (amount of heterogeneity accounted for):            29.90%
##
## Test of Moderators (coefficients 2:4):
## QM(df = 3) = 8.7715, p-val = 0.0325
##
## Model Results:
##
##               estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt        -0.7657  0.4463  -1.7155  0.0863  -1.6405   0.1091  .
## cvel            1.6975  0.8726   1.9454  0.0517  -0.0127   3.4078  .
## hhabtypeSand   -0.2722  0.1147  -2.3726  0.0177  -0.4970  -0.0473  *
## O2bot           0.0025  0.0016   1.5610  0.1185  -0.0006   0.0057
```

```
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Multimodel

Table 4: OC short top 10 models

model	aicc	weights
lnRR ~ 1 + cvel	4.345732	0.4983945
lnRR ~ 1 + cvel + O2bot	7.333117	0.1119105
lnRR ~ 1 + watdepth + nppsurf + heffortnum	7.356191	0.1106268
lnRR ~ 1 + cvel + nppsurf + heffortnum	7.812896	0.0880416
lnRR ~ 1 + cvel + nppsurf	10.084847	0.0282709
lnRR ~ 1 + cvel + nppsurf + O2bot	10.564837	0.0222388
lnRR ~ 1 + hhabtype + watdepth + nppsurf + heffortnum	10.735890	0.0204159
lnRR ~ 1 + histfished + watdepth + nppsurf + heffortnum	10.917300	0.0186456
lnRR ~ 1 + cvel + watdepth + nppsurf + heffortnum	10.999145	0.0178979
lnRR ~ 1 + watdepth + nppsurf + timesincetrawl + heffortnum	11.618164	0.0131336

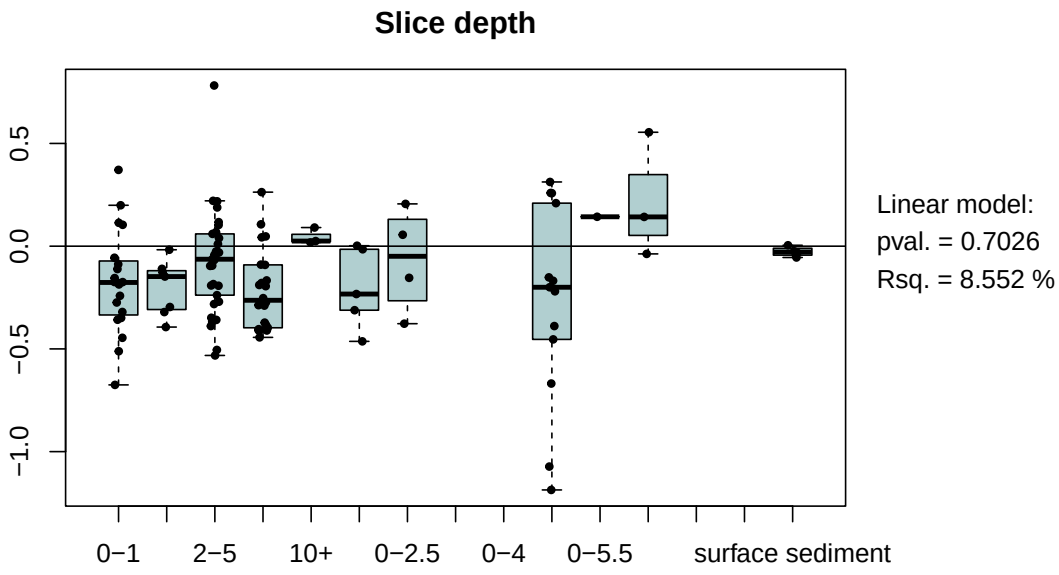
```
##
## Mixed-Effects Model (k = 73; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
##   1.0062   -2.0125    3.9875   10.7756    4.3457
##
## tau^2 (estimated amount of residual heterogeneity):     0.0465 (SE = 0.0088)
## tau (square root of estimated tau^2 value):             0.2155
## R^2 (amount of heterogeneity accounted for):            26.55%
##
## Test of Moderators (coefficient 2):
## QM(df = 1) = 4.8896, p-val = 0.0270
##
## Model Results:
##
##          estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt   -0.3504  0.1673  -2.0947  0.0362  -0.6782  -0.0225  *
## cvel       2.1363  0.9661   2.2112  0.0270   0.2428   4.0298  *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

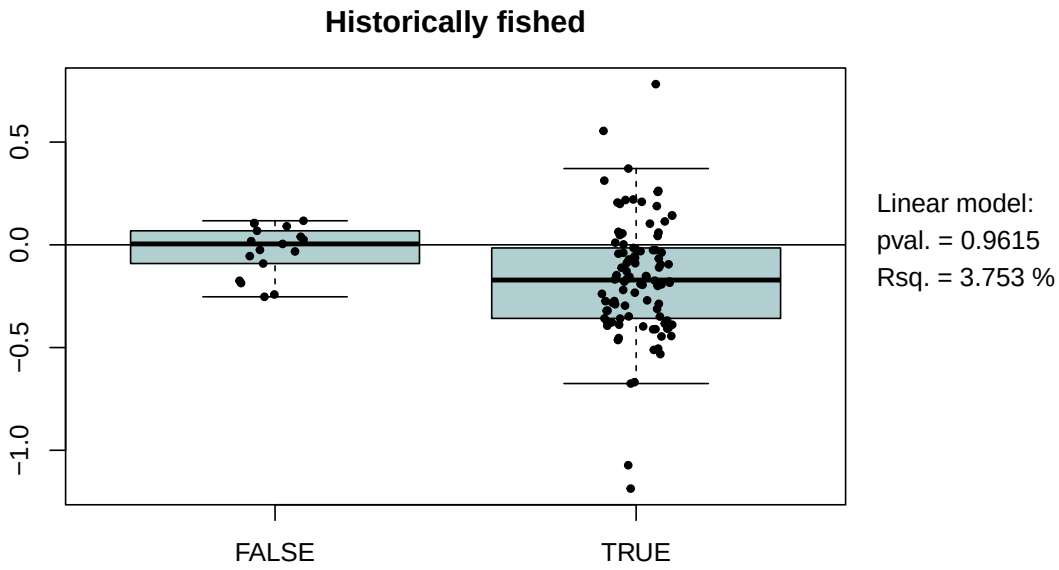
RECOVERY

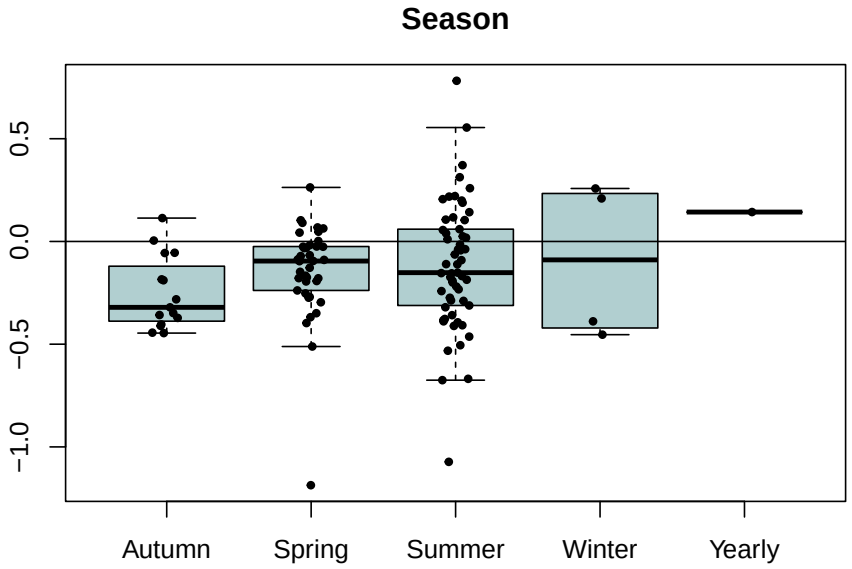
Individual variables

Mods	Rsquared	Pvalue
Slice depth	8.552230	0.7025534
Historically fished	3.753257	0.9614937

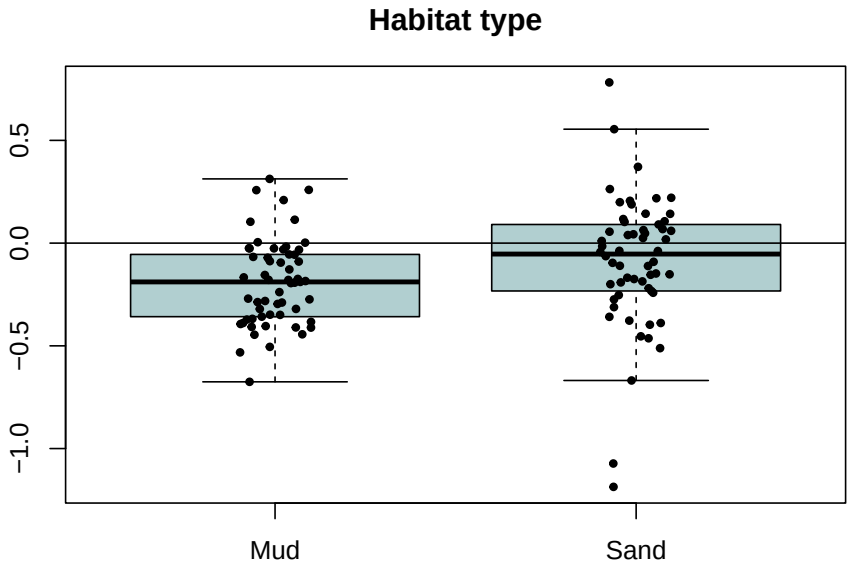
Mods	Rsquared	Pvalue
Season	2.382474	0.9614743
Sediment	6.371300	0.8232132







Linear model:
pval. = 0.9615
Rsq. = 2.382 %

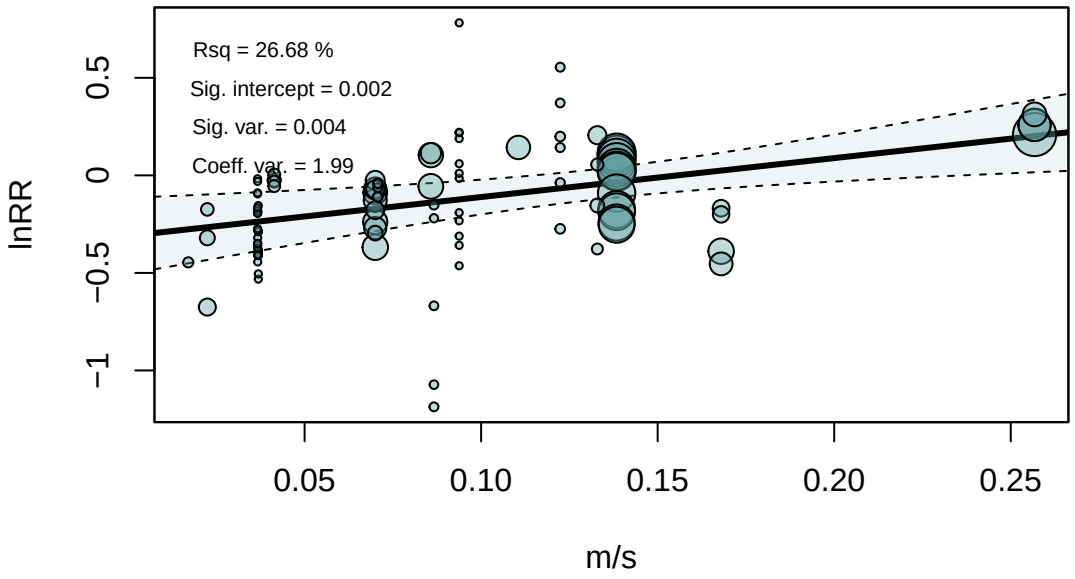


Linear model:
pval. = 0.8232
Rsq. = 6.371 %

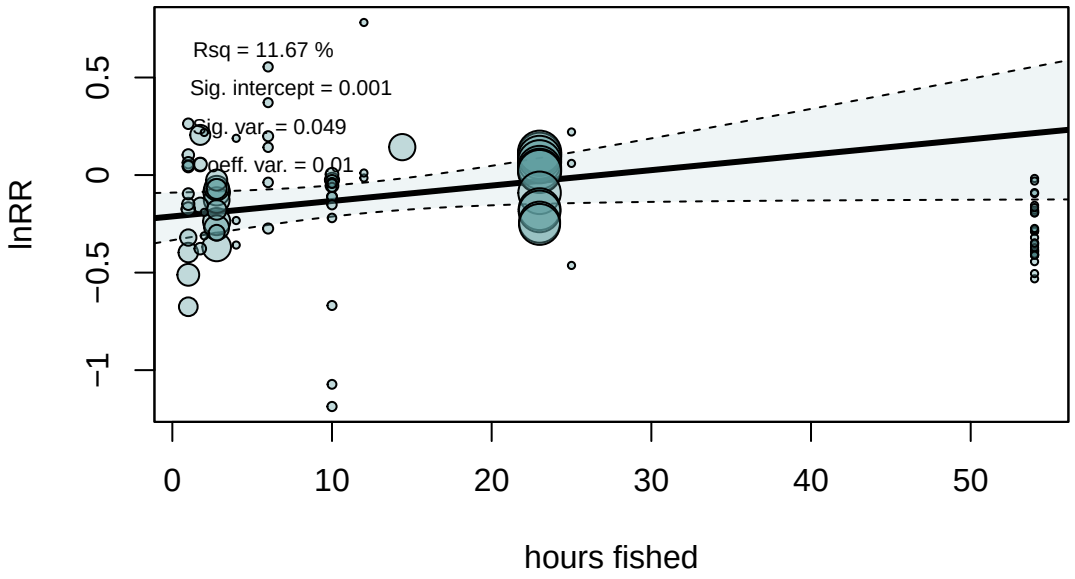
Continuous variables

Mods	Rsquared	Pvalue
Current velocity	26.678411	0.0039208
Hours fished	11.668952	0.0487278
Depth	21.749193	0.8283212
NPP surf.	8.142168	0.0305428
O2 bottom	14.674928	0.9074155
Dist. shore	2.201918	0.5308820

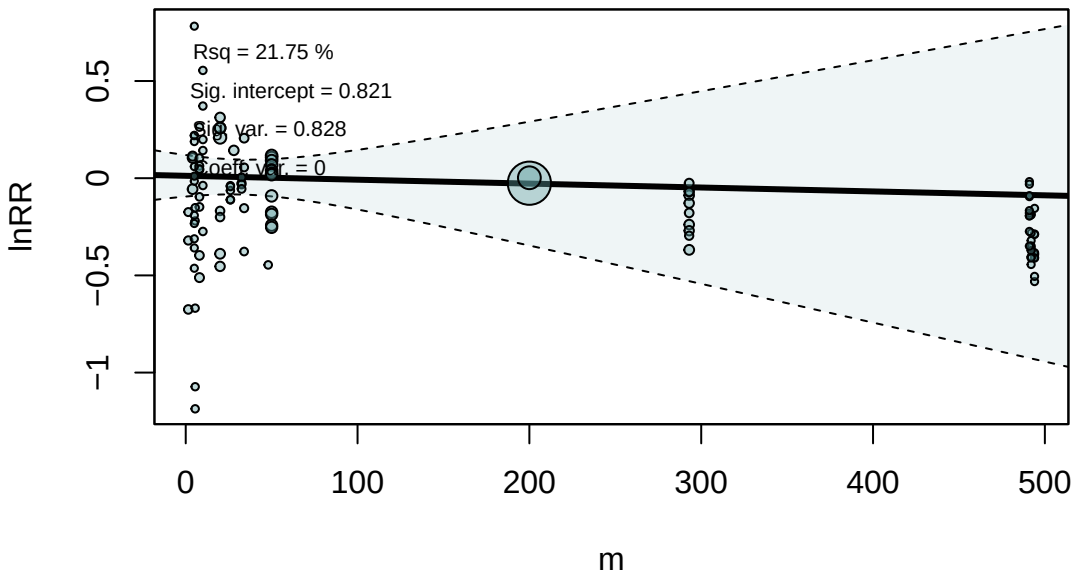
Current velocity



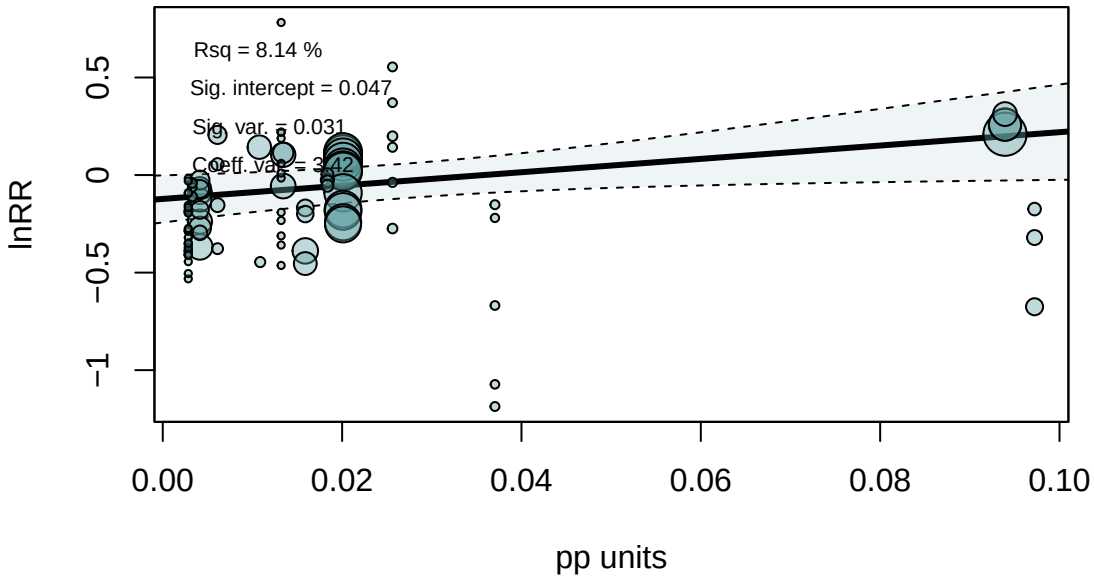
Fishing effort



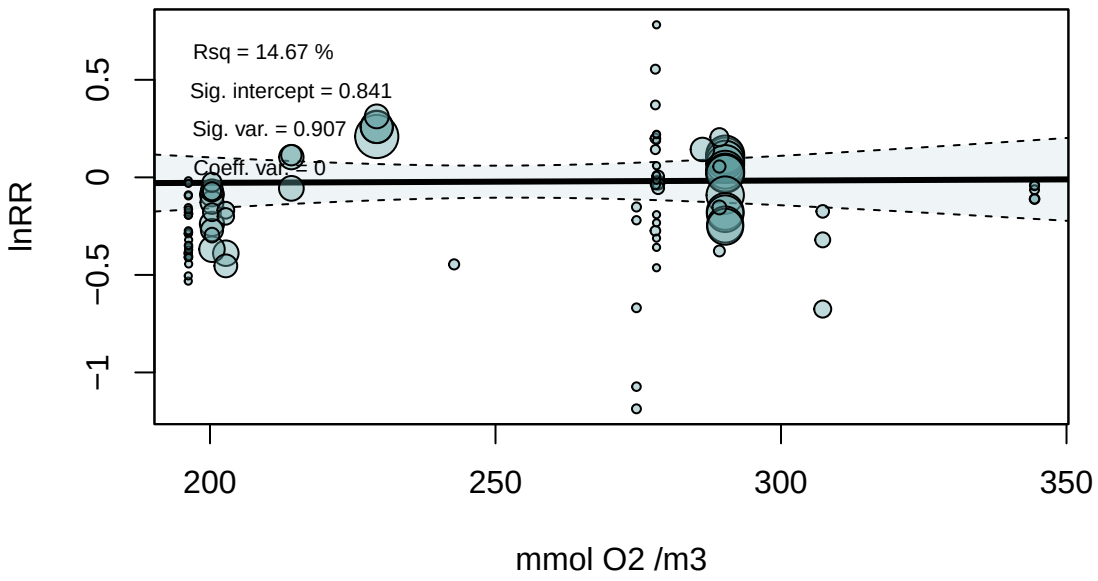
Water depth



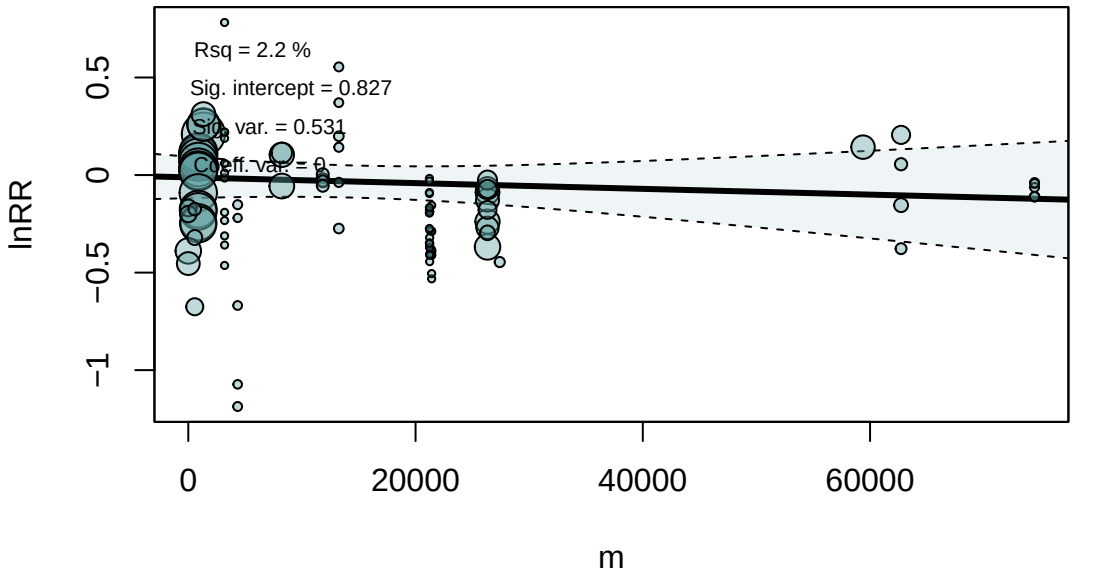
Primary productivity



Bottom water oxygen



Distance to shore



Full model selection

Stepwise

OCrec[, c(8, 20, 21, 24, 25, 31, 32, 35, 36, 87)]

```
##
## Mixed-Effects Model (k = 103; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
##   3.9215   -7.8430   18.1570   50.7981   22.8842
##
## tau^2 (estimated amount of residual heterogeneity):     0.0338 (SE = 0.0059)
## tau (square root of estimated tau^2 value):             0.1838
## R^2 (amount of heterogeneity accounted for):            36.16%
##
## Test of Moderators (coefficients 2:12):
## QM(df = 11) = 27.6103, p-val = 0.0037
##
## Model Results:
##
##                              estimate      se     zval    pval    ci.lb
## intrcpt                       -0.5664  0.1165  -4.8614  <.0001  -0.7948
## cvel                           3.5597  1.0084   3.5301  0.0004   1.5833
## sslicedepth1-2                 0.1579  0.1756   0.8993  0.3685  -0.1863
## sslicedepth2-5                 0.1358  0.1077   1.2610  0.2073  -0.0752
## sslicedepth5-10                0.0021  0.1374   0.0155  0.9877  -0.2672
## sslicedepth10+                 0.1185  0.1373   0.8630  0.3881  -0.1506
## sslicedepth0-2                -0.0232  0.1162  -0.2000  0.8414  -0.2509
## sslicedepth0-2.5               0.1560  0.1565   0.9973  0.3186  -0.1506
## sslicedepth0-5                -0.1687  0.1671  -1.0094  0.3128  -0.4963
## sslicedepth0-5.5               0.3159  0.2063   1.5316  0.1256  -0.0884
## sslicedepth0-10                0.3316  0.2845   1.1657  0.2437  -0.2259
## sslicedepthsurface sediment    0.3924  0.1565   2.5065  0.0122   0.0856
##                                ci.ub
## intrcpt                       -0.3380  ***
## cvel                           5.5361  ***
## sslicedepth1-2                 0.5021
## sslicedepth2-5                 0.3468
## sslicedepth5-10                0.2714
## sslicedepth10+                 0.3876
## sslicedepth0-2                 0.2044
## sslicedepth0-2.5               0.4627
## sslicedepth0-5                 0.1589
## sslicedepth0-5.5               0.7202
## sslicedepth0-10                0.8892
## sslicedepthsurface sediment    0.6992    *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Multimodel

Table 7: OC short top 10 models

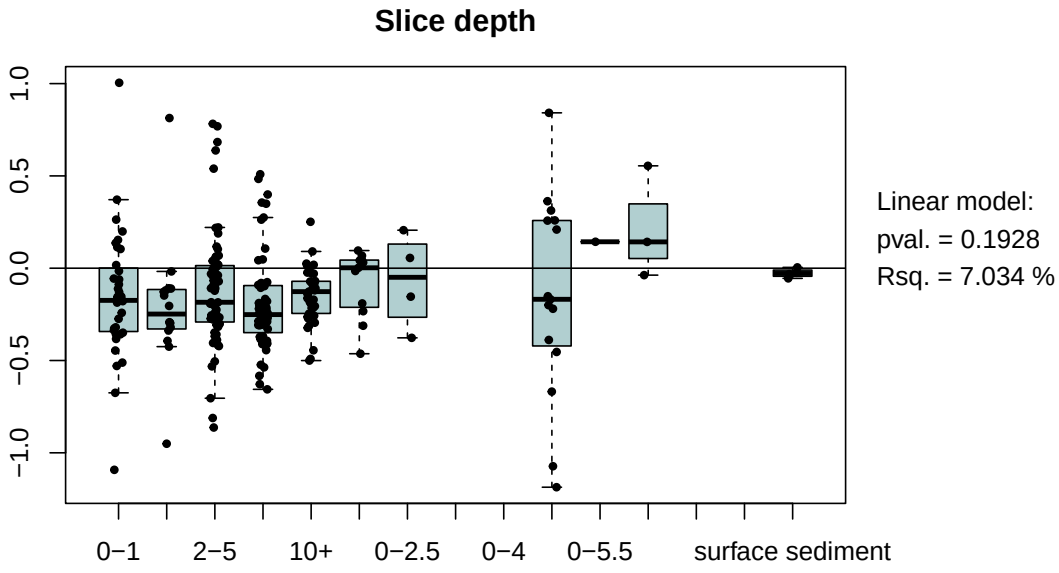
model	aicc	weights
lnRR ~ 1 + cvel	-3.3331003	0.1571226
lnRR ~ 1 + cvel + O2bot	-2.5738338	0.1074895
lnRR ~ 1 + cvel + watdepth	-2.2106048	0.0896379
lnRR ~ 1 + nppsurf + O2bot + heffortnum	-2.0285462	0.0818386
lnRR ~ 1 + hhabtype + nppsurf + heffortnum	-1.3784279	0.0591271
lnRR ~ 1 + hhabtype + cvel + watdepth	-0.8922723	0.0463681
lnRR ~ 1 + cvel + log(timesincetrawl + 1)	-0.8350625	0.0450606
lnRR ~ 1 + histfished + cvel	-0.8279807	0.0449013
lnRR ~ 1 + nppsurf + O2bot + heffortnum + log(timesincetrawl + 1)	-0.7815032	0.0438699
lnRR ~ 1 + cvel + nppsurf + O2bot + heffortnum	-0.5605520	0.0392814

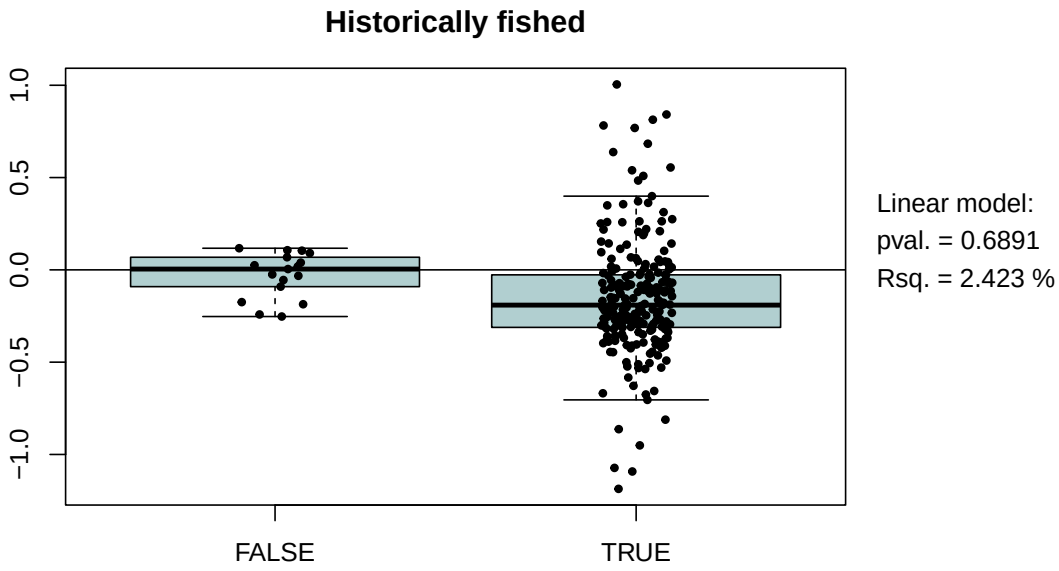
```
##
## Mixed-Effects Model (k = 103; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
##   4.7903   -9.5805   -3.5805    4.2648   -3.3331
##
## tau^2 (estimated amount of residual heterogeneity):     0.0385 (SE = 0.0064)
## tau (square root of estimated tau^2 value):             0.1961
## R^2 (amount of heterogeneity accounted for):            27.30%
##
## Test of Moderators (coefficient 2):
## QM(df = 1) = 8.5415, p-val = 0.0035
##
## Model Results:
##
##          estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt   -0.3106  0.0984  -3.1566  0.0016  -0.5034  -0.1177  **
## cvel       1.9950  0.6826   2.9226  0.0035   0.6571   3.3329  **
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

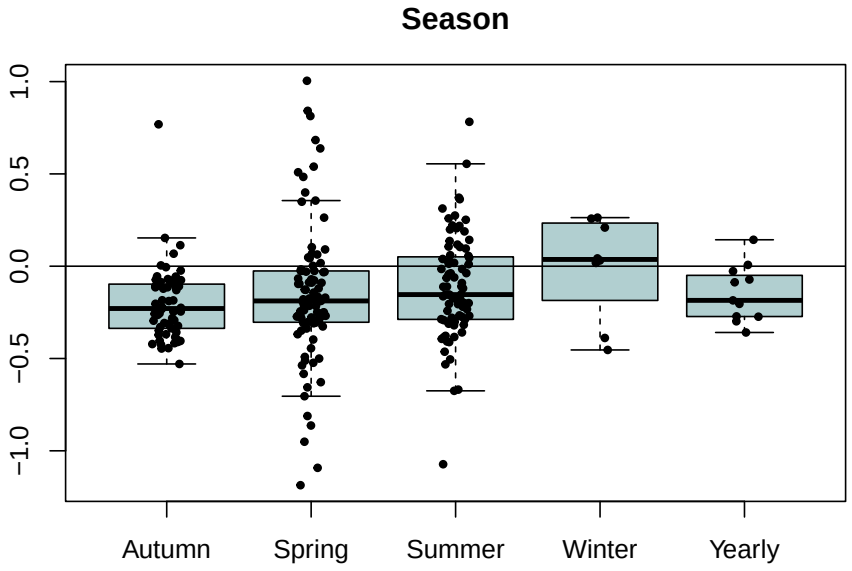
ALL DATA

Individual variables

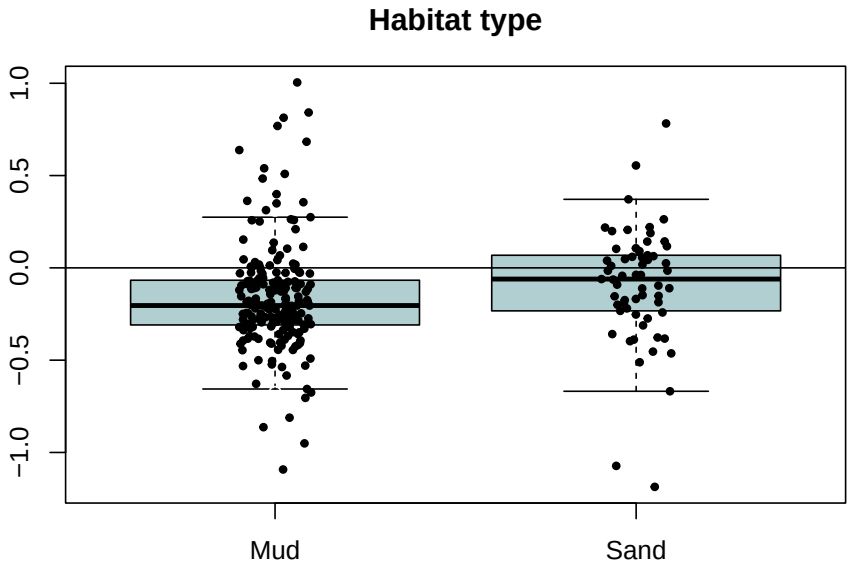
Mods	Rsquared	Pvalue
Slice depth	7.033676	0.1927502
Historically fished	2.423430	0.6891433
Season	4.192325	0.4229664
Sediment	3.963371	0.9153210


Slice depth
1.0
0.5
0.0
−0.5
−1.0
0−1
2−5
10+
0−2.5
0−4
0−5.5
surface sediment
Linear model:
pval. = 0.1928
Rsq. = 7.034 %


Historically fished
1.0
0.5
0.0
−0.5
−1.0
FALSE
TRUE
Linear model:
pval. = 0.6891
Rsq. = 2.423 %



Linear model:
pval. = 0.423
Rsq. = 4.192 %

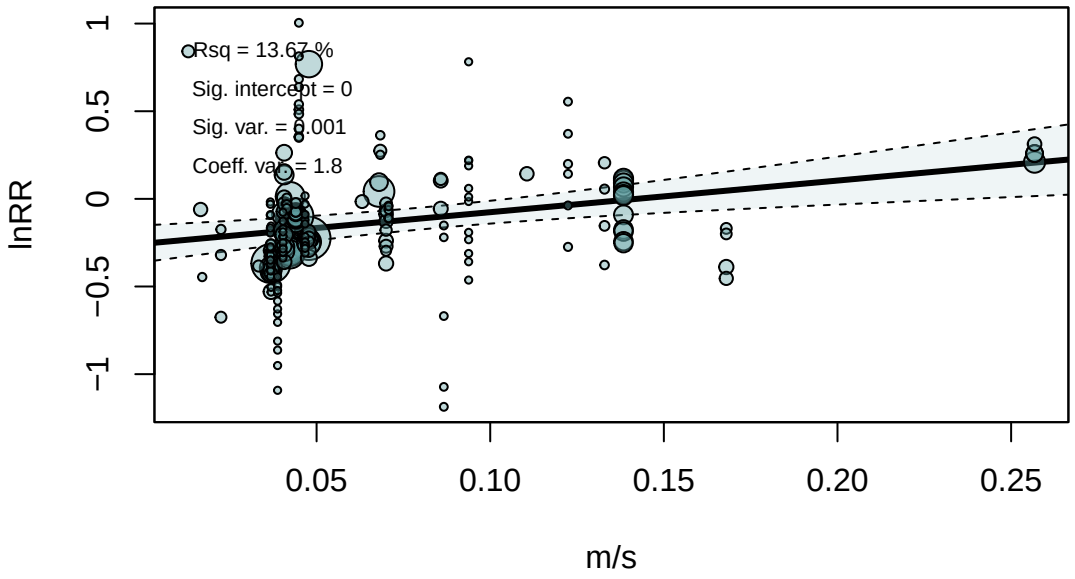


Linear model:
pval. = 0.9153
Rsq. = 3.963 %

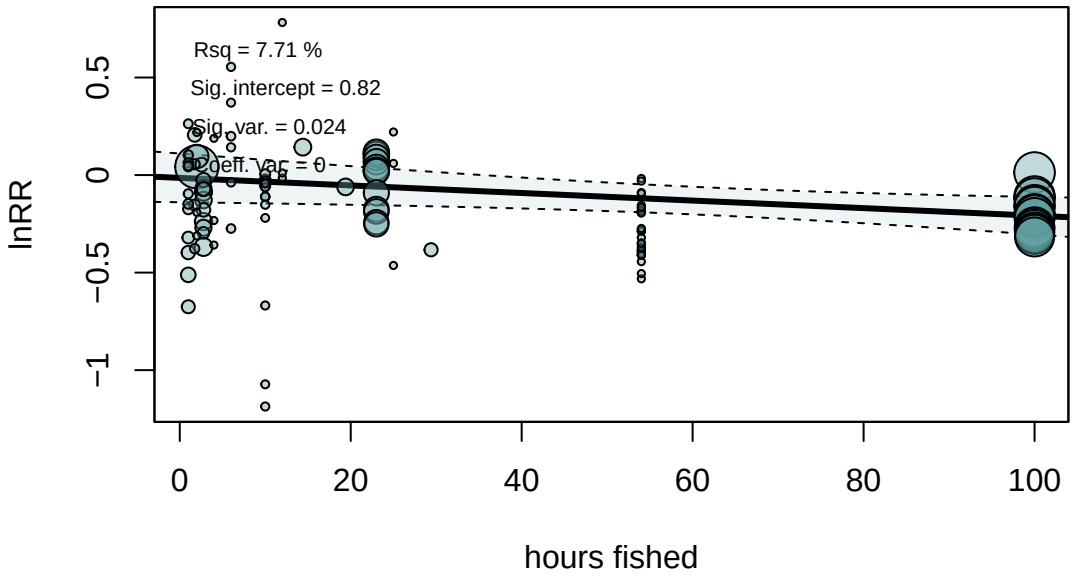
Continuous variables

Mods	Rsquared	Pvalue
Current velocity	13.66514	0.0006080
Hours fished	7.71458	0.0237375
Depth	16.94361	0.0476176
NPP surf.	5.09948	0.0029593
O2 bottom	16.43346	0.1203549
Dist. shore	0.00000	0.4029564

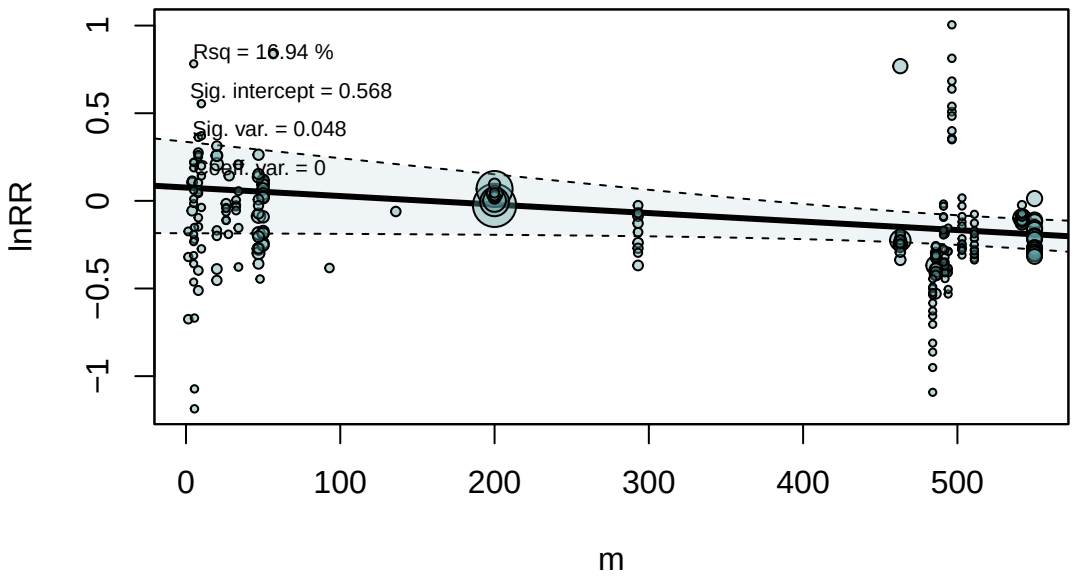
Current velocity



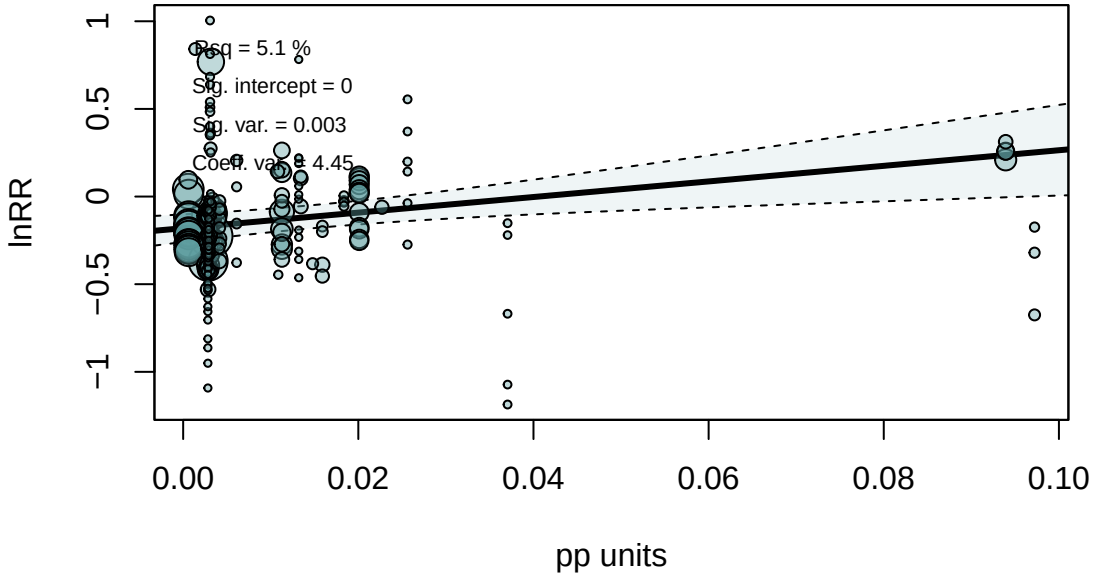
Fishing effort

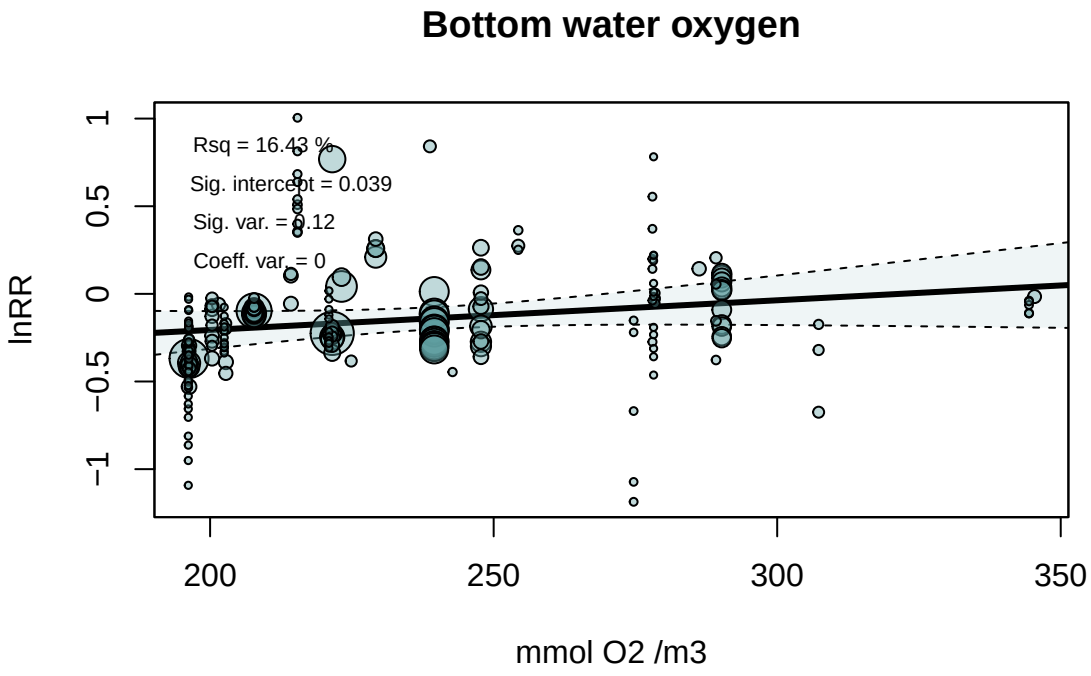


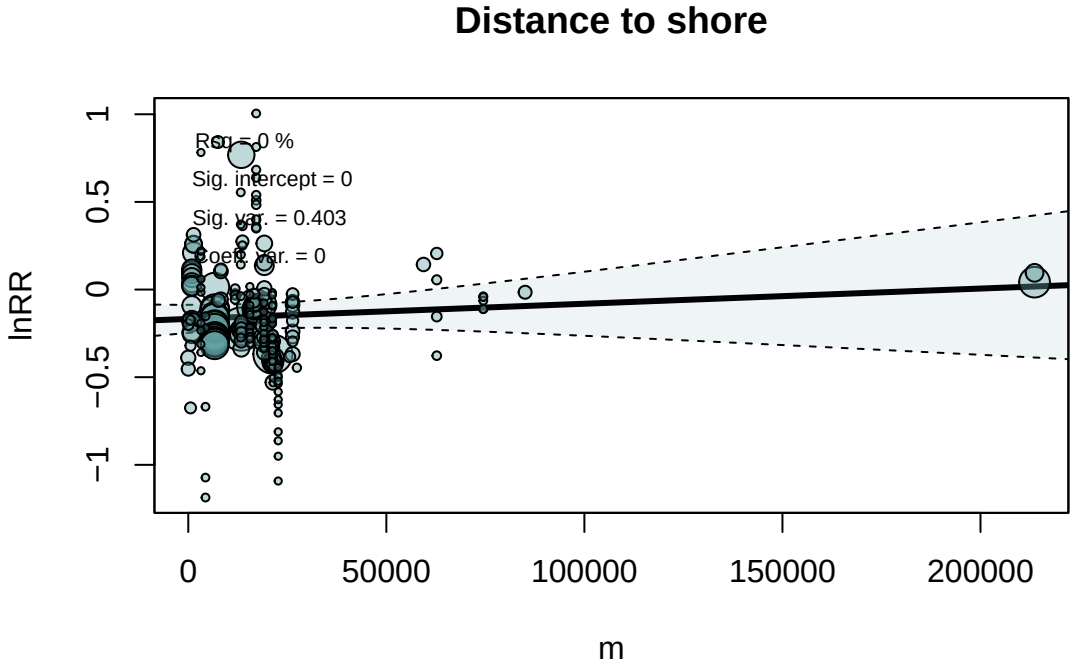
Water depth



Primary productivity








```
##                cvel   watdepth    nppsurf
## cvel       1.0000000 -0.6169198  0.5740851
## watdepth -0.6169198  1.0000000 -0.5460304
## nppsurf   0.5740851 -0.5460304  1.0000000
```

Full model selection

Stepwise

- Not using heffortnum here because there is too much missing data.
- Not using timessincetrawl.
- Not using 167, 111, 185.
- Note, "yearly" as season is a bit strange.
- OCall[, c(8, 20, 21, 24, 25, 31, 32, 35, 36, 87)]

```
##
## Mixed-Effects Model (k = 225; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -20.3151   40.6301   52.6301   72.9919   53.0245
##
## tau^2 (estimated amount of residual heterogeneity):     0.0495 (SE = 0.0053)
## tau (square root of estimated tau^2 value):             0.2224
## R^2 (amount of heterogeneity accounted for):            23.22%
##
## Test of Moderators (coefficients 2:5):
## QM(df = 4) = 13.3799, p-val = 0.0096
##
## Model Results:
##
##               estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt        -0.4012  0.4705  -0.8528  0.3938  -1.3234   0.5209
## cvel            1.6477  0.6807   2.4206  0.0155   0.3135   2.9819  *
## hhabtypeSand   -0.1993  0.1001  -1.9898  0.0466  -0.3955  -0.0030  *
## watdepth       -0.0002  0.0002  -1.1476  0.2511  -0.0006   0.0001
## O2bot           0.0011  0.0018   0.5971  0.5504  -0.0025   0.0047
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Multimodel

Table 10: OC short top 10 models

model	aicc	weights
lnRR ~ 1 + hseason + hhabtype + cvel + watdepth + nppsurf + O2bot	49.00808	0.1811395
lnRR ~ 1 + hhabtype + cvel + watdepth + nppsurf + O2bot	49.11180	0.1719847
lnRR ~ 1 + cvel + O2bot	50.25217	0.0972438
lnRR ~ 1 + hhabtype + cvel + O2bot	51.12693	0.0627930
lnRR ~ 1 + hhabtype + cvel + nppsurf + O2bot	51.16100	0.0617324
lnRR ~ 1 + cvel + O2bot + shoredist	51.73943	0.0462283
lnRR ~ 1 + histfished + hhabtype + cvel + watdepth + nppsurf + O2bot	51.86848	0.0433395
lnRR ~ 1 + histfished + cvel + O2bot	52.23074	0.0361595
lnRR ~ 1 + cvel + nppsurf + O2bot	52.23405	0.0360997
lnRR ~ 1 + histfished + hseason + hhabtype + cvel + watdepth + nppsurf + O2bot	52.28968	0.0351093

```
##
## Mixed-Effects Model (k = 225; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -24.1011   48.2023   68.2023  101.9550   69.2754
##
## tau^2 (estimated amount of residual heterogeneity):     0.0490 (SE = 0.0053)
## tau (square root of estimated tau^2 value):             0.2213
## R^2 (amount of heterogeneity accounted for):            23.96%
##
## Test of Moderators (coefficients 2:9):
## QM(df = 8) = 19.8860, p-val = 0.0108
##
## Model Results:
##
##                estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt         -1.0984  0.6502  -1.6895  0.0911  -2.3727   0.1758  .
## hseasonSpring    0.0159  0.1015   0.1563  0.8758  -0.1830   0.2147
## hseasonSummer   -0.1518  0.1177  -1.2904  0.1969  -0.3824   0.0788
## hseasonWinter   -0.0311  0.1849  -0.1683  0.8664  -0.3935   0.3313
## hseasonYearly   -0.3417  0.1549  -2.2057  0.0274  -0.6454  -0.0381  *
## hhabtypeSand    -0.2504  0.1025  -2.4428  0.0146  -0.4513  -0.0495  *
## cvel             1.0985  0.8992   1.2216  0.2219  -0.6640   2.8610
## watdepth        -0.0004  0.0002  -1.5700  0.1164  -0.0008   0.0001
## O2bot            0.0050  0.0028   1.7954  0.0726  -0.0005   0.0104  .
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

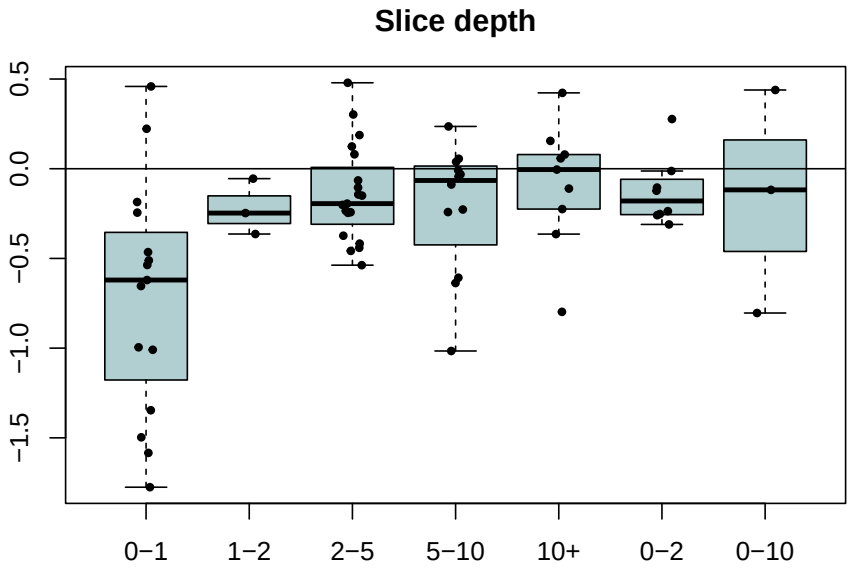
—- MODELLING CHL A ——

SHORT TERM

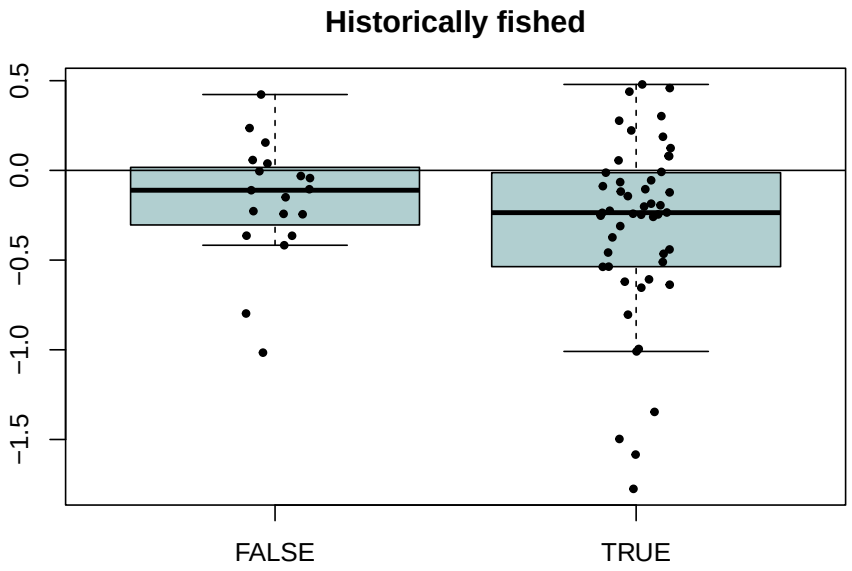
Individual variables

- One observation with VarLnRR > 8 is removed or it does not work with ~sslicedepth.

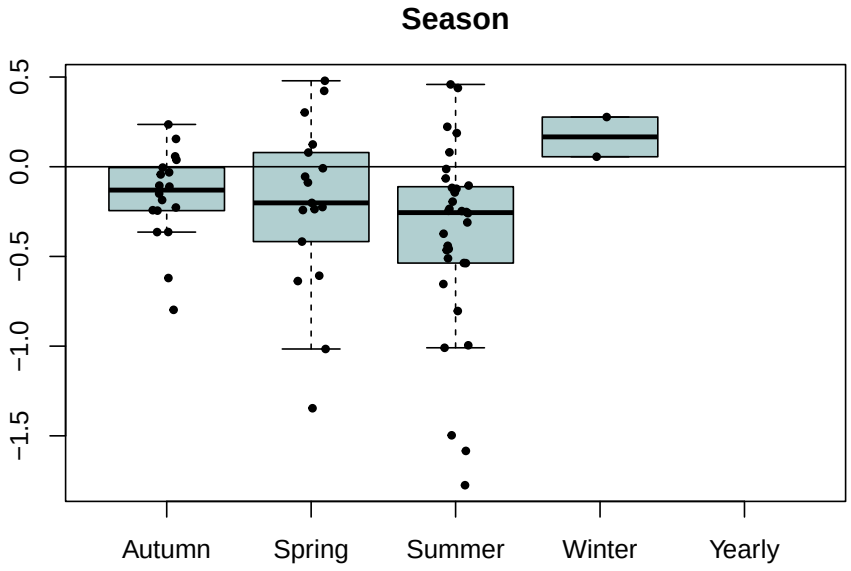
Mods	Rsquared	Pvalue
Slice depth	5.349325	0.1644452
Historically fished	2.083371	0.1210784
Season	13.044041	0.0296907
Sediment	1.833025	0.1792993



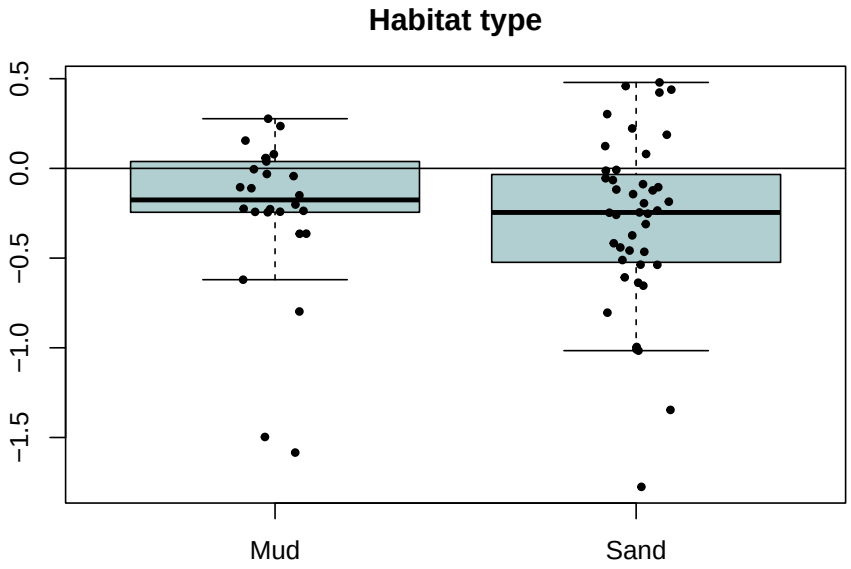
Linear model:
pval. = 0.1644
Rsq. = 5.349 %



Linear model:
pval. = 0.1211
Rsq. = 2.083 %



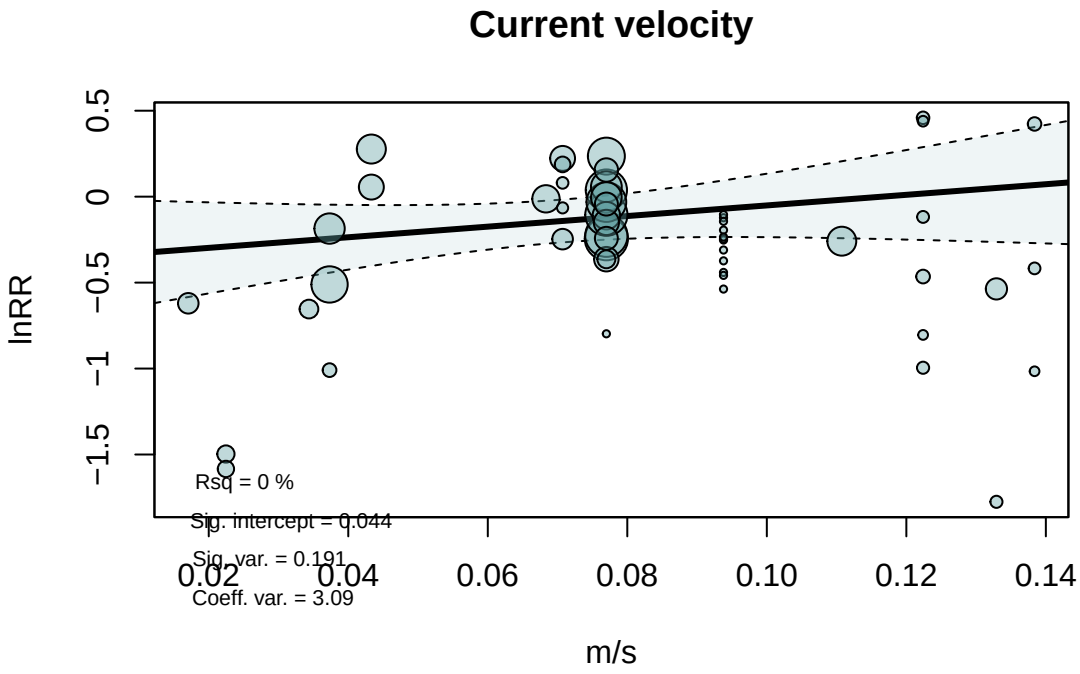
Linear model:
pval. = 0.0297
Rsq. = 13.044 %

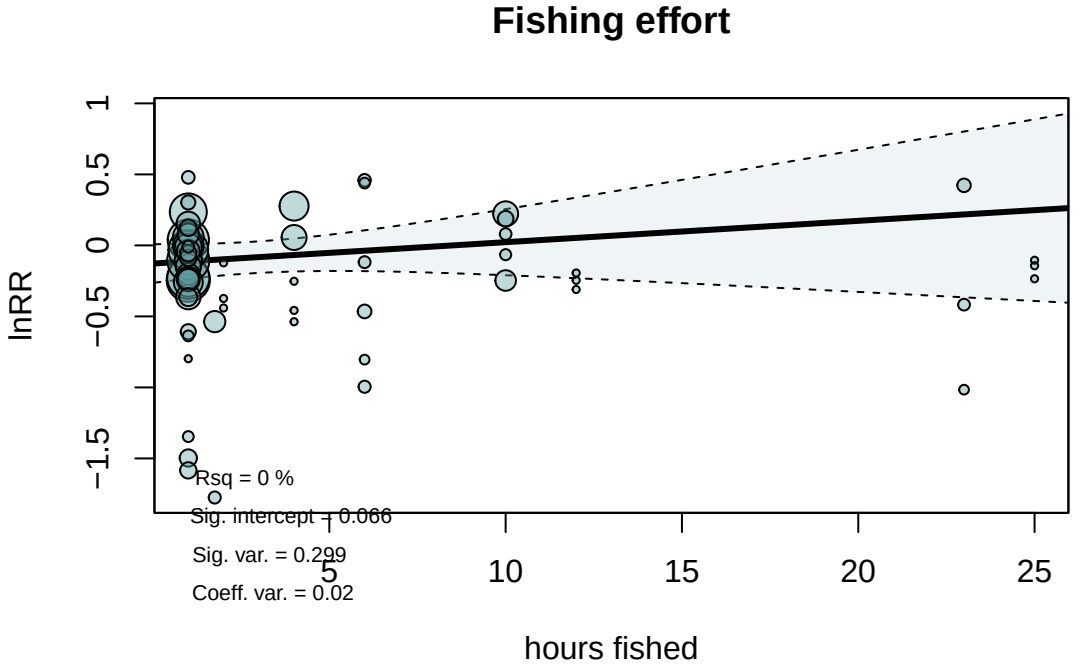


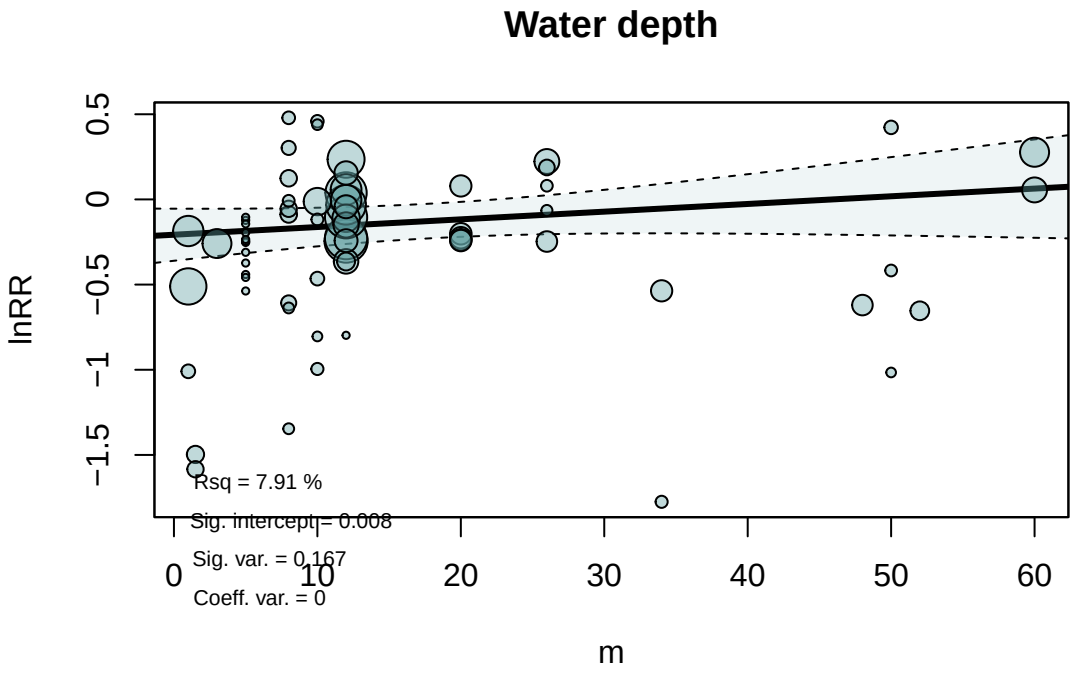
Linear model:
pval. = 0.1793
Rsq. = 1.833 %

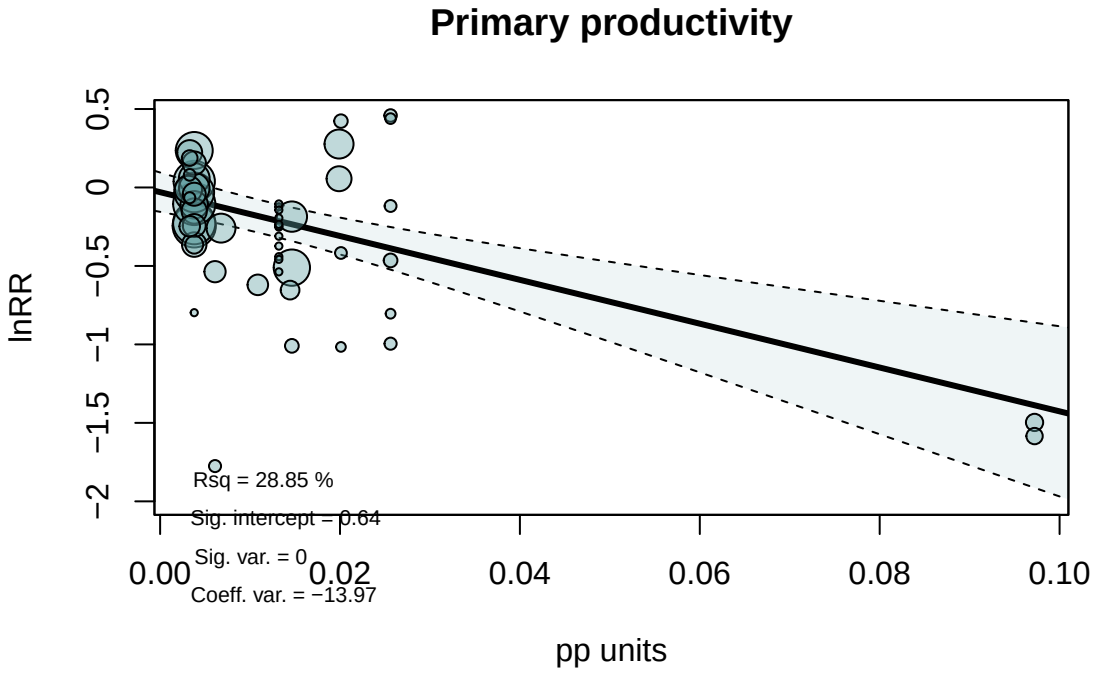
Continuous variables

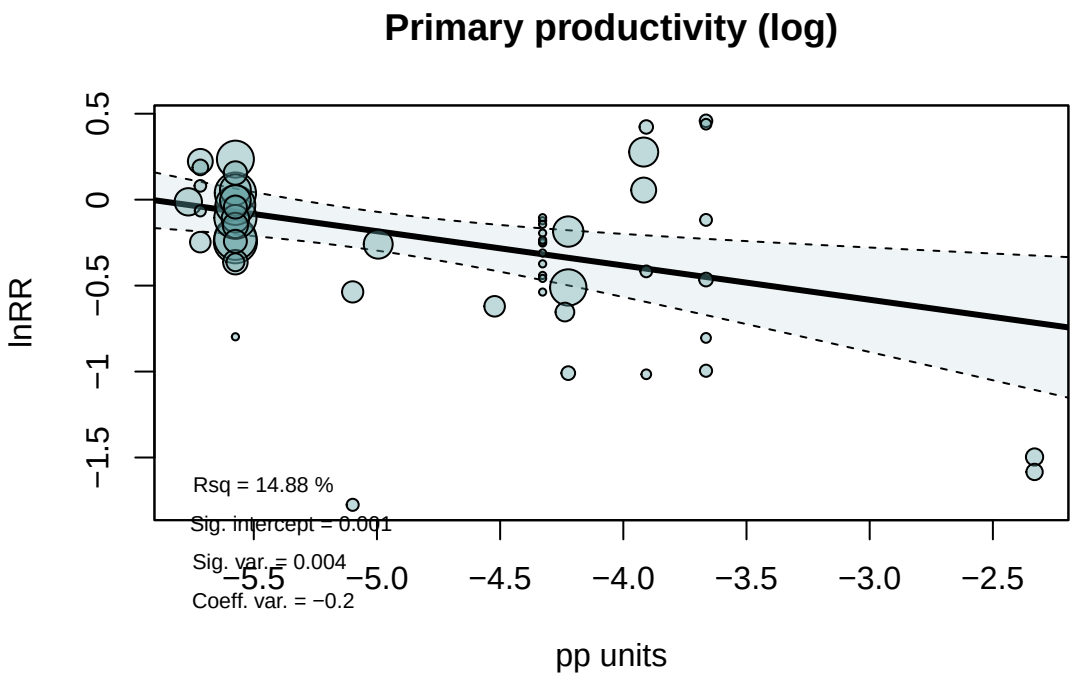
Mods	Rsquared	Pvalue
Current velocity	0.000000	0.1909770
Hours fished	0.000000	0.2986341
Depth	7.909253	0.1673183
NPP surf.	28.845661	0.0000050
O2 bottom	3.739989	0.1168612
Dist. shore	0.000000	0.4304080

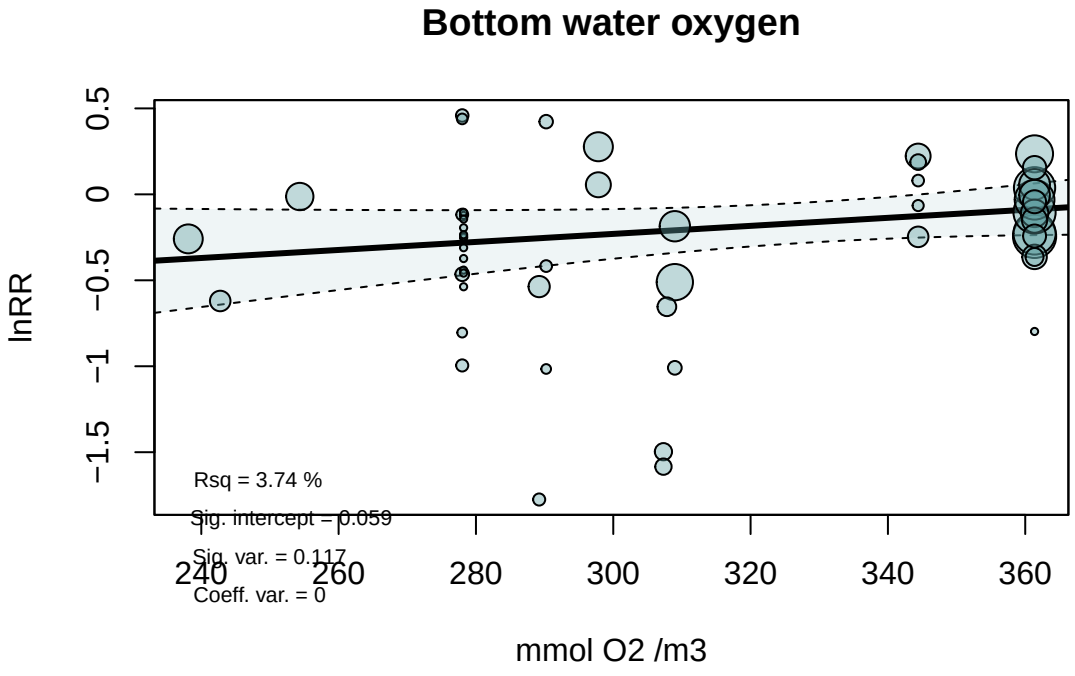

Current velocity
lnRR
0.5
0
−0.5
−1
−1.5
Rsq = 0 %
Sig. intercept = 0.044
Sig. var. = 0.191
Coeff. var. = 3.09
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m/s

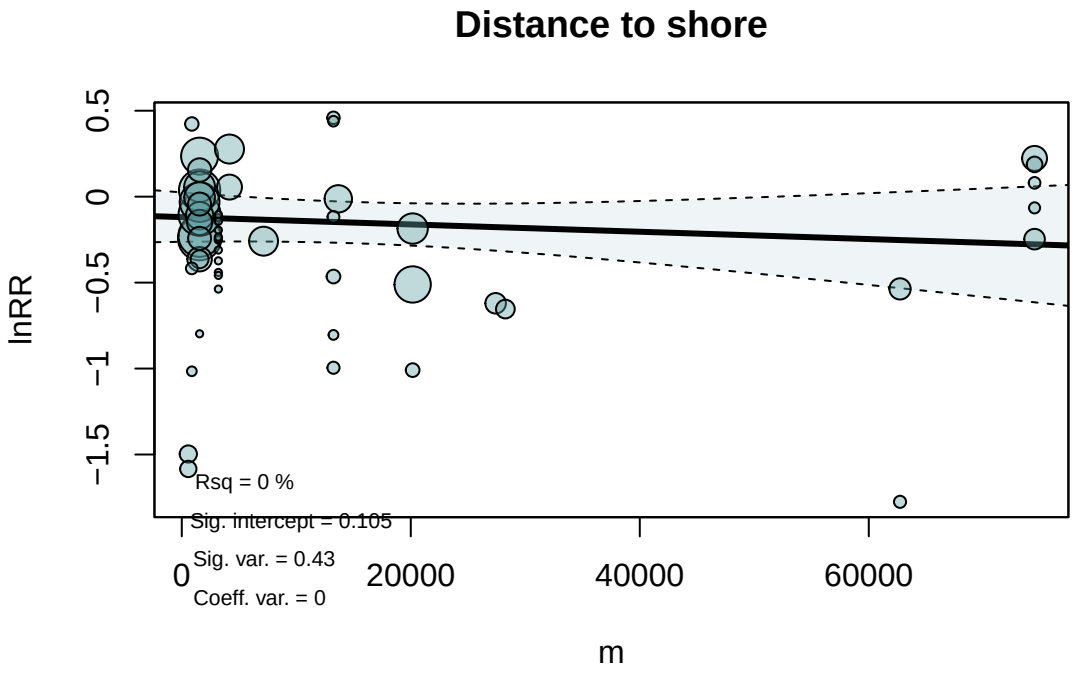

Fishing effort
lnRR
1
0.5
0
−0.5
−1.5
Rsq = 0 %
Sig. intercept = 0.066
Sig. var. = 0.299
Coeff. var. = 0.02
5
10
15
20
25
hours fished

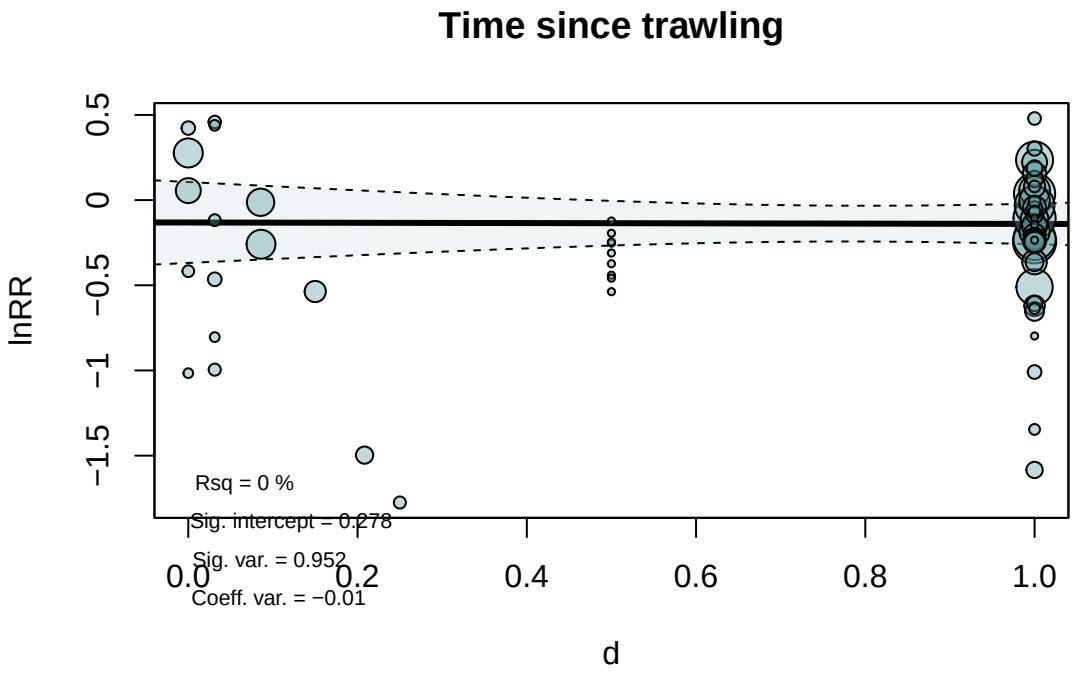

Water depth
lnRR
0.5
0
−0.5
−1
−1.5
Rsq = 7.91 %
Sig. intercept = 0.008
Sig. var. = 0.167
Coeff. var. = 0
0
10
20
30
40
50
60
m


Primary productivity
lnRR
0.5
0
−0.5
−1
−1.5
−2
Rsq = 28.85 %
Sig. intercept = 0.64
Sig. var. = 0
Coeff. var. = −13.97
0.00
0.02
0.04
0.06
0.08
0.10
pp units


Primary productivity (log)
lnRR
0.5
0
−0.5
−1
−1.5
−5.5
−5.0
−4.5
−4.0
−3.5
−3.0
−2.5
pp units
Rsq = 14.88 %
Sig. intercept = 0.001
Sig. var. = 0.004
Coeff. var. = −0.2


Bottom water oxygen
lnRR
0.5
0
−0.5
−1
−1.5
240
260
280
300
320
340
360
mmol O2 /m3
Rsq = 3.74 %
Sig. intercept = 0.059
Sig. var. = 0.117
Coeff. var. = 0


Distance to shore
lnRR
0.5
0
−0.5
−1
−1.5
Rsq = 0 %
Sig. intercept = 0.105
Sig. var. = 0.43
Coeff. var. = 0
0
20000
40000
60000
m


Time since trawling
lnRR
0.5
0
−0.5
−1
−1.5
Rsq = 0 %
Sig. intercept = 0.278
Sig. var. = 0.952
Coeff. var. = −0.01
0.0
0.2
0.4
0.6
0.8
1.0
d

Full model selection

Stepwise

–> Redo with heffortnum

CHshort[, c(8, 20, 21, 24, 25, 31, 32, 35, 36, 87)]

```
##
## Mixed-Effects Model (k = 50; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -21.4829   42.9658   52.9658   62.1090   54.4658
##
## tau^2 (estimated amount of residual heterogeneity):     0.0379 (SE = 0.0122)
## tau (square root of estimated tau^2 value):             0.1948
## R^2 (amount of heterogeneity accounted for):            39.95%
##
## Test of Moderators (coefficients 2:4):
## QM(df = 3) = 30.6331, p-val < .0001
##
## Model Results:
##
##             estimate      se     zval    pval     ci.lb     ci.ub
## intrcpt       0.5081  0.2233   2.2758  0.0229    0.0705    0.9457    *
## cvel         -7.0092  2.6809  -2.6145  0.0089  -12.2638   -1.7547   **
## nppsurf     -17.3164  3.2050  -5.4030  <.0001  -23.5980  -11.0348  ***
## heffortnum    0.0284  0.0140   2.0335  0.0420    0.0010    0.0557    *
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Multimodel

Table 13: OC short top 10 models

model	aicc	weights
lnRR ~ 1 + watdepth + nppsurf + heffortnum	35.55554	0.1637868
lnRR ~ 1 + cvel + nppsurf + O2bot + heffortnum + timesincetrawl	35.68937	0.1531857
lnRR ~ 1 + cvel + watdepth + nppsurf + heffortnum	36.99160	0.0798811
lnRR ~ 1 + histfished + watdepth + nppsurf + heffortnum	37.63657	0.0578616
lnRR ~ 1 + watdepth + nppsurf + O2bot + heffortnum	38.10583	0.0457607
lnRR ~ 1 + watdepth + nppsurf + heffortnum + timesincetrawl	38.16197	0.0444939
lnRR ~ 1 + hseason + nppsurf	38.84579	0.0316091
lnRR ~ 1 + nppsurf + O2bot + heffortnum + timesincetrawl	38.86614	0.0312890
lnRR ~ 1 + hhabtype + watdepth + nppsurf + heffortnum	39.43587	0.0235330
lnRR ~ 1 + hseason + watdepth + nppsurf	39.62221	0.0214394

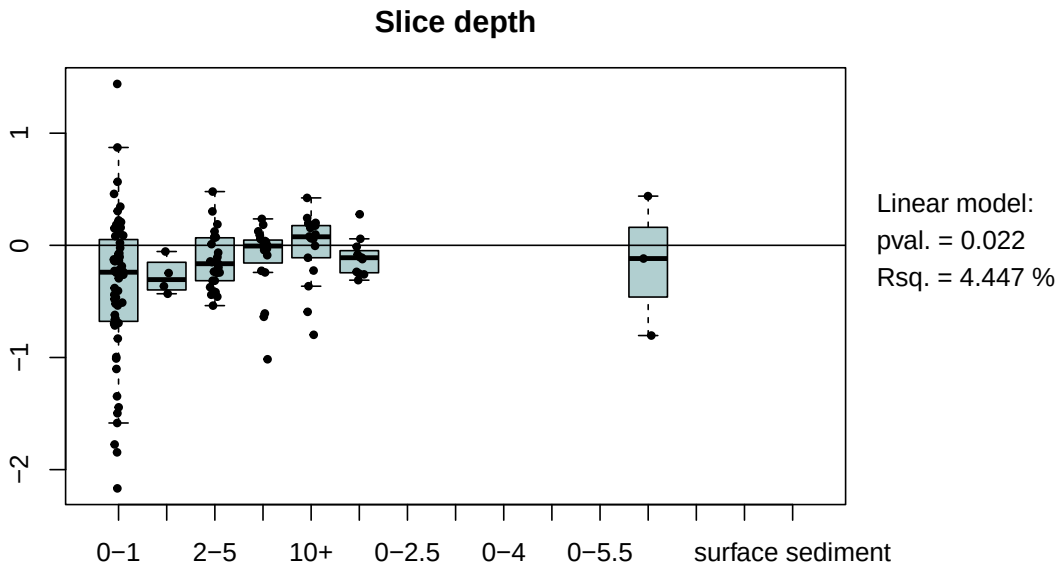
```
##
## Mixed-Effects Model (k = 50; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
```

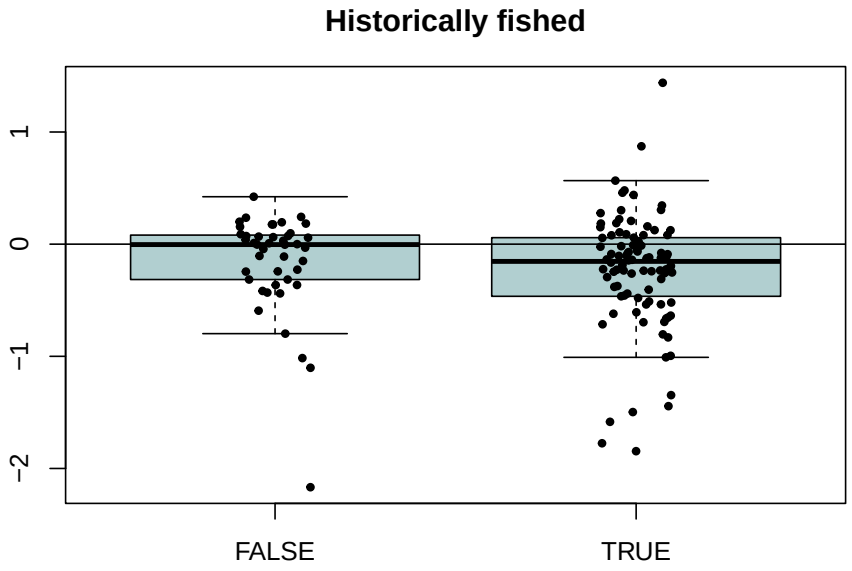
```
## -12.0278   24.0555   34.0555   43.1988   35.5555
##
## tau^2 (estimated amount of residual heterogeneity):     0.0358 (SE = 0.0116)
## tau (square root of estimated tau^2 value):             0.1893
## R^2 (amount of heterogeneity accounted for):            43.26%
##
## Test of Moderators (coefficients 2:4):
## QM(df = 3) = 30.3870, p-val < .0001
##
## Model Results:
##
##             estimate      se     zval    pval     ci.lb    ci.ub
## intrcpt      -0.1317  0.0861  -1.5293  0.1262   -0.3005   0.0371
## watdepth      0.0079  0.0039   2.0024  0.0452    0.0002   0.0156    *
## nppsurf     -13.9471  2.8218  -4.9426  <.0001  -19.4778  -8.4164  ***
## heffortnum    0.0042  0.0150   0.2790  0.7802   -0.0252   0.0336
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

RECOVERY

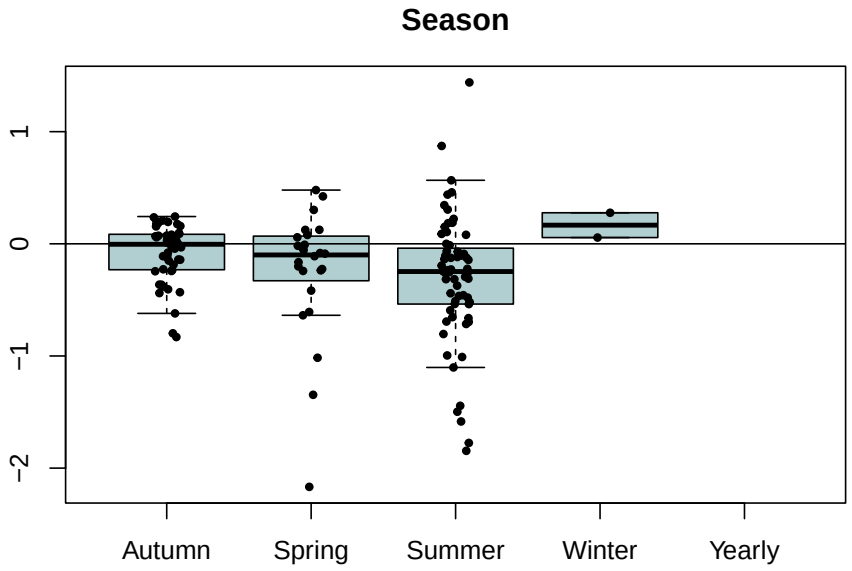
Individual variables

Mods	Rsquared	Pvalue
Slice depth	4.446666	0.0219594
Historically fished	5.084141	0.0395353
Season	4.162632	0.4186942
Sediment	4.070523	0.0266126

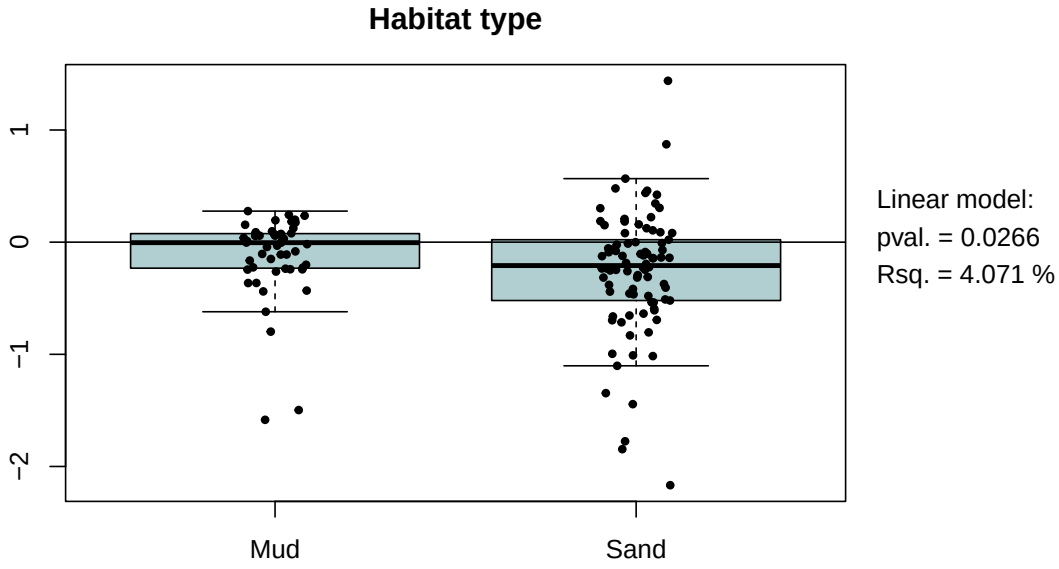




Linear model:
pval. = 0.0395
Rsq. = 5.084 %

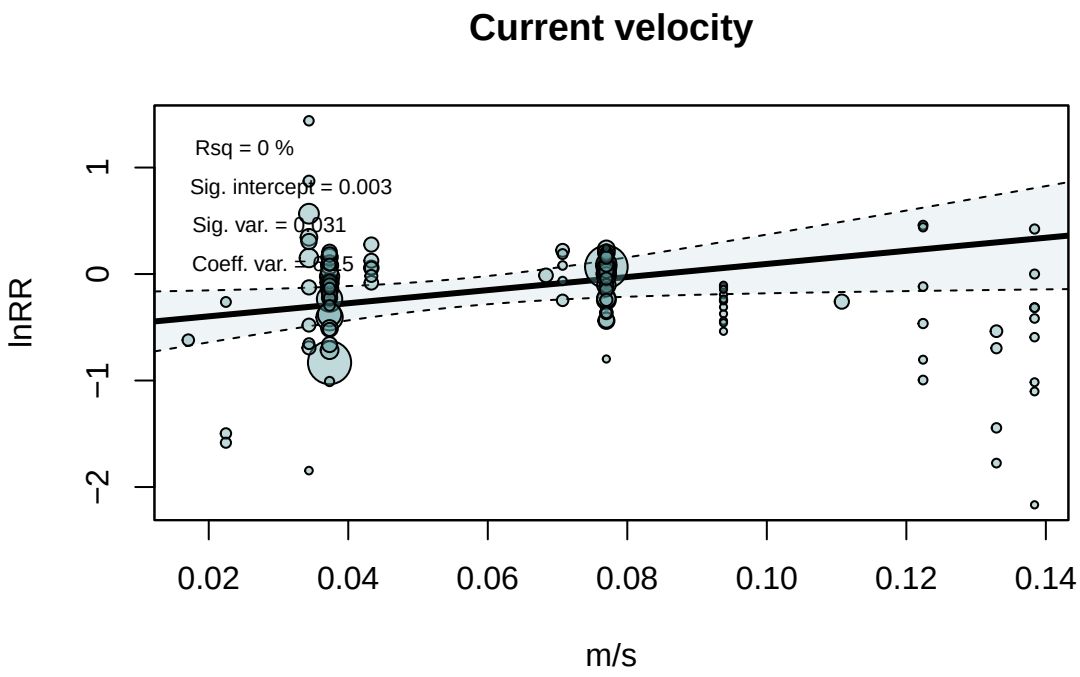


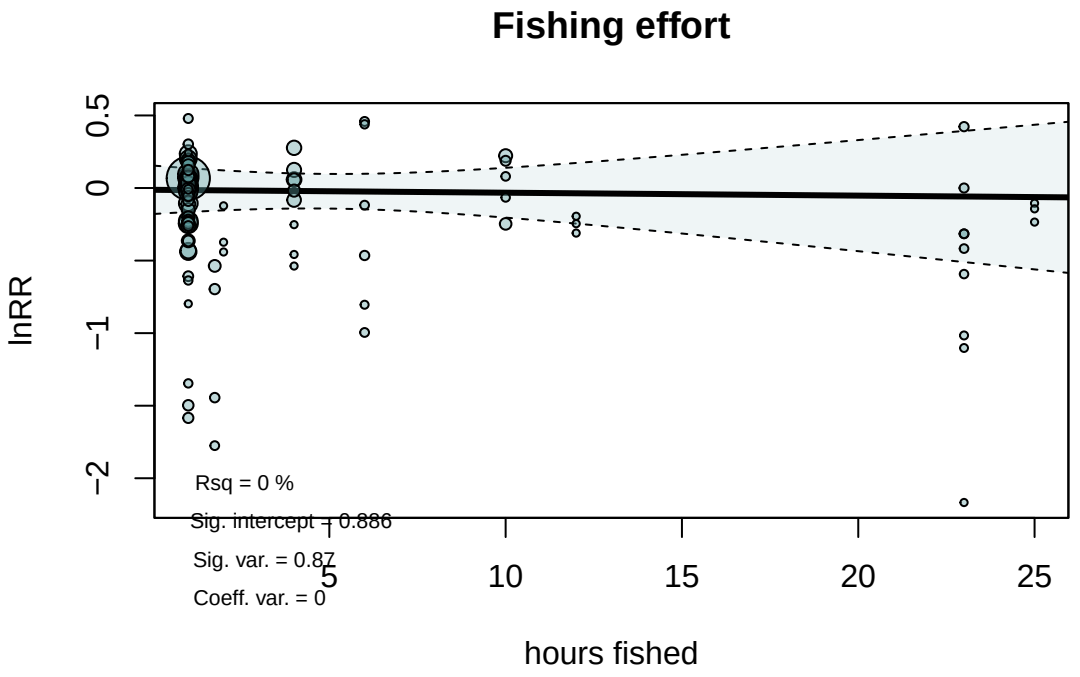
Linear model:
pval. = 0.4187
Rsq. = 4.163 %



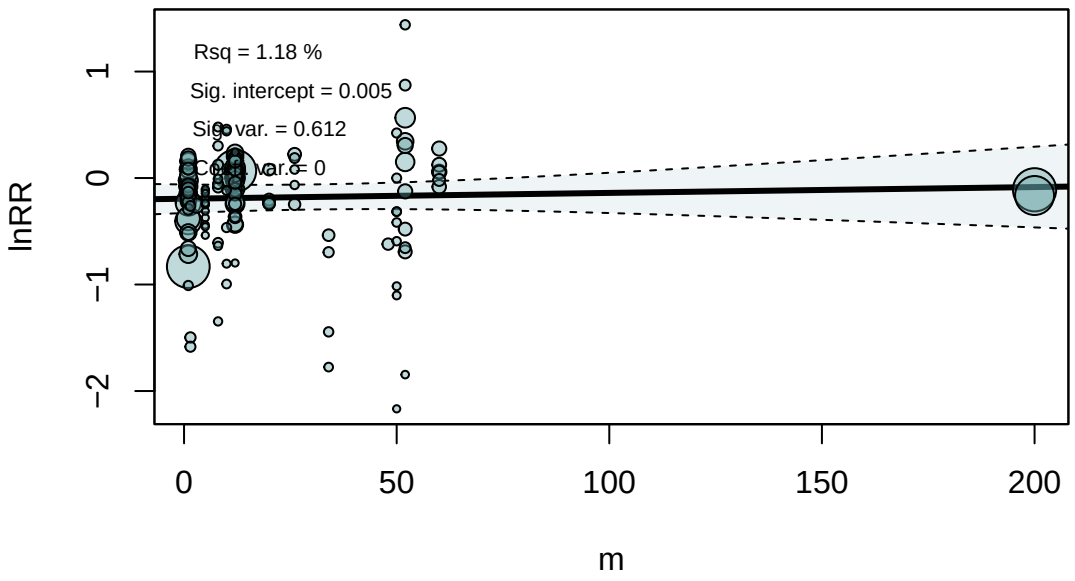
Continuous variables

Mods	Rsquared	Pvalue
Current velocity	0.000000	0.0314185
Hours fished	0.000000	0.8701161
Depth	1.182804	0.6124197
NPP surf.	12.136847	0.0015085
O2 bottom	8.480961	0.0134721
Dist. shore	0.000000	0.0409077

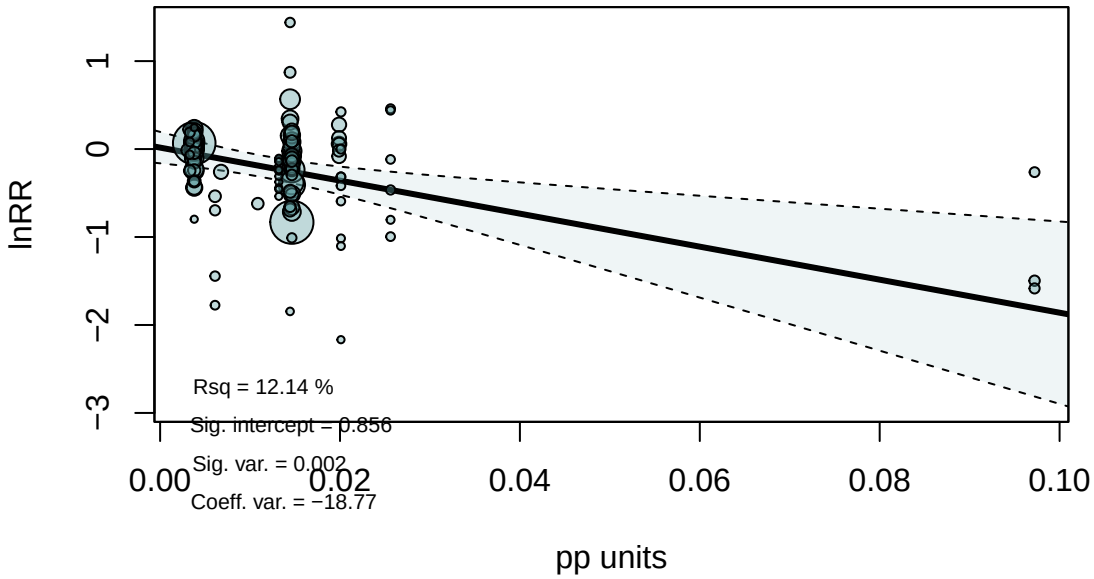

Current velocity
Rsq = 0 %
Sig. intercept = 0.003
Sig. var. = 0.031
Coeff. var. = 0.15
lnRR
1
0
−1
−2
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m/s


Fishing effort
Rsq = 0 %
Sig. intercept = 0.886
Sig. var. = 0.87
Coeff. var. = 0
lnRR
0.5
0
−1
−2
5
10
15
20
25
hours fished

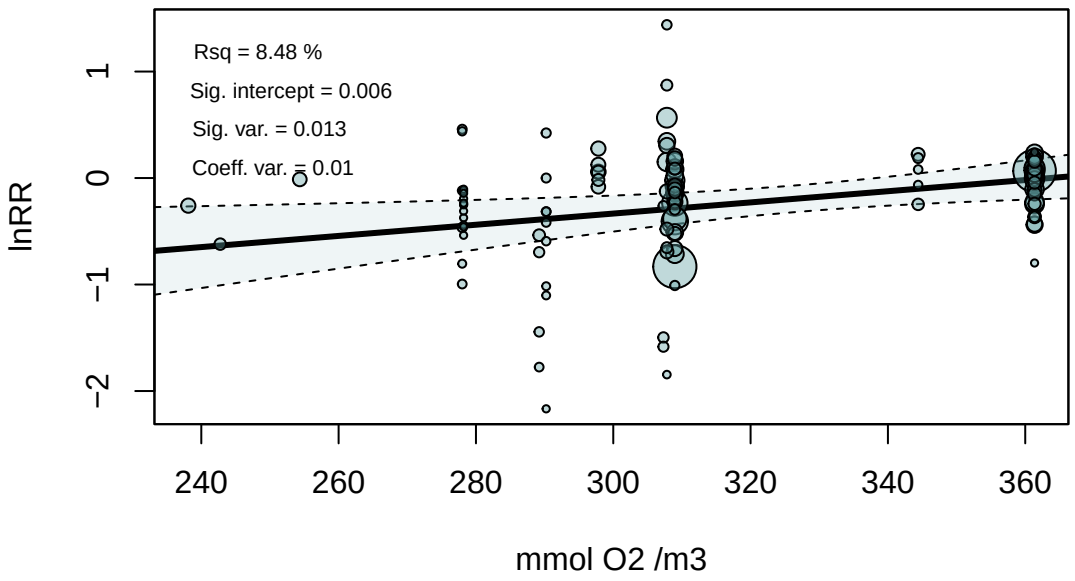
Water depth



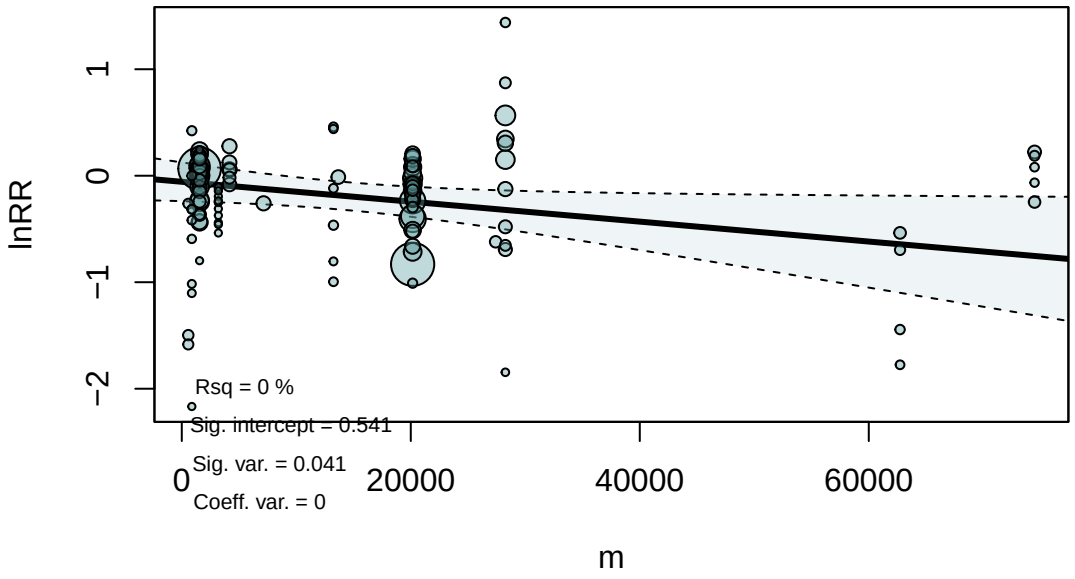
Primary productivity

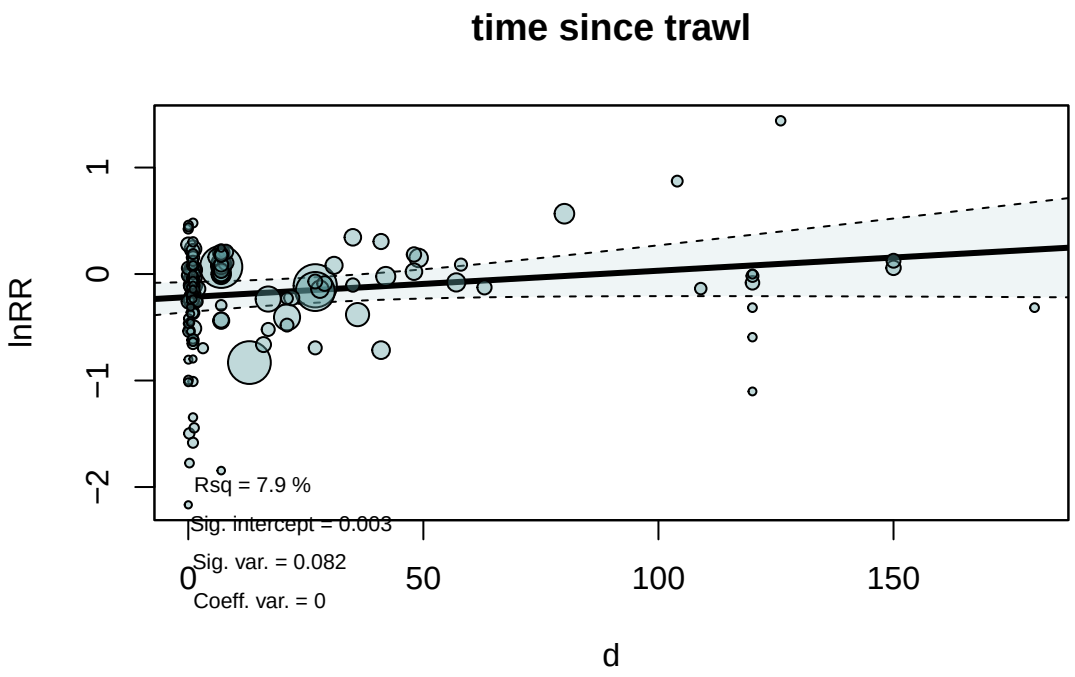


Bottom water oxygen



Distance to shore





Full model selection

Stepwise

- Cannot use heffortnum

```
##
## Mixed-Effects Model (k = 121; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -52.4413  104.8827  128.8827  161.2885  132.0992
##
## tau^2 (estimated amount of residual heterogeneity):     0.0599 (SE = 0.0115)
## tau (square root of estimated tau^2 value):             0.2447
## R^2 (amount of heterogeneity accounted for):            29.82%
##
## Test of Moderators (coefficients 2:11):
## QM(df = 10) = 39.7210, p-val < .0001
##
## Model Results:
##
##                  estimate      se     zval    pval     ci.lb    ci.ub
## intrcpt           -1.2366  0.7101  -1.7414  0.0816   -2.6285   0.1552    .
## sslicedepth1-2    -0.2488  0.2163  -1.1503  0.2500   -0.6727   0.1751
## sslicedepth2-5     0.1711  0.2042   0.8378  0.4021   -0.2292   0.5714
## sslicedepth5-10    0.1201  0.1280   0.9379  0.3483   -0.1309   0.3710
## sslicedepth10+     0.2215  0.1458   1.5193  0.1287   -0.0642   0.5072
## sslicedepth0-2     0.1052  0.1620   0.6495  0.5160   -0.2123   0.4228
```

```
## sslicedepth0-10    0.5570  0.4658   1.1959  0.2317   -0.3559   1.4700
## watdepth           0.0069  0.0023   2.9874  0.0028    0.0024   0.0115   **
## O2bot              0.0029  0.0021   1.3401  0.1802   -0.0013   0.0070
## nppsurf          -10.4749  2.9265  -3.5794  0.0003  -16.2107  -4.7391  ***
## timesincetrawl     0.0039  0.0014   2.8987  0.0037    0.0013   0.0066   **
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Multimodel

Table 16: OC short top 10 models

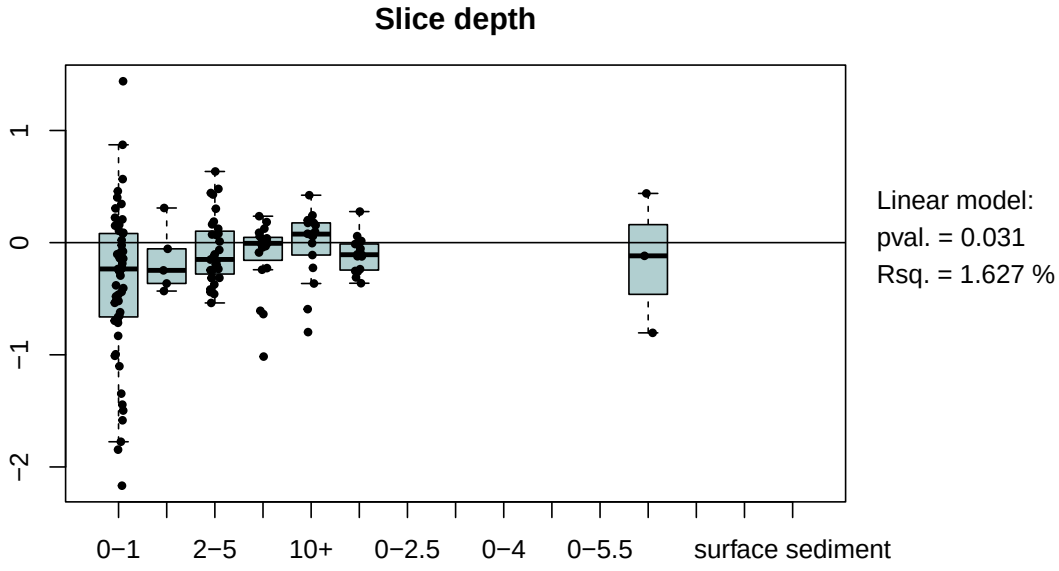
model	aicc	weights
lnRR ~ 1 + timesincetrawl	120.9743	0.2013362
lnRR ~ 1 + hhabtype + watdepth + nppsurf + O2bot + shoredist	123.7747	0.0496383
lnRR ~ 1 + watdepth + timesincetrawl	124.4006	0.0362991
lnRR ~ 1 + watdepth + nppsurf + shoredist	124.8298	0.0292884
lnRR ~ 1 + histfished + hseason + cvel + nppsurf	125.1720	0.0246825
lnRR ~ 1 + histfished + watdepth + nppsurf + O2bot + shoredist	125.3024	0.0231252
lnRR ~ 1 + watdepth + nppsurf + shoredist + timesincetrawl	125.3947	0.0220817
lnRR ~ 1 + watdepth + nppsurf + O2bot + shoredist	125.4628	0.0213428
lnRR ~ 1 + histfished + hhabtype + watdepth + nppsurf + O2bot + shoredist	125.5080	0.0208652
lnRR ~ 1 + hseason + cvel + watdepth + nppsurf + O2bot + shoredist	125.5948	0.0199793

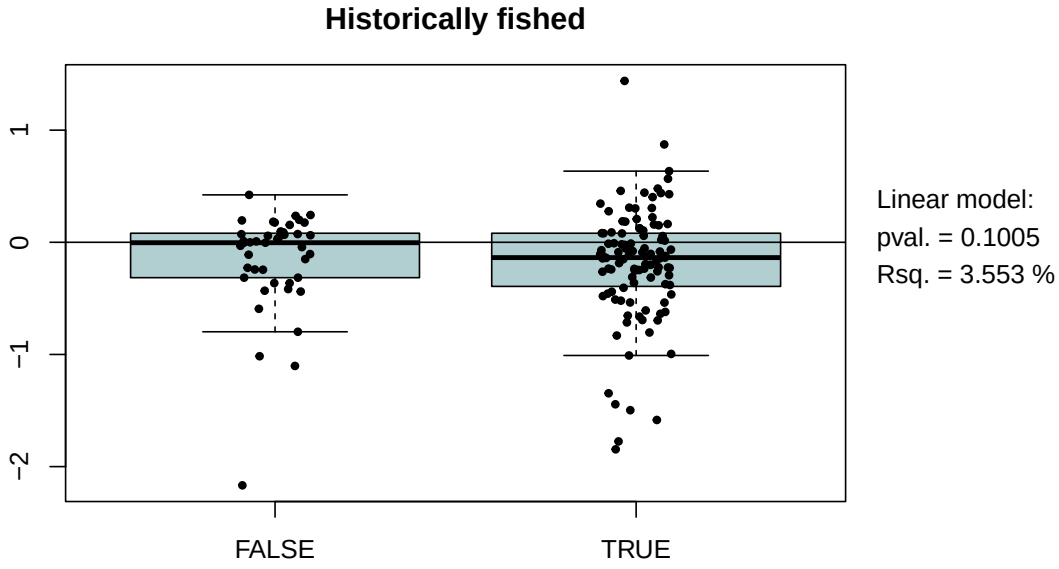
```
##
## Mixed-Effects Model (k = 123; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -57.3846  114.7691  120.7691  129.1565  120.9743
##
## tau^2 (estimated amount of residual heterogeneity):     0.0757 (SE = 0.0132)
## tau (square root of estimated tau^2 value):             0.2752
## R^2 (amount of heterogeneity accounted for):            8.15%
##
## Test of Moderators (coefficient 2):
## QM(df = 1) = 2.8689, p-val = 0.0903
##
## Model Results:
##
##                estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt         -0.2186  0.0760  -2.8780  0.0040  -0.3675  -0.0697  **
## timesincetrawl   0.0025  0.0015   1.6938  0.0903  -0.0004   0.0054   .
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

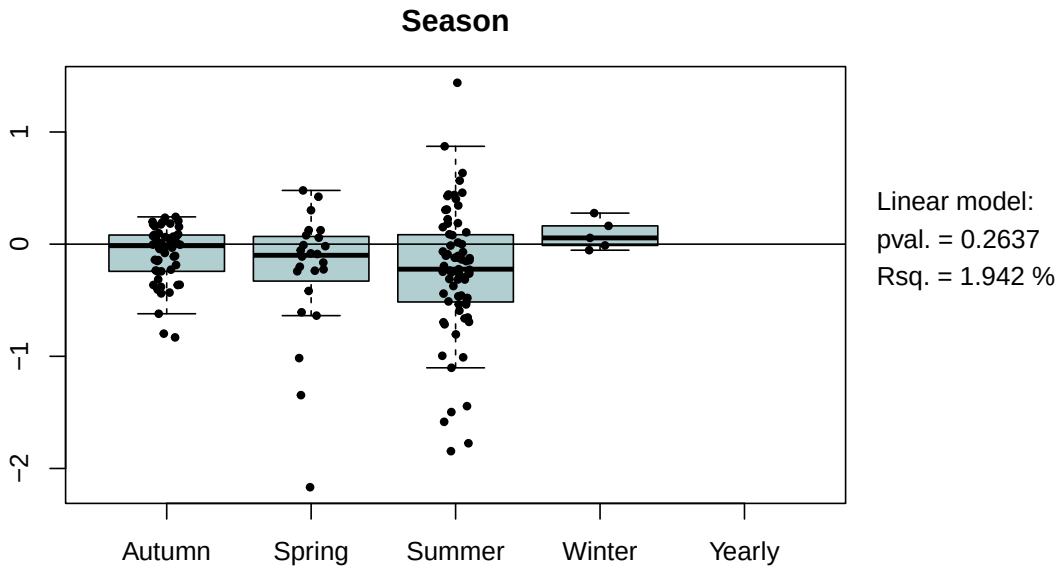
ALL DATA

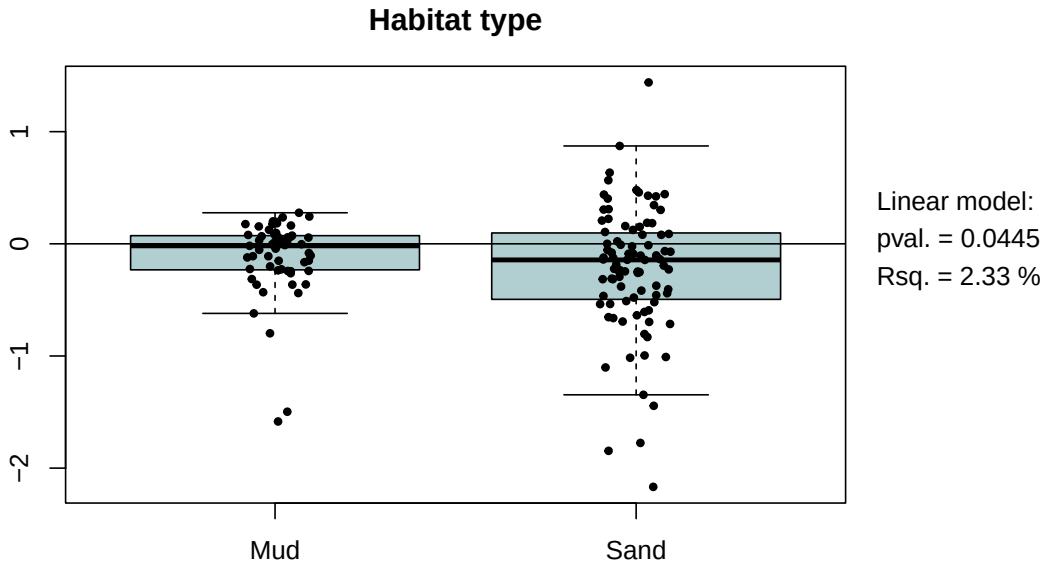
Individual variables

Mods	Rsquared	Pvalue
Slice depth	1.627349	0.0309739
Historically fished	3.552576	0.1005142
Season	1.941684	0.2637447
Sediment	2.329708	0.0444774



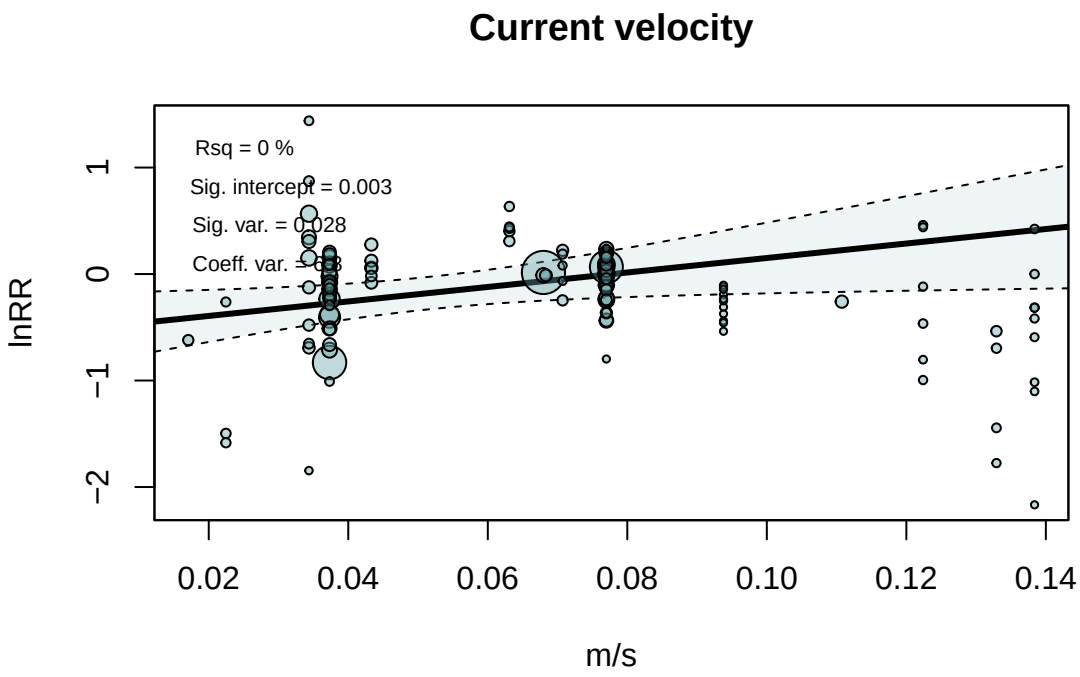


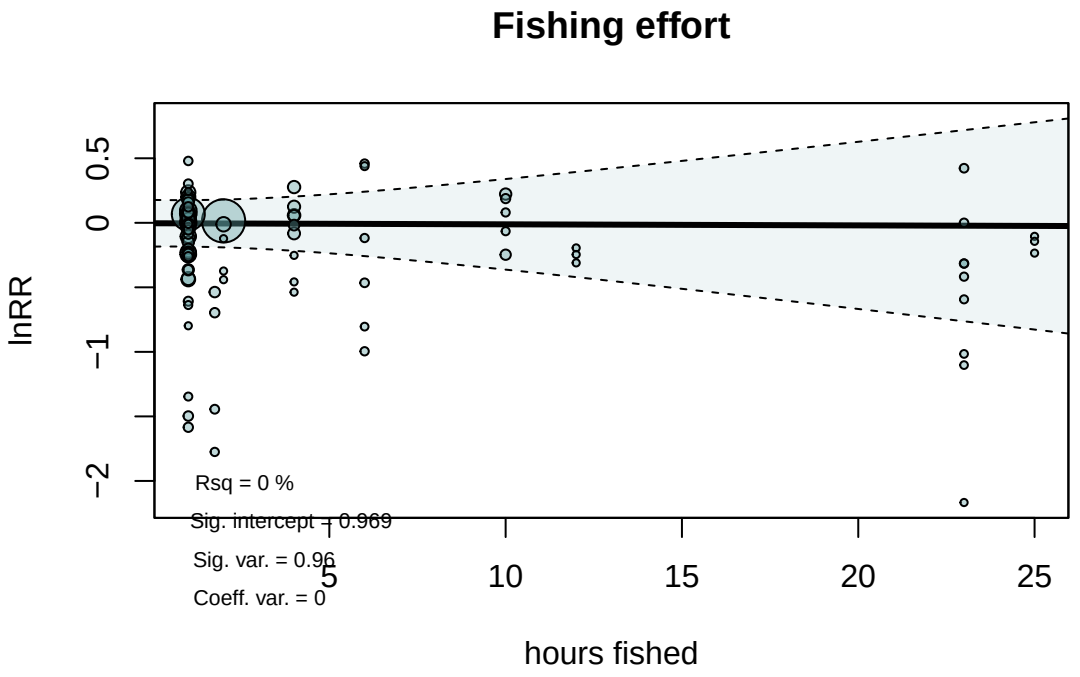




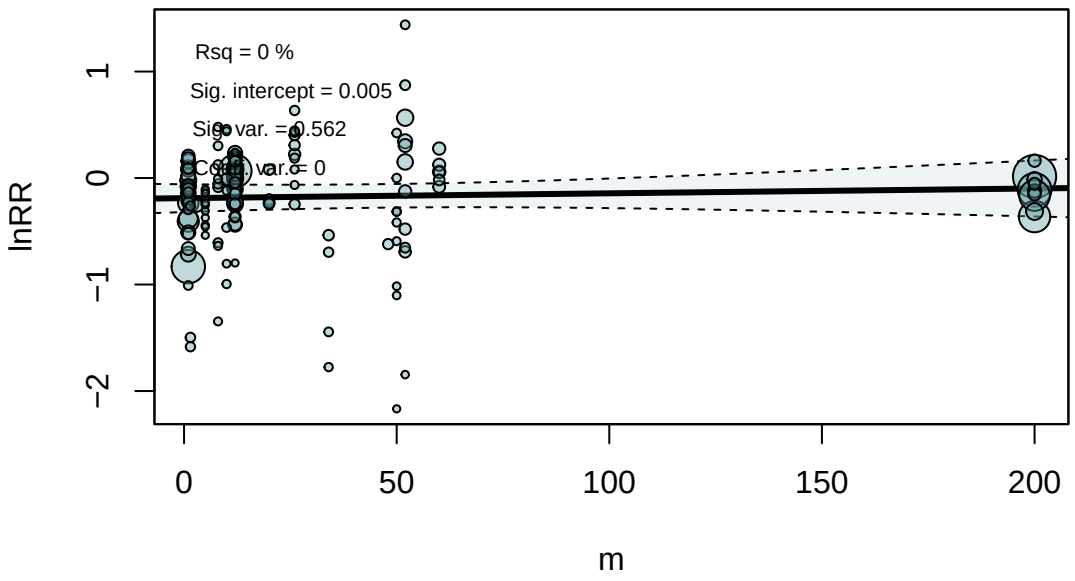
Continuous variables

Mods	Rsquared	Pvalue
Current velocity	0.0000000	0.0283740
Hours fished	0.0000000	0.9600462
Depth	0.0000000	0.5623786
NPP surf.	13.9658704	0.0201581
O2 bottom	5.7664342	0.9897065
Dist. shore	0.0831873	0.5763544

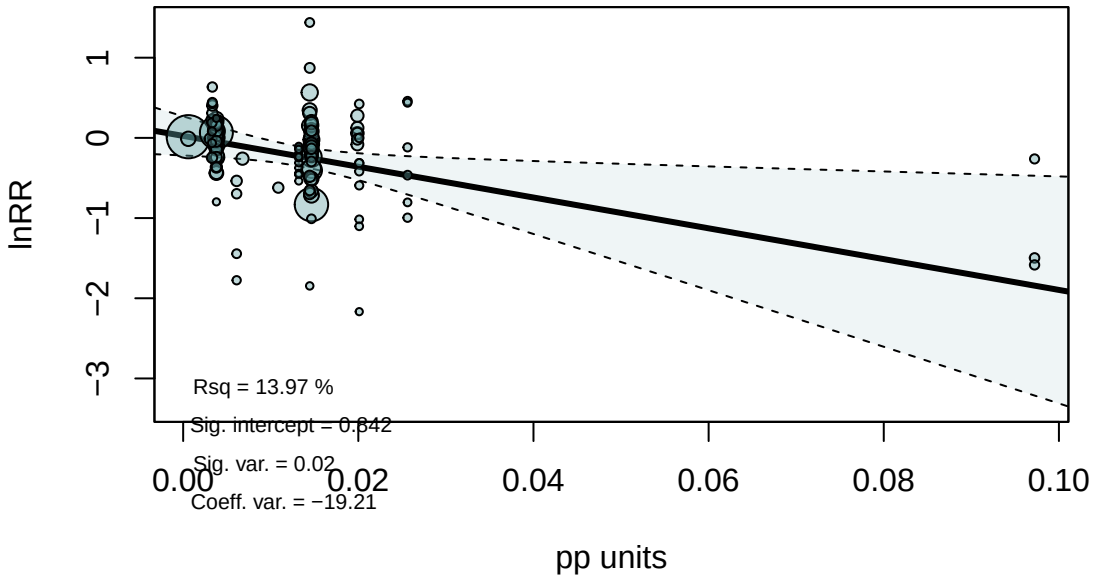

Current velocity
Rsq = 0 %
Sig. intercept = 0.003
Sig. var. = 0.028
Coeff. var. = 0.8
lnRR
1
0
−1
−2
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m/s


Fishing effort
Rsq = 0 %
Sig. intercept = 0.969
Sig. var. = 0.96
Coeff. var. = 0
lnRR
0.5
0
−1
−2
5
10
15
20
25
hours fished

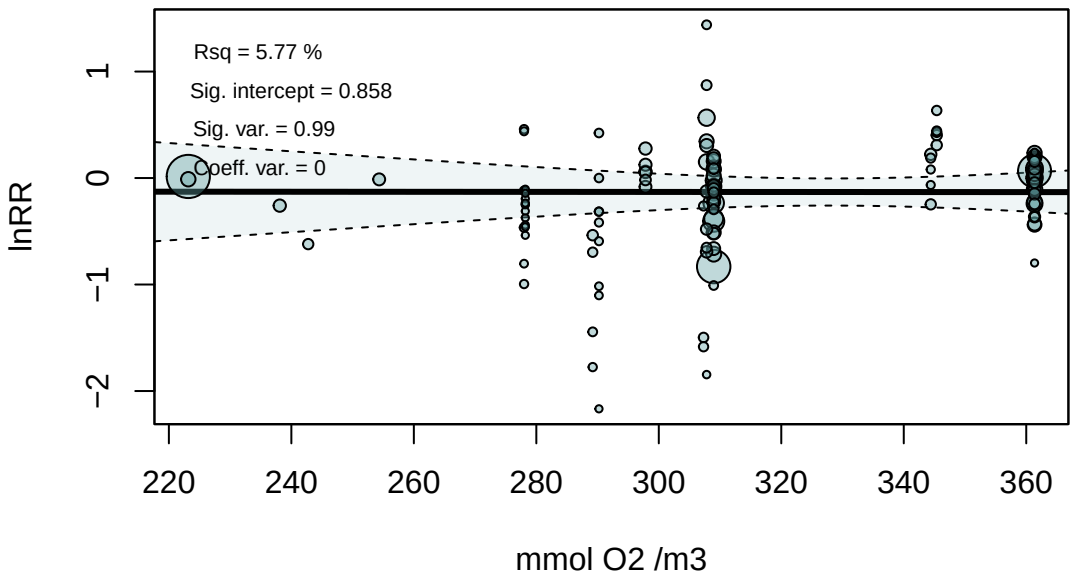
Water depth



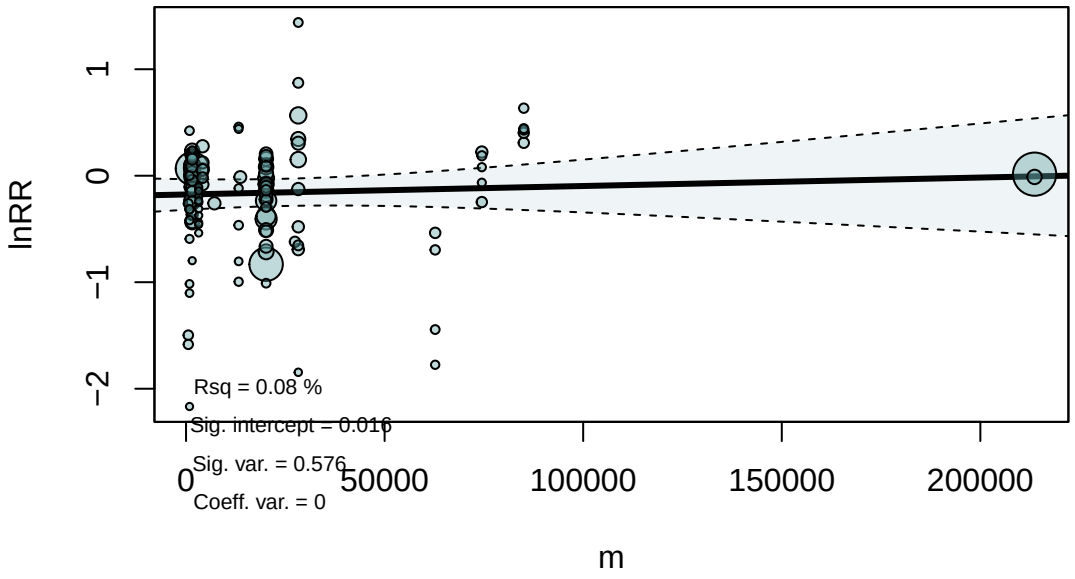
Primary productivity



Bottom water oxygen



Distance to shore



Full model selection

Stepwise

- Cannot use heffortnum

CHall[, c(8, 20, 21, 24, 25, 31, 32, 35, 36, 87)]

```
##
## Mixed-Effects Model (k = 128; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -51.2740  102.5479  126.5479  159.6940  129.5479
##
## tau^2 (estimated amount of residual heterogeneity):     0.0559 (SE = 0.0107)
## tau (square root of estimated tau^2 value):             0.2364
## R^2 (amount of heterogeneity accounted for):            34.96%
##
## Test of Moderators (coefficients 2:11):
## QM(df = 10) = 53.7404, p-val < .0001
##
## Model Results:
##
##                  estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt           -4.4627  0.8234  -5.4196  <.0001  -6.0765  -2.8488  ***
## sslicedepth1-2    -0.0293  0.1987  -0.1476  0.8827  -0.4188   0.3602
## sslicedepth2-5     0.4398  0.2044   2.1523  0.0314   0.0393   0.8403    *
## sslicedepth5-10    0.4529  0.1538   2.9446  0.0032   0.1514   0.7543   **
## sslicedepth10+     0.4908  0.1660   2.9571  0.0031   0.1655   0.8162   **
## sslicedepth0-2     0.7045  0.1810   3.8918  <.0001   0.3497   1.0592  ***
## sslicedepth0-10    0.8624  0.4738   1.8202  0.0687  -0.0662   1.7910    .
## watdepth           0.0070  0.0015   4.5980  <.0001   0.0040   0.0100  ***
## hhabtypeSand       0.5926  0.1276   4.6429  <.0001   0.3424   0.8427  ***
## cvel              -3.1982  1.7219  -1.8573  0.0633  -6.5731   0.1768    .
## O2bot              0.0117  0.0023   5.0404  <.0001   0.0071   0.0162  ***
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Multimodel

Table 19: OC short top 10 models

model	aicc	weights
lnRR ~ 1 + sslicedepth + hhabtype + cvel + watdepth + O2bot	129.5479	0.1265767
lnRR ~ 1 + hseason + watdepth + nppsurf + O2bot	130.6911	0.0714703
lnRR ~ 1 + sslicedepth + histfished + hhabtype + watdepth + O2bot	131.1492	0.0568389
lnRR ~ 1 + histfished + hseason + cvel + nppsurf	131.1773	0.0560444
lnRR ~ 1 + sslicedepth + histfished + hhabtype + cvel + watdepth + O2bot	131.5822	0.0457747
lnRR ~ 1 + sslicedepth + hhabtype + watdepth + O2bot	131.8385	0.0402676
lnRR ~ 1 + hseason + cvel + watdepth + nppsurf + O2bot + shoredist	132.1180	0.0350155
lnRR ~ 1 + histfished + hseason + watdepth + nppsurf + O2bot + shoredist	132.3710	0.0308559

model	aicc	weights
lnRR ~ 1 + sslicedepth + hhabtype + cvel + watdepth + nppsurf + O2bot	132.7524	0.0254976
lnRR ~ 1 + hseason + hhabtype + cvel + nppsurf + O2bot	132.7595	0.0254080

```
##
## Mixed-Effects Model (k = 128; tau^2 estimator: REML)
##
##   logLik  deviance       AIC       BIC      AICc
## -51.2740  102.5479  126.5479  159.6940  129.5479
##
## tau^2 (estimated amount of residual heterogeneity):     0.0559 (SE = 0.0107)
## tau (square root of estimated tau^2 value):             0.2364
## R^2 (amount of heterogeneity accounted for):            34.96%
##
## Test of Moderators (coefficients 2:11):
## QM(df = 10) = 53.7404, p-val < .0001
##
## Model Results:
##
##                  estimate      se     zval    pval    ci.lb    ci.ub
## intrcpt           -4.4627  0.8234  -5.4196  <.0001  -6.0765  -2.8488  ***
## sslicedepth1-2    -0.0293  0.1987  -0.1476  0.8827  -0.4188   0.3602
## sslicedepth2-5     0.4398  0.2044   2.1523  0.0314   0.0393   0.8403    *
## sslicedepth5-10    0.4529  0.1538   2.9446  0.0032   0.1514   0.7543   **
## sslicedepth10+     0.4908  0.1660   2.9571  0.0031   0.1655   0.8162   **
## sslicedepth0-2     0.7045  0.1810   3.8918  <.0001   0.3497   1.0592  ***
## sslicedepth0-10    0.8624  0.4738   1.8202  0.0687  -0.0662   1.7910    .
## hhabtypeSand       0.5926  0.1276   4.6429  <.0001   0.3424   0.8427  ***
## cvel              -3.1982  1.7219  -1.8573  0.0633  -6.5731   0.1768    .
## watdepth           0.0070  0.0015   4.5980  <.0001   0.0040   0.0100  ***
## O2bot              0.0117  0.0023   5.0404  <.0001   0.0071   0.0162  ***
##
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```