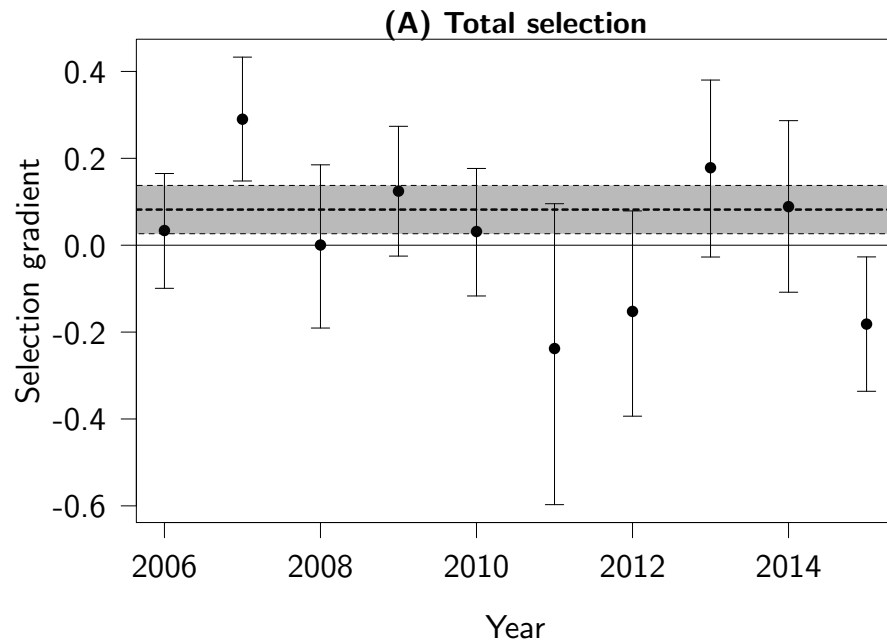


```
## Loading required package: Matrix
## Loading required package: coda
## Loading required package: ape
```

```
setPar()
plot(SelAByYear, x=2006:2015, ylim=c(min( CIselAByYear), max( CIselAByYear)), xlab="Year", y
abline(h=0)
arrows(x0 = 2006:2015,x1 = 2006:2015,code = 3, y0 = CIselAByYear[1,],
       y1 = CIselAByYear[2,], angle = 90,length = 0.1)
abline(h=coefficients(m0all)[2], lty=2, lwd=5)
lowm0all <- coefficients(m0all)[2]+1.96*sm0all$coefficients[2,2]
highm0all <- coefficients(m0all)[2]-1.96*sm0all$coefficients[2,2]
polygon(x=c(2005,2016,2016,2005),y=c(lowm0all,lowm0all, highm0all, highm0all),
       fillOddEven = TRUE, col=rgb(0.1,0.1,0.1,0.3), lty=2)
```



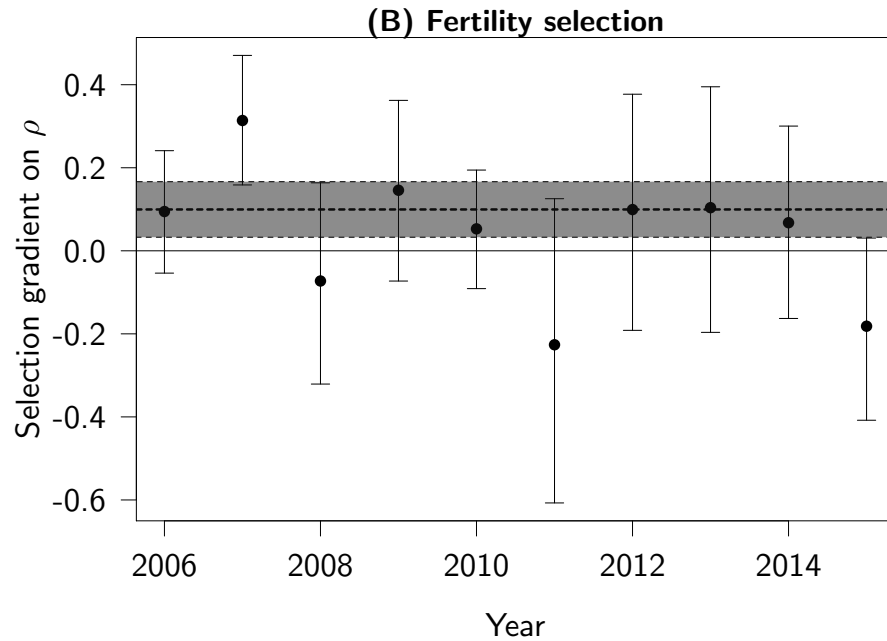
```
#points(x=2006:2015,y=unlist(coefficients(mmRnoCorfitness)$Year["StMass"]), pch=17)
```

```
setPar()
plot(SelAByYearRho, x=2006:2015, ylim=c(min( CIselAByYearRho), max( CIselAByYearRho)), xlab="Year", y
abline(h=0)
arrows(x0 = 2006:2015,x1 = 2006:2015,code = 3, y0 = CIselAByYearRho[1,],
       y1 = CIselAByYearRho[2,], angle = 90,length = 0.1)
```

```

abline(h=coefficients(mOallRho)[2], lty=2, lwd=5)
smOallRho <- summary(mOallRho)
lowmOallRho <- coefficients(mOallRho)[2]+1.96*smOallRho$coefficients[2,2]
highmOallRho <- coefficients(mOallRho)[2]-1.96*smOallRho$coefficients[2,2]
polygon(x=c(2005,2016,2016,2005),y=c(lowmOallRho,lowmOallRho, highmOallRho, highmOallRho),
       fillOddEven = TRUE, col=rgb(0.1,0.1,0.1,0.5), lty=2)

```



```

setPar()
plot(SelAByYearPhi, x=2006:2015, ylim=c(min( CIselAByYearPhi, na.rm=TRUE), max( CIselAByYearPhi, na.rm=TRUE)),
     abline(h=0)
arrows(x0 = 2006:2015,x1 = 2006:2015,code = 3, y0 = CIselAByYearPhi[1,],
       y1 = CIselAByYearPhi[2,], angle = 90,length = 0.1)
abline(h=coefficients(mOallphi)[2], lty=2, lwd=5)
lowmOallphi <- coefficients(mOallphi)[2]+1.96*smOallphi$coefficients[2,2]
highmOallphi <- coefficients(mOallphi)[2]-1.96*smOallphi$coefficients[2,2]
polygon(x=c(2005,2016,2016,2005),y=c(lowmOallphi,lowmOallphi, highmOallphi, highmOallphi),
       fillOddEven = TRUE, col=rgb(0.1,0.1,0.1,0.5), lty=2 )

```



```

      paste(round(smmRnoCorrho$coefficients[2,1],rounding)," (" ,round(smmRnoCorrho$coefficients[2,1],rounding)),
      paste(round(smmRnoCorphi$coefficients[2,1],rounding)," (" ,round(smmRnoCorphi$coefficients[2,1],rounding)),
SigmaA <- c(sqrt(as.numeric(smmARnoCorfitness$varcor$Year.1)),
            sqrt(as.numeric(smmRnoCorrho$varcor$Year.1)),
            sqrt(as.numeric(smmRnoCorphi$varcor$Year.1)))
SigRat <- c(smmARnoCorfitness$coefficients[2,1]/sqrt(as.numeric(smmARnoCorfitness$varcor$Year.1)),
            smmRnoCorrho$coefficients[2,1]/sqrt(as.numeric(smmRnoCorrho$varcor$Year.1)),
            smmRnoCorphi$coefficients[2,1]/sqrt(as.numeric(smmRnoCorphi$varcor$Year.1)))

psigmaA <- c(fitnessAanova$`Pr(>Chisq)`[2]/2, RhoAanova$`Pr(>Chisq)`[2]/2, PhiAanova$`Pr(>Chisq)`[2]/2)
confsigma <- c(paste("[",round(CImmARnoCorfitness[2,1],rounding),";",round(CImmARnoCorfitness[2,1],rounding)),
              paste("[",round(CImmRnoCorrho[2,1],rounding),";",round(CImmRnoCorrho[2,2],rounding)),
              paste("[",round(CImmRnoCorphi[2,1],rounding),";",round(CImmRnoCorphi[2,2],rounding)))

TabSel <- data.frame(BetaGlm = BetaGlm, B=SDyears, C=SEyears , D=BetaGLMM , E=SigmaA, DD =confsigma)

```

Table 1:

0.082 (0.028)	0.167	0.097	0.036 (0.044)	0.117	[0.063;0.218]	8.1E-06	0.309
0.1 (0.034)	0.160	0.117	0.052 (0.044)	0.111	[0.053;0.212]	2.5E-04	0.466
-0.248 (0.089)	0.484	0.319	-0.217 (0.098)	0.109	[0;0.425]	3.6E-01	-1.998

Correlation between selection and evolution

```

posterior.mode(as.mcmc(SelToG))

##      var1
## 0.360992

HPDinterval(as.mcmc(SelToG))

##      lower      upper
## var1 -0.3910723 0.635243
## attr("Probability")
## [1] 0.95

```

```

szgr <- 2
szax <- 1.3
marr <- c(4, 4, 1, 1) + 0.1
par(las=1,mar=marr, cex=szgr, cex.lab=szax , cex.axis=szax, lwd=2 , las=1)

bbv <- boxplot(bvpairwise,ylab="Change in breeding values (g)", xlab="Year", range = 1,cex=1.5)
polygon(x = c(2006,2008:2014,2016,2016,2014:2008,2006) -2006, y = c(LowDrift,rev(HighDrift)))

bbv$stats

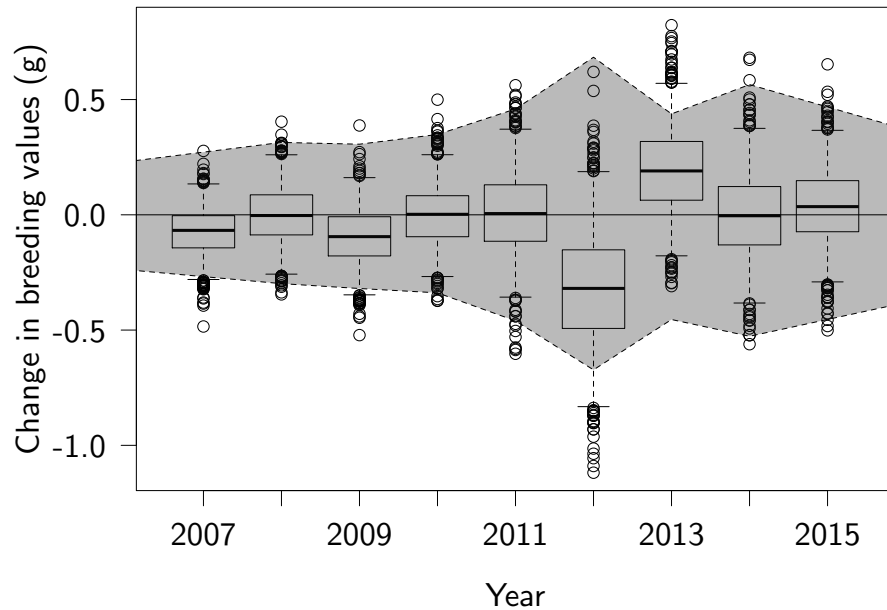
```

```
##           [,1]      [,2]      [,3]      [,4]      [,5]
## [1,] -0.280501568 -0.257383635 -0.347173588 -0.267832000 -0.357132486
## [2,] -0.143366410 -0.087176846 -0.178386364 -0.095028840 -0.114692786
## [3,] -0.067520536 -0.003132208 -0.094707610  0.002214962  0.005447066
## [4,] -0.003739138  0.086721131 -0.008337006  0.082918931  0.130138872
## [5,]  0.134012211  0.260359089  0.161244353  0.260692898  0.371425991
##           [,6]      [,7]      [,8]      [,9]
## [1,] -0.8321504 -0.17794910 -0.382623528 -0.29096950
## [2,] -0.4928537  0.06339068 -0.130565493 -0.07342106
## [3,] -0.3192183  0.19033674 -0.004056911  0.03549705
## [4,] -0.1519085  0.31816724  0.122591670  0.14822783
## [5,]  0.1872504  0.57031481  0.374995899  0.36644027

bbv$group

## [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [36] 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
## [71] 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
## [106] 3 3 3 3 3 3 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
## [141] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
## [176] 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
## [211] 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
## [246] 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7
## [281] 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
## [316] 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
## [351] 9

abline(h=0)
```



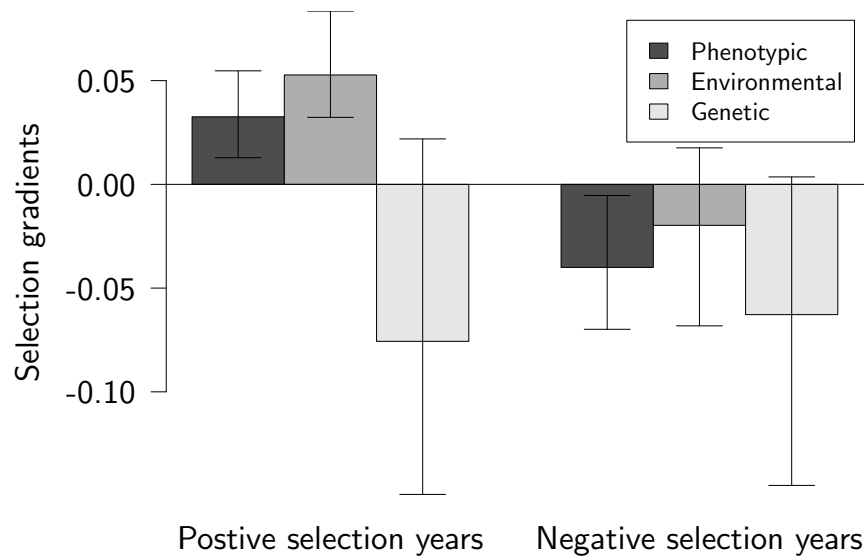
```
density(bvpairwise[,1])

##
## Call:
## density.default(x = bvpairwise[, 1])
##
## Data: bvpairwise[, 1] (1000 obs.); Bandwidth 'bw' = 0.02343
##
##      x              y
## Min.   :-0.5547   Min.   :0.000192
## 1st Qu.: -0.3292   1st Qu.:0.018199
## Median :-0.1036   Median :0.424183
## Mean    :-0.1036   Mean    :1.107278
## 3rd Qu.: 0.1219    3rd Qu.:2.109751
## Max.     : 0.3475   Max.     :3.900320
```

```
setPar()
par(mar=c(4, 6, 1, 1) + 0.1)
Betas <- matrix(sapply(X = list(BetaP1, BetaE1, BetaG1, BetaP2, BetaE2, BetaG2), posterior.m
BetasCI <- sapply(X = list(BetaP1, BetaE1, BetaG1, BetaP2, BetaE2, BetaG2), HPDinterval)

x <- barplot(Betas, beside=TRUE, ylim=c(min(BetasCI),max(BetasCI)),names.arg = c("Postive se
abline(h=0)
arrows(x0 = x, y0=BetasCI[1,],y1=BetasCI[2,],angle = 90,code = 3)
```

```
mtext(side=2, "Selection gradients", line=4, las=0, cex=szax*szgr)
```



```
posterior.mode(BetaG1 - BetaE1)

##          var1
## -0.1234186

HPDinterval(BetaG1 - BetaE1)

##          lower      upper
## var1 -0.2180723 -0.02770633
## attr(,"Probability")
## [1] 0.95

mean((BetaG1 - BetaE1)>0)*2

## [1] 0.006

posterior.mode(BetaG2 - BetaE2)

##          var1
## -0.009610168

HPDinterval(BetaG2 - BetaE2)
```

```

##           lower      upper
## var1 -0.1379426 0.05755331
## attr("Probability")
## [1] 0.95

mean((BetaG2 - BetaE2)>0)*2

## [1] 0.424

posterior.mode(BetaE1 - BetaE2)

##           var1
## 0.07575993

HPDinterval(BetaE1 - BetaE2)

##           lower      upper
## var1 0.03828845 0.1372658
## attr("Probability")
## [1] 0.95

mean((BetaE1 - BetaE2)<0)*2

## [1] 0

posterior.mode(BetaG1 - BetaG2)

##           var1
## -0.003689573

HPDinterval(BetaG1 - BetaG2)

##           lower      upper
## var1 -0.08005378 0.07575714
## attr("Probability")
## [1] 0.95

mean((BetaG1 - BetaG2)>0)*2

## [1] 0.908

mat <- matrix(c(1, 2, 3, 4, 5, 6),ncol = 2)
layout(mat, widths = rep.int(1, ncol(mat)), heights = c(1,1,1), respect = FALSE )

szgr <- 2
szax <- 1.3

```



```

par(las=1, cex=szgr, cex.lab=szax , cex.axis=szax, lwd=2 ,pch=16, las=1,
    oma=c(0,0,0,0))

nyears <- 6
h2 <- 0.3

### Graph constant
par(mar=c(3, 4, 2, 1) + 0.1)
constant_selcov <- rep(1, times=nyears)
constantevol <- constant_selcov * h2

constant_tp <- as.matrix(rbind(constant_selcov, constantevol))

cumulative_constant <- cumsum(constantevol)

xb1 <- barplot(height = constant_tp, ylim = c(-1.5,2), beside = TRUE,
               main="\\textbf{(A)}", yaxt="n", border = NA)
axis(side=2, at = c(-1,0,1,2))
axis(side=1, at = seq(from=min(xb1), to=max(xb1), length.out = nyears),
      labels = FALSE, tick = TRUE)
mtext(text = "Differential", side = 2, line = 2, cex=3, las=0)
abline(h=0)

lines(x=seq(from=min(xb1), to=max(xb1), length.out = nyears), y=cumulative_constant)
box(which = "plot", lty = "solid")

### Graph fluctuation
par(mar=c(3, 4, 2, 1) + 0.1)
flu_selcov <- c(1.2,0.82,0.6,0.94,1.3,0.65)
flu_evol <- flu_selcov * h2

flu_tp <- as.matrix(rbind(flu_selcov, flu_evol))

cumulative_flu <- cumsum(flu_evol)

xb2 <- barplot(height = flu_tp, ylim = c(-1.5,2), beside = TRUE,
               main="\\textbf{(B)}", yaxt="n", border = NA)
axis(side=2, at = c(-1,0,1,2))
axis(side=1, at = seq(from=min(xb1), to=max(xb1), length.out = nyears),
      labels = FALSE, tick = TRUE)
mtext(text = "Differential", side = 2, line = 2, cex=3, las=0)
abline(h=0)

lines(x=seq(from=min(xb2), to=max(xb2), length.out = nyears), y=cumulative_flu)
box(which = "plot", lty = "solid")

```

```

### Graph reversal
par(mar=c(3, 4, 2,1) + 0.1)
rev_selcov <- c(0.6,-1.1,-0.8,0.9,-0.22,0.5)
rev_evol <- rev_selcov * h2

rev_tp <- as.matrix(rbind(rev_selcov, rev_evol))

cumulative_rev <- cumsum(rev_evol)

xb3 <- barplot(height = rev_tp, ylim = c(-1.5,2), beside = TRUE,
               main="\\textbf{(C)}", yaxt="n", border = NA)
axis(side=2, at = c(-1,0,1,2))
axis(side=1, at = seq(from=min(xb1), to=max(xb1), length.out = nyyears),
      labels = 1:6,tick = TRUE)
mtext(text = "Differential", side = 2, line = 2, cex=3, las=0)
abline(h=0)

lines(x=seq(from=min(xb3), to=max(xb3), length.out = nyyears), y=cumulative_rev)
box(which = "plot", lty = "solid")
mtext(text = "Year", side = 1, line = 2, cex=3)

### legend
par(mar=c(0, 1, 2,0) + 0.1)
plot(1, type="n", axes = FALSE, xlab="", ylab="")
legend(x = "topleft", legend = c("Selection differential", "Genetic differential", "Evolutionary change"),
      bty = "n",
      col = c(grey(seq(0.3^2.2, 0.9^2.2, length = 2)^(1/2.2)), "black"),
      lty = c(0, 0, 1), lwd = c(0, 0, 3),
      pch = c(22, 22, NA),
      pt.bg = c(grey(seq(0.3^2.2, 0.9^2.2, length = 2)^(1/2.2)), NA),
      pt.cex = 3, cex=1.5)
#cex=1, fill = , xjust=0.5, yjust=0.5, lty=c(0,0,1), lwd = c(0, 0, 1))

### Graph decoupling
par(mar=c(3, 1, 2, 4) + 0.1)
dec_selcov <- c(1.2,0.82,0.6,0.94,1.3,0.65)
dec_evol <- h2* dec_selcov - 0.4

dec_tp <- as.matrix(rbind(dec_selcov, dec_evol))

cumulative_dec <- cumsum(dec_evol)

xb4 <- barplot(height = dec_tp, ylim = c(-1.5,2), beside = TRUE,
               main="\\textbf{(D)}", yaxt="n", border = NA)
axis(side=2, at = c(-1,0,1,2), labels = FALSE, tick = TRUE)

```

```

axis(side=1, at = seq(from=min(xb1), to=max(xb1), length.out = nyears),
      labels = FALSE, tick = TRUE)
abline(h=0)
lines(x=seq(from=min(xb4), to=max(xb4), length.out = nyears), y=cumulative_dec)
box(which = "plot", lty = "solid")
### Graph decoupling + flu
par(mar=c(3, 1, 2, 4) + 0.1)
dec_selcov <- c(0.6,-1.1,-0.8,0.9,-0.22,0.5)
dec_evol <- 0.3+dec_selcov * h2

dec_tp <- as.matrix(rbind(dec_selcov, dec_evol))

cumulative_dec <- cumsum(dec_evol)

xb4 <- barplot(height = dec_tp, ylim = c(-1.5,2), beside = TRUE,
               main="\\textbf{(E)}", yaxt="n", border = NA)
axis(side=2, at = c(-1,0,1,2), labels = FALSE, tick = TRUE)
axis(side=1, at = seq(from=min(xb1), to=max(xb1), length.out = nyears),
      labels = 1:6, tick = TRUE)
abline(h=0)

lines(x=seq(from=min(xb4), to=max(xb4), length.out = nyears), y=cumulative_dec)
box(which = "plot", lty = "solid")
mtext(text = "Year", side = 1, line = 2, cex = 3)

```

