

# **Exploring the effects of discarding using the Atlantis model**

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**Managing discards in fisheries**  
**9-13 April 2018**  
**Zaragoza**

# Introduction

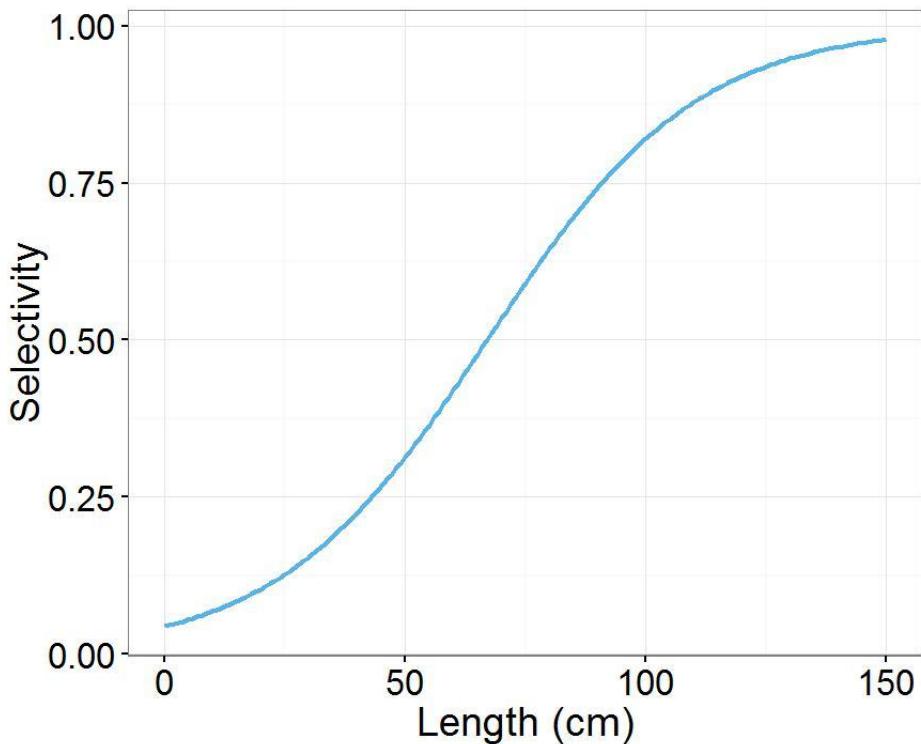
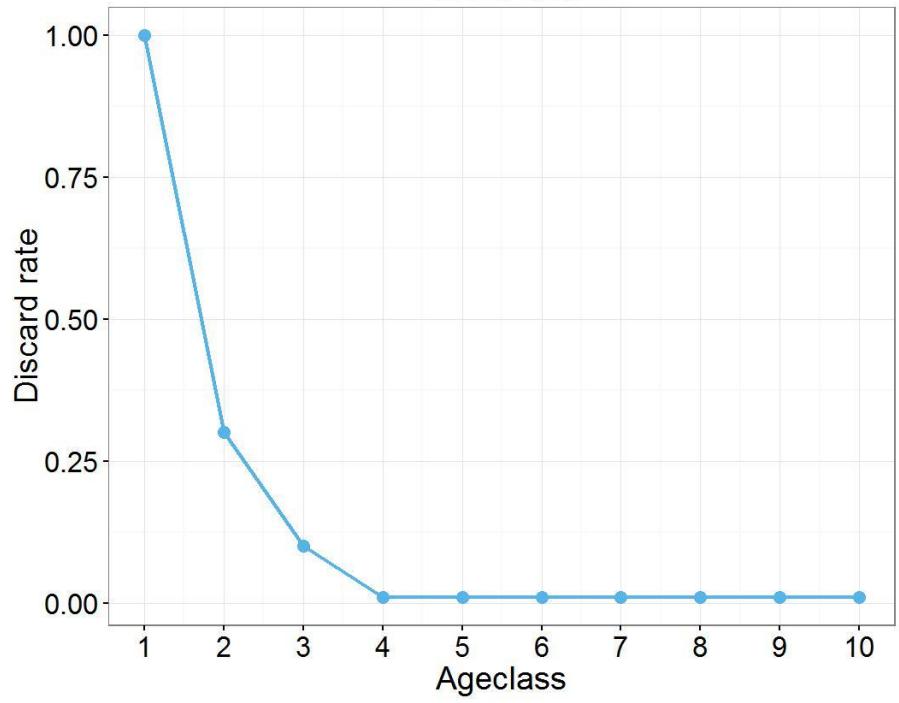
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- Ecological and economic effects of discarding investigated.
- Five scenarios with different discard rate and selectivity.
- Discarding of cod and haddock only

# Modeling discards

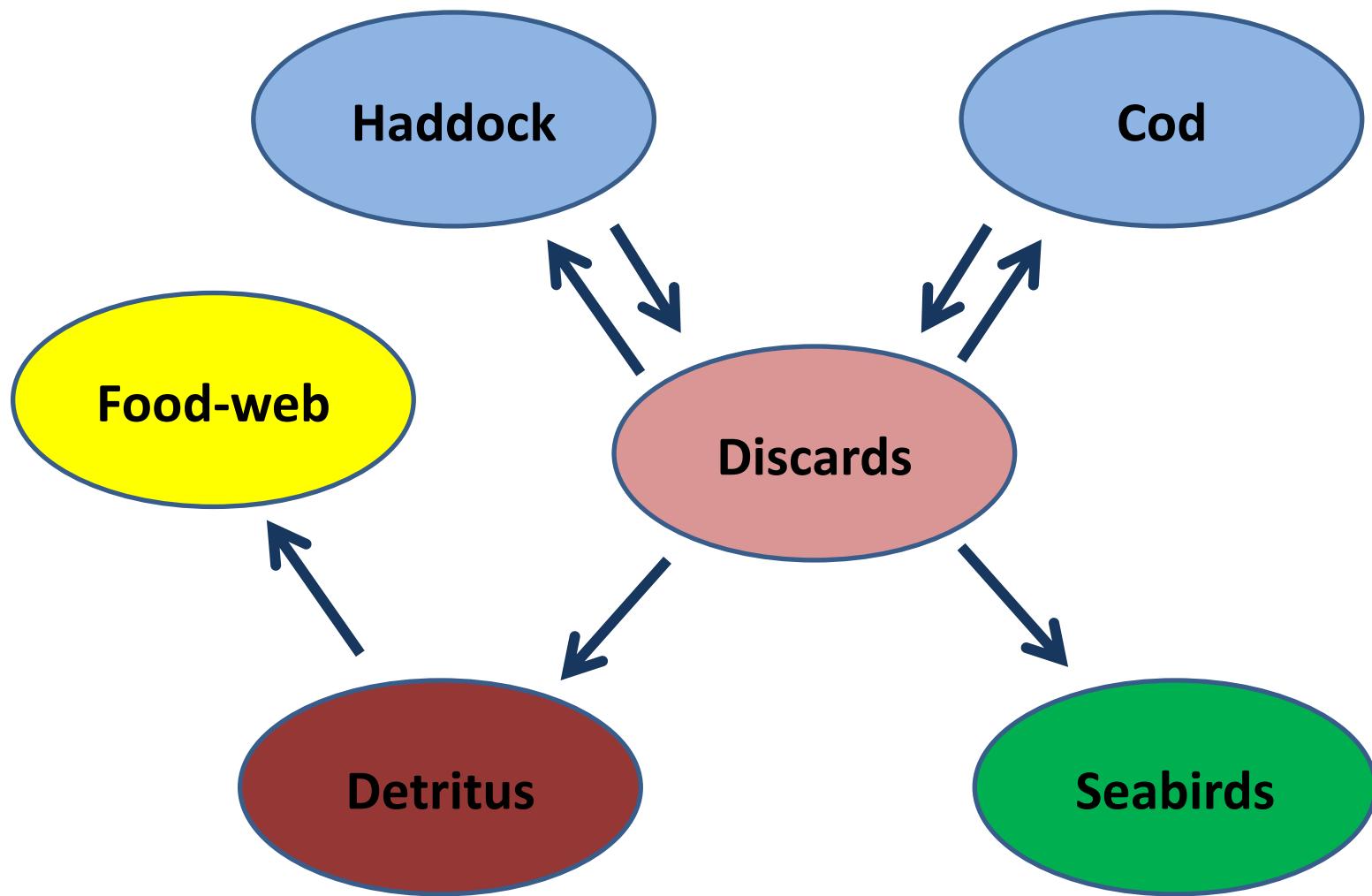
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Haddock



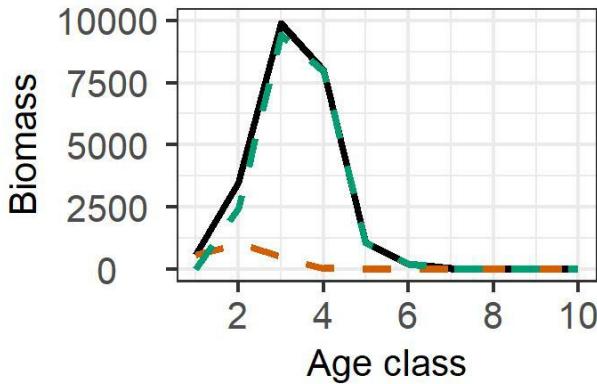
# Modeling discards

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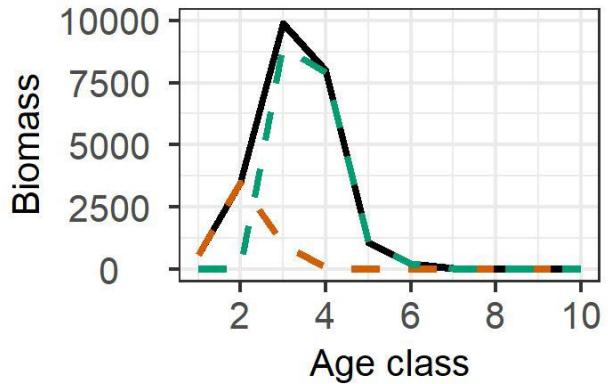


# The scenarios

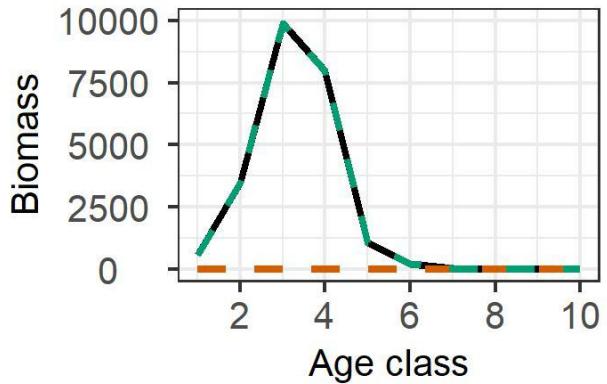
1) Status quo



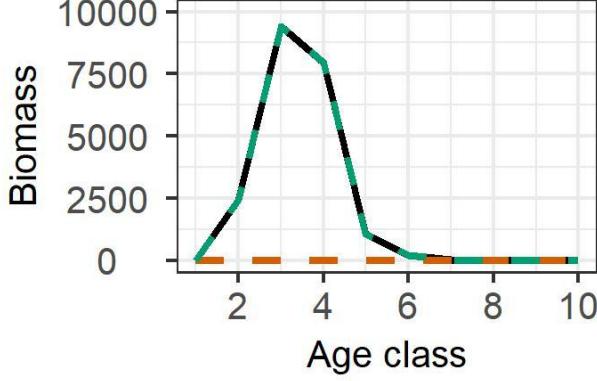
2) More discards



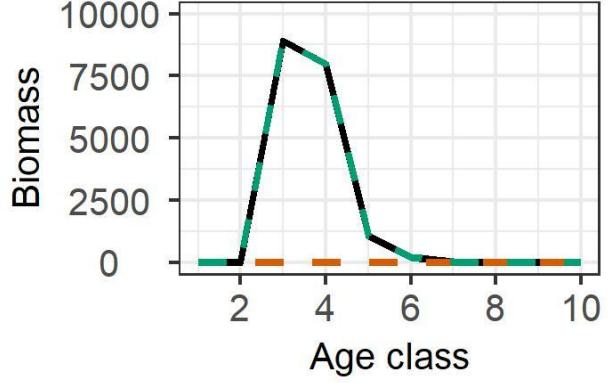
3) No discards



4) Improved selectivity



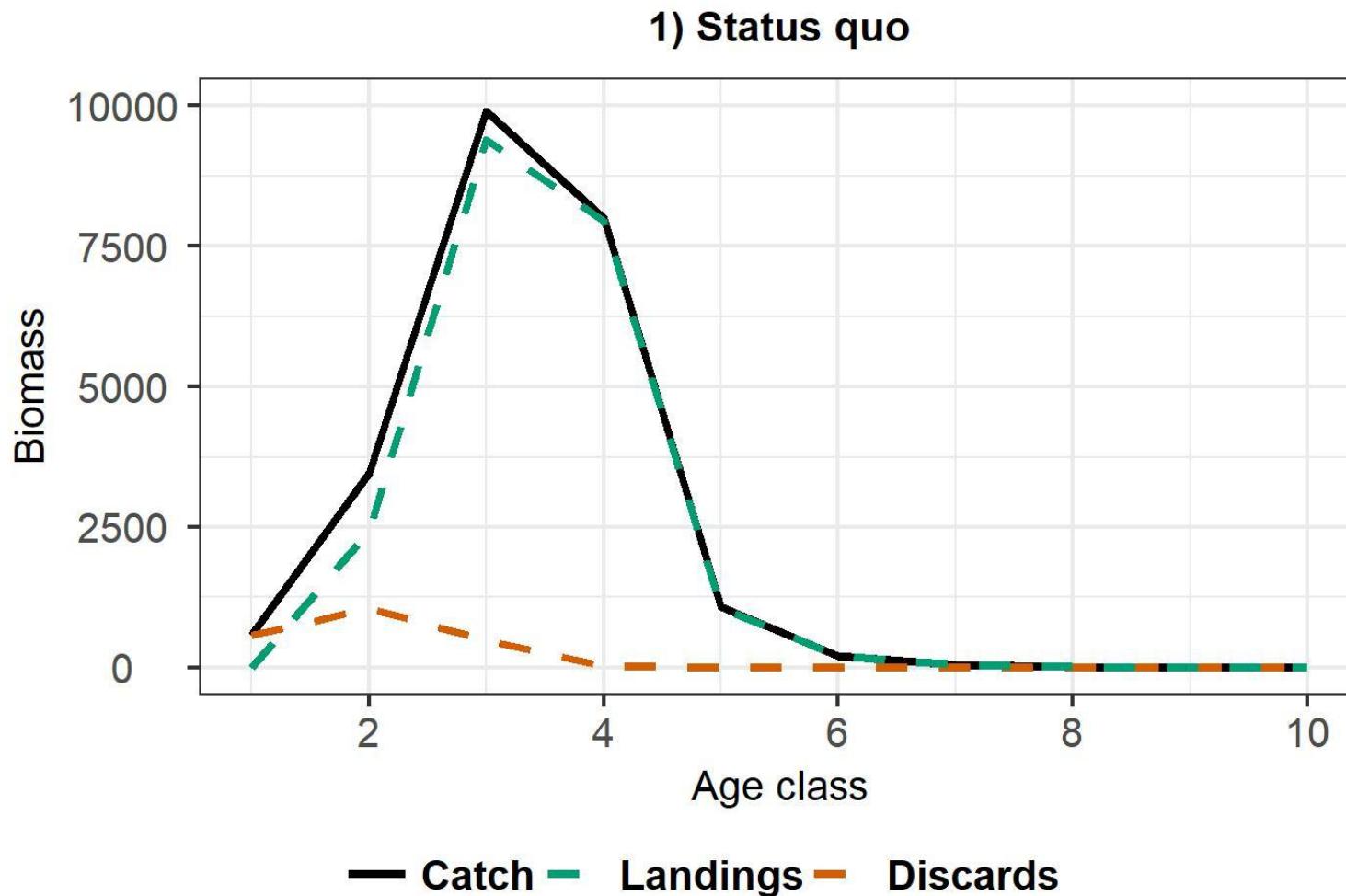
5) Perfect compliance



— Catch — Landings — Discards

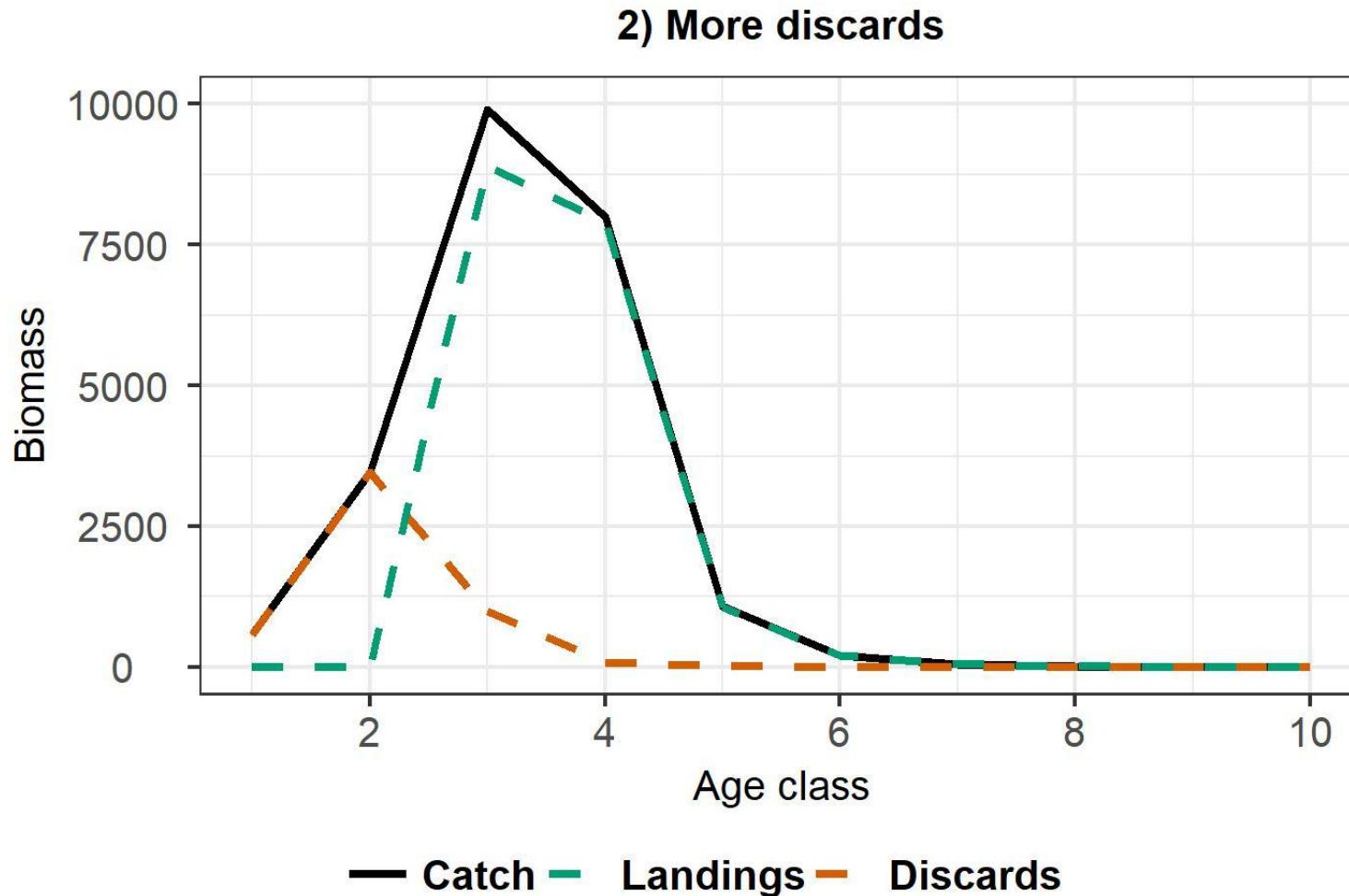
# The scenarios

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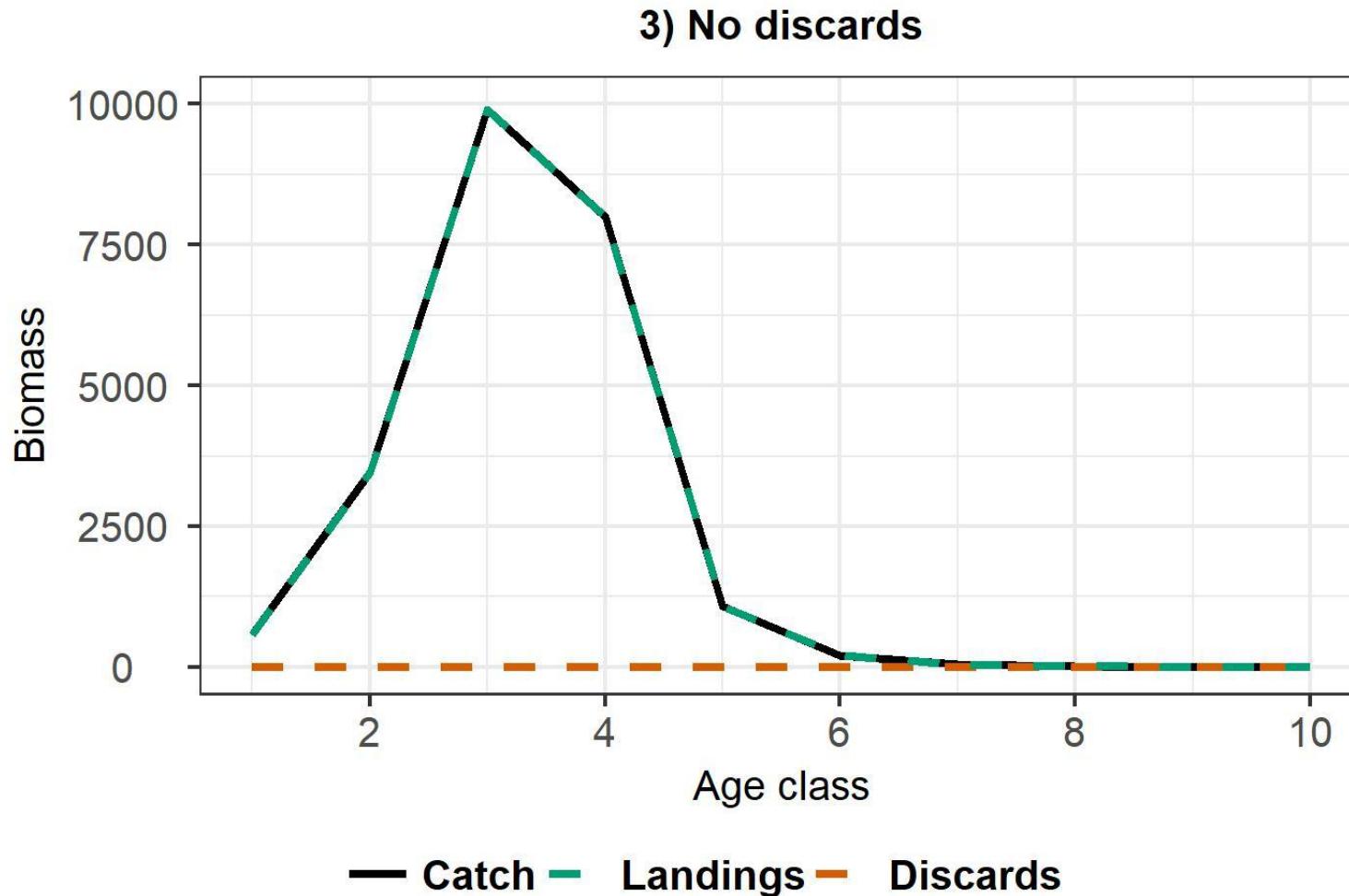
# The scenarios

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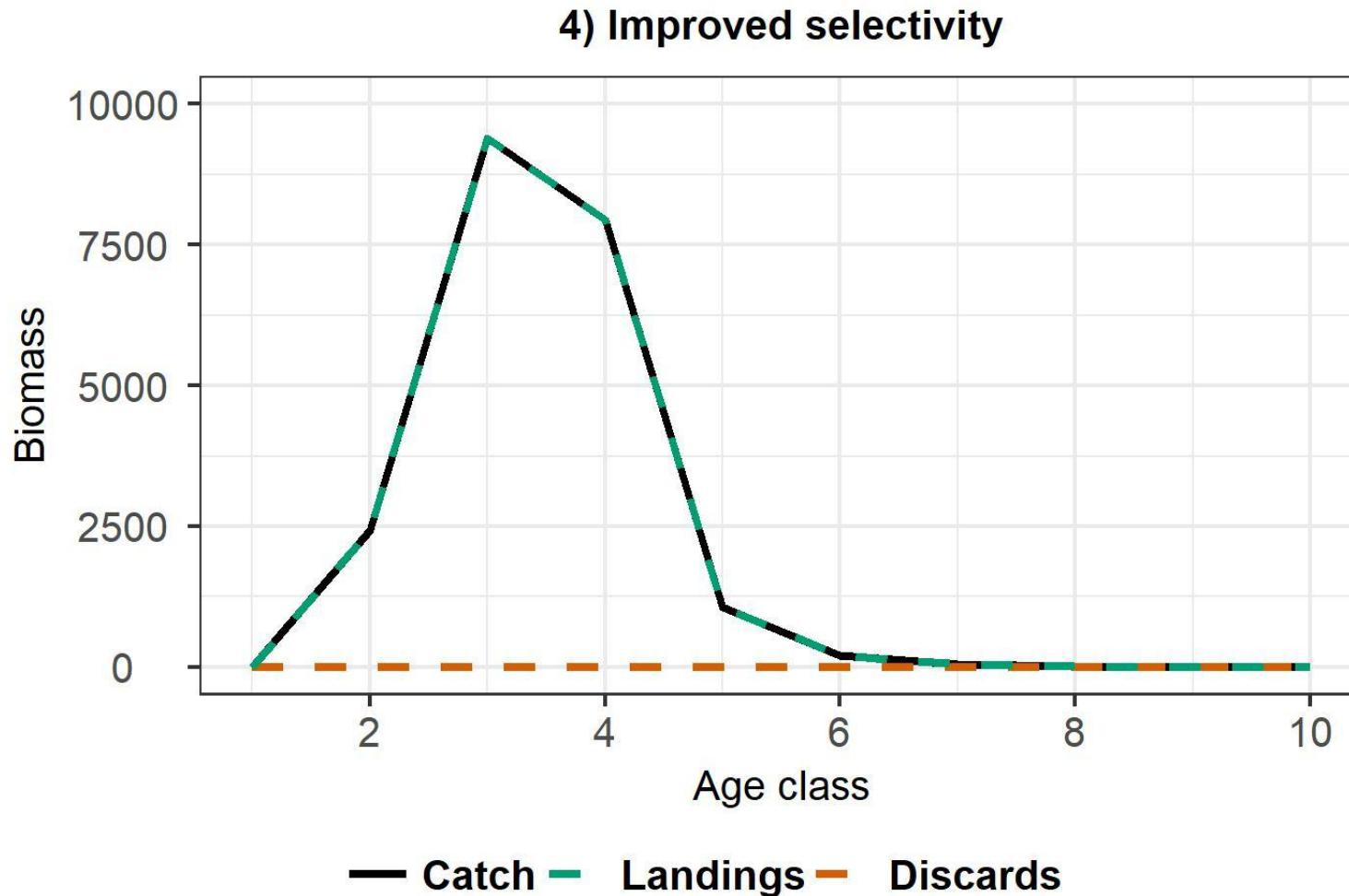
# The scenarios

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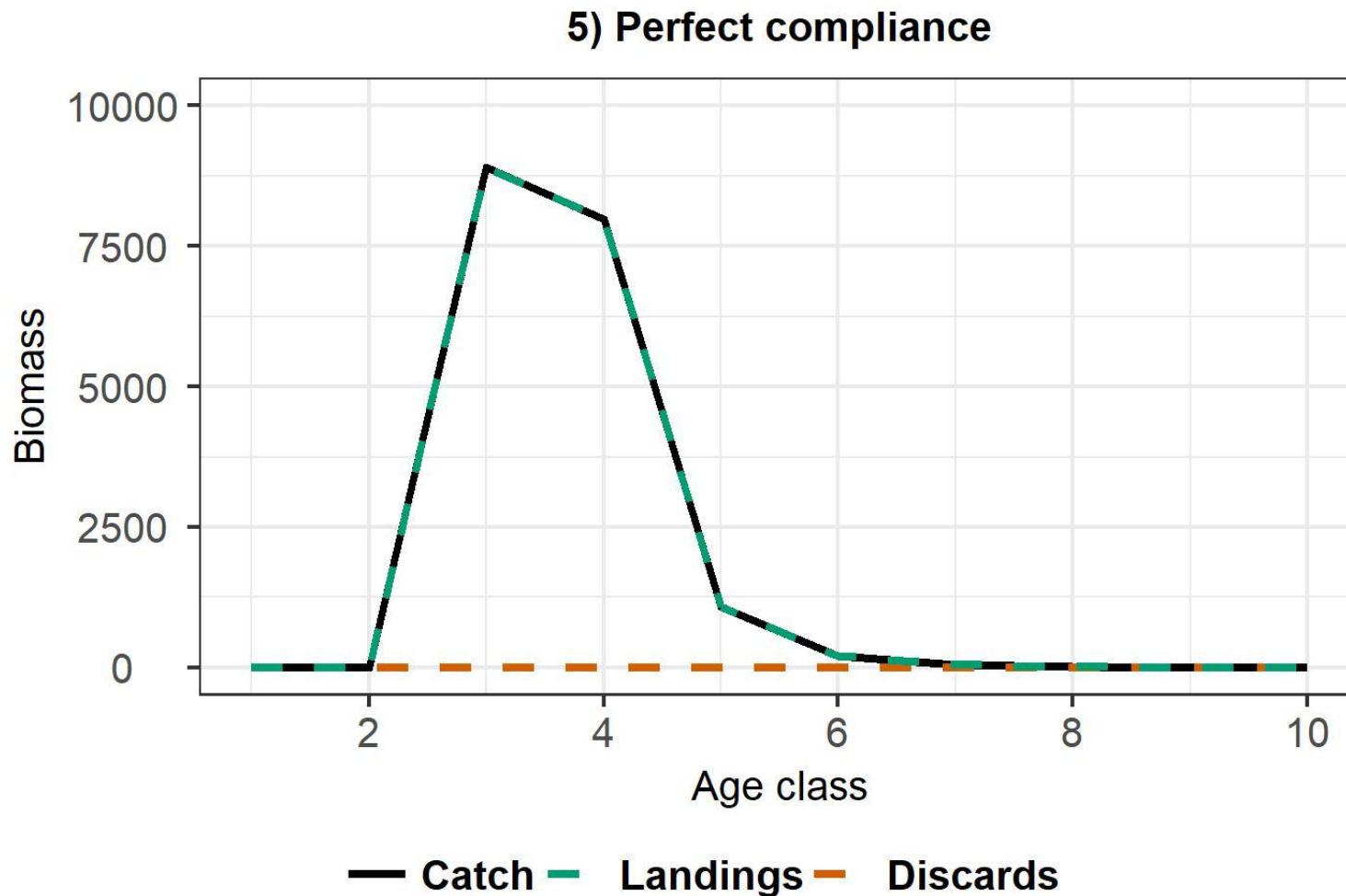
# The scenarios

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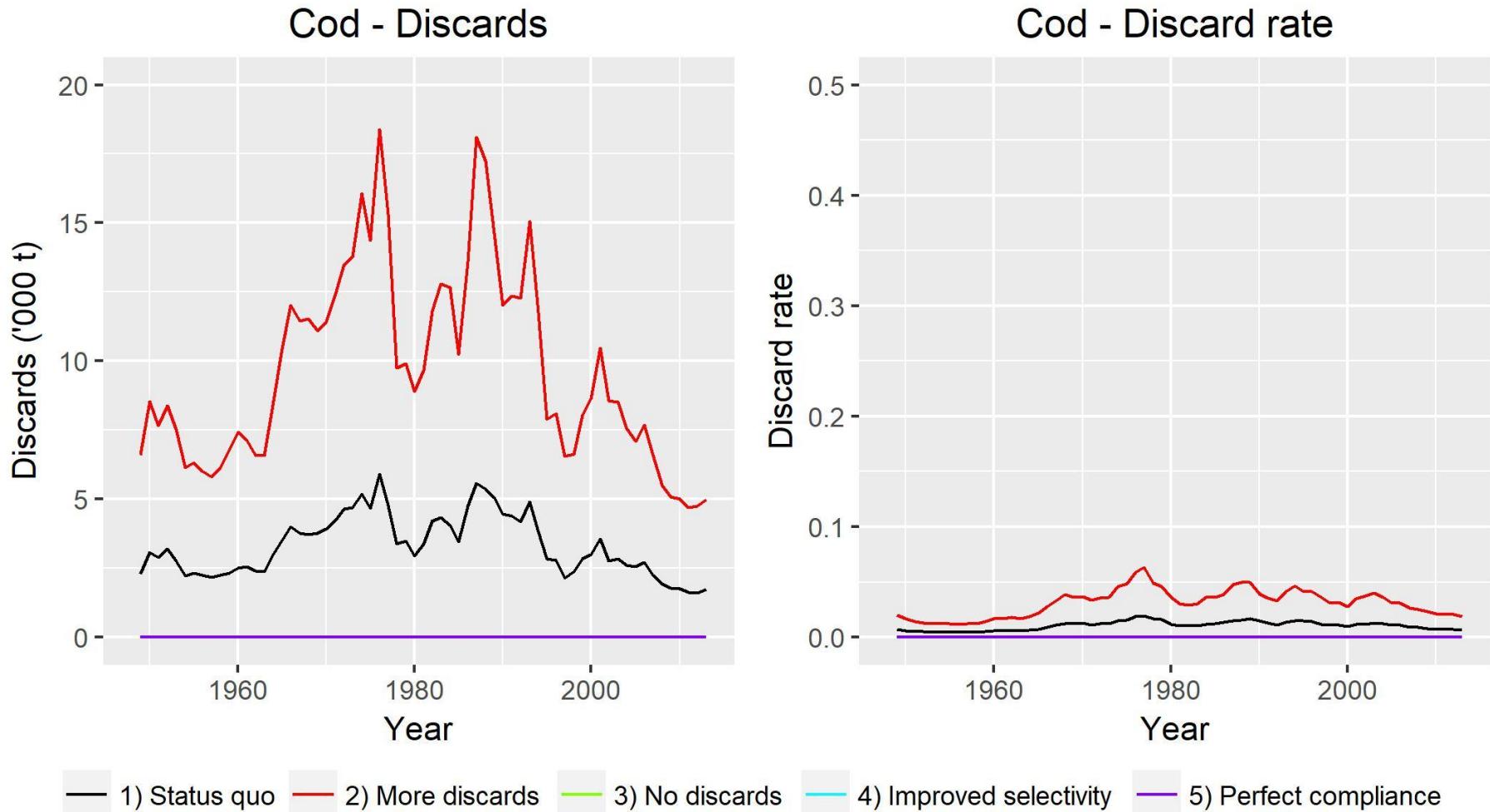


# The scenarios

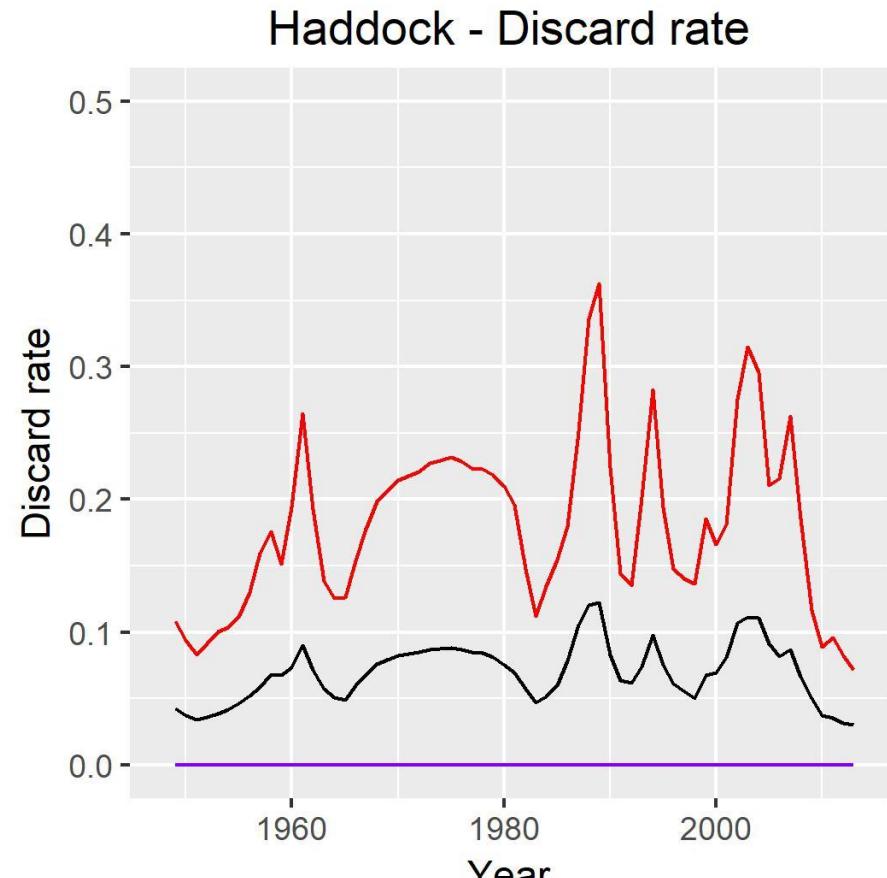
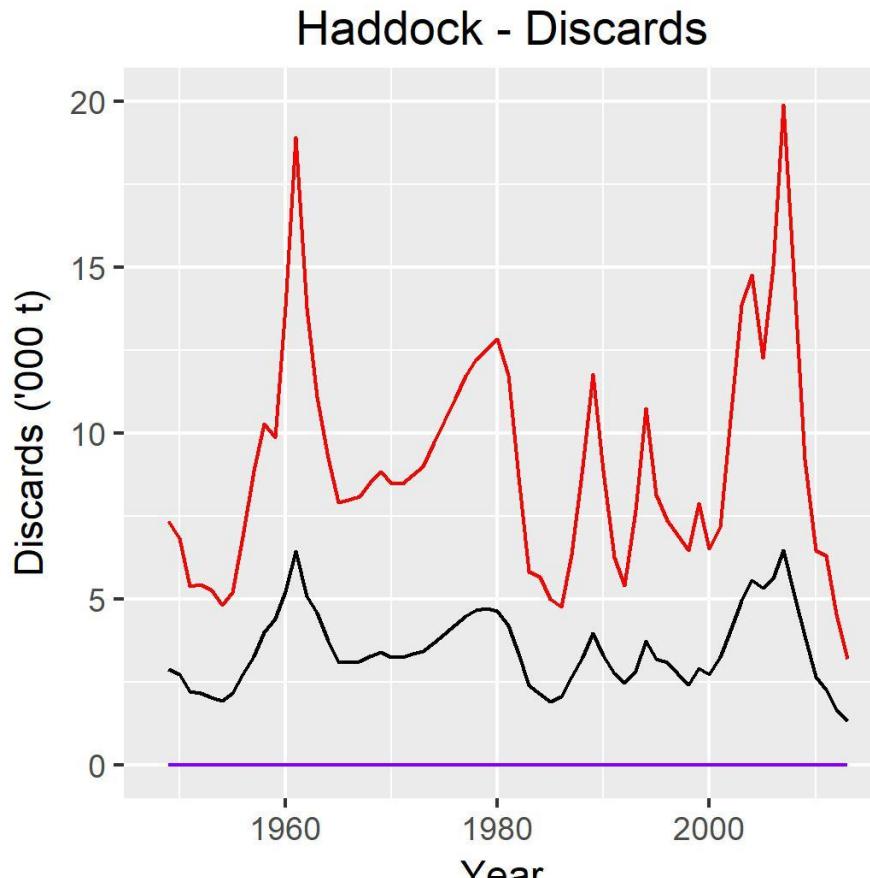
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# Simulated discards of cod

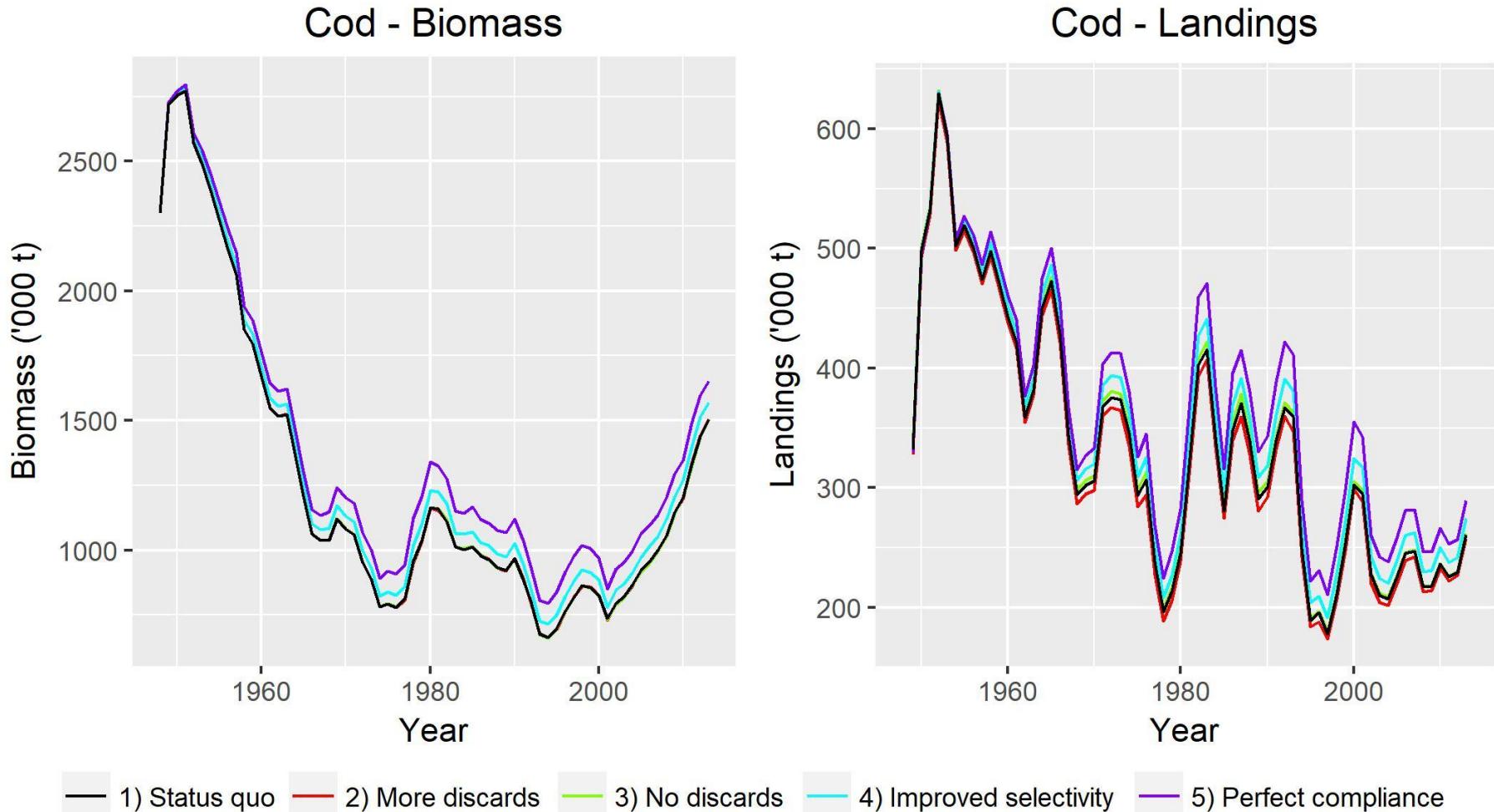


# Simulated discards of haddock

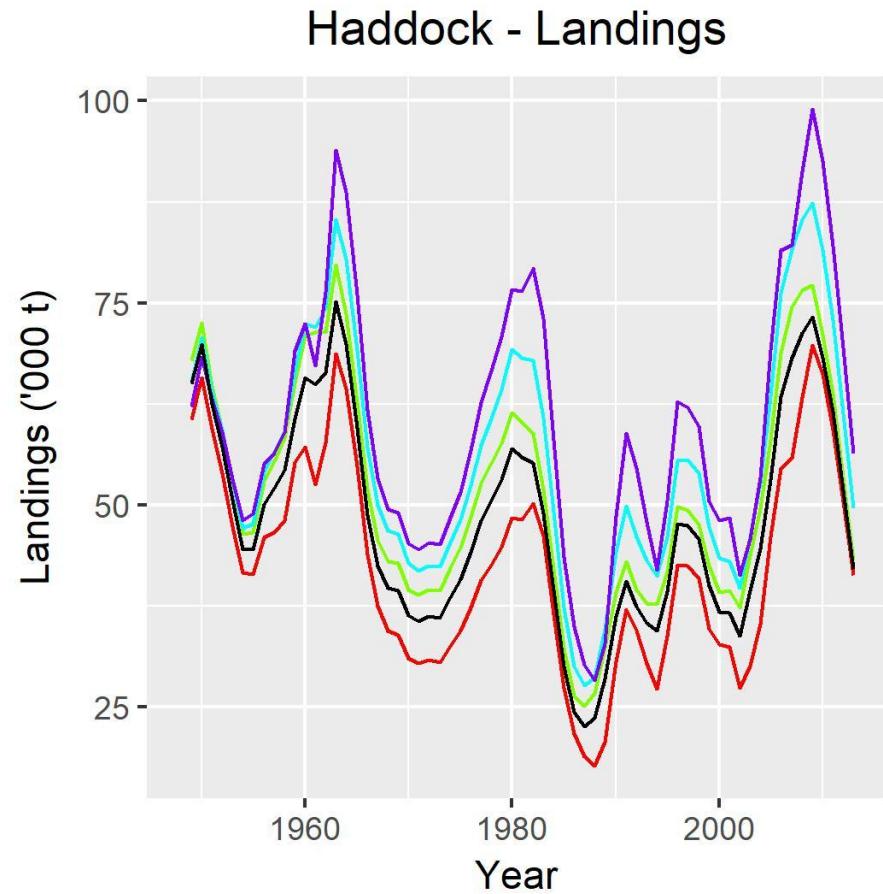
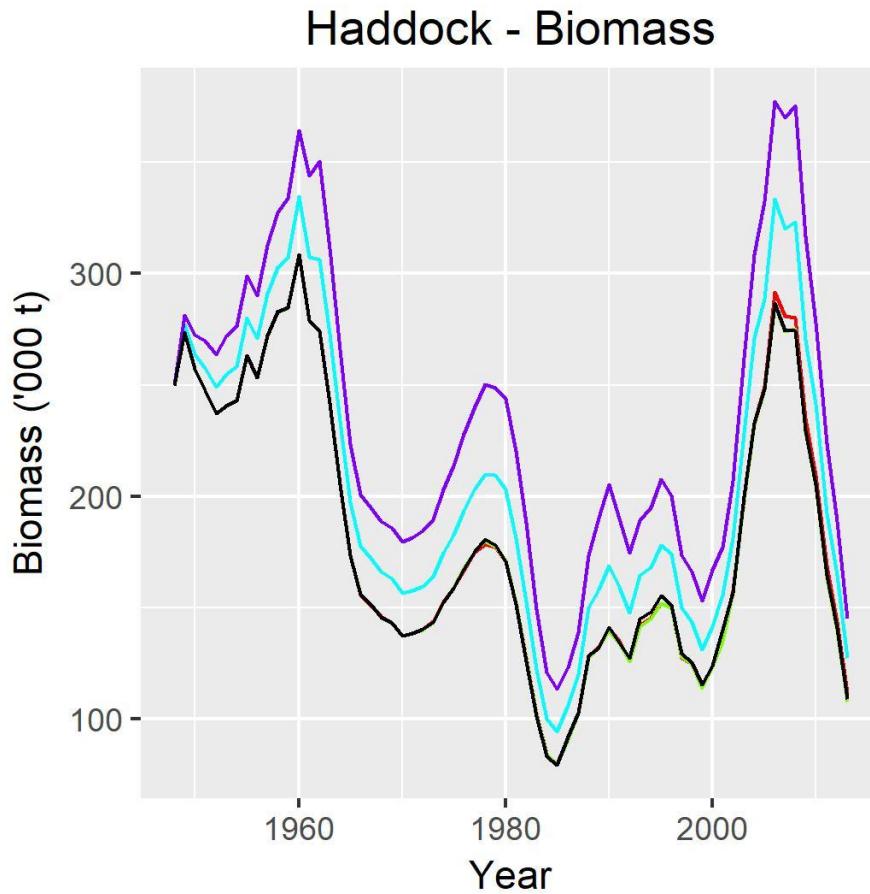


- 1) Status quo — 2) More discards
- 3) No discards — 4) Improved selectivity
- 5) Perfect compliance

# Simulated biomass and landings of cod



# Simulated biomass and landings of haddock



— 1) Status quo   — 2) More discards   — 3) No discards   — 4) Improved selectivity   — 5) Perfect compliance

# Calculating economic indicators

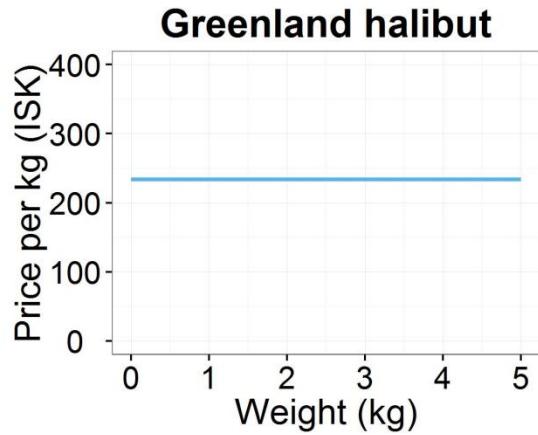
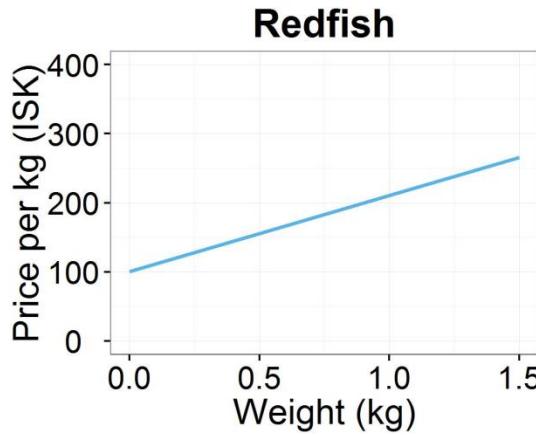
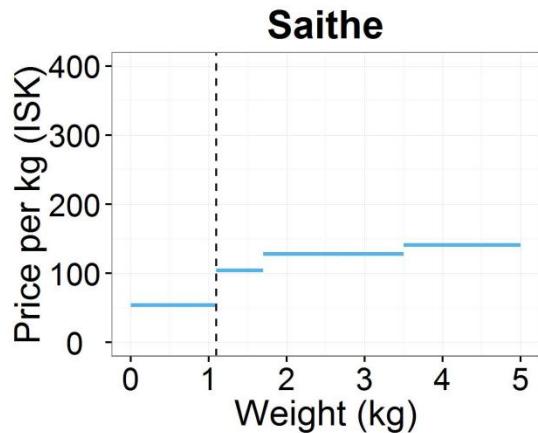
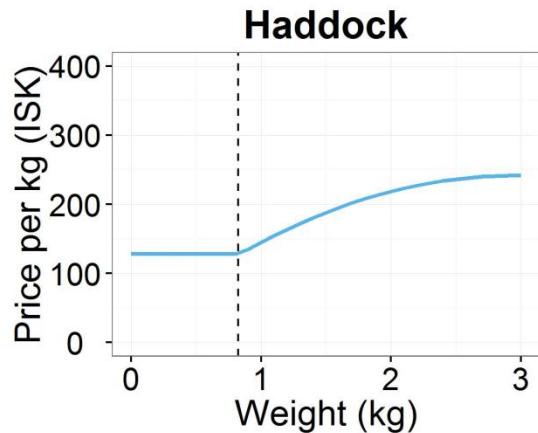
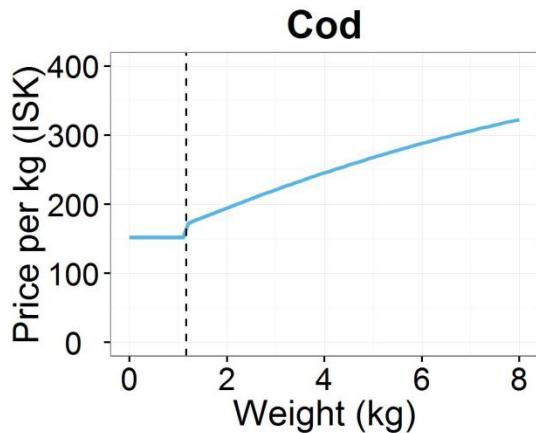
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- Revenue
- Cost
- Profit



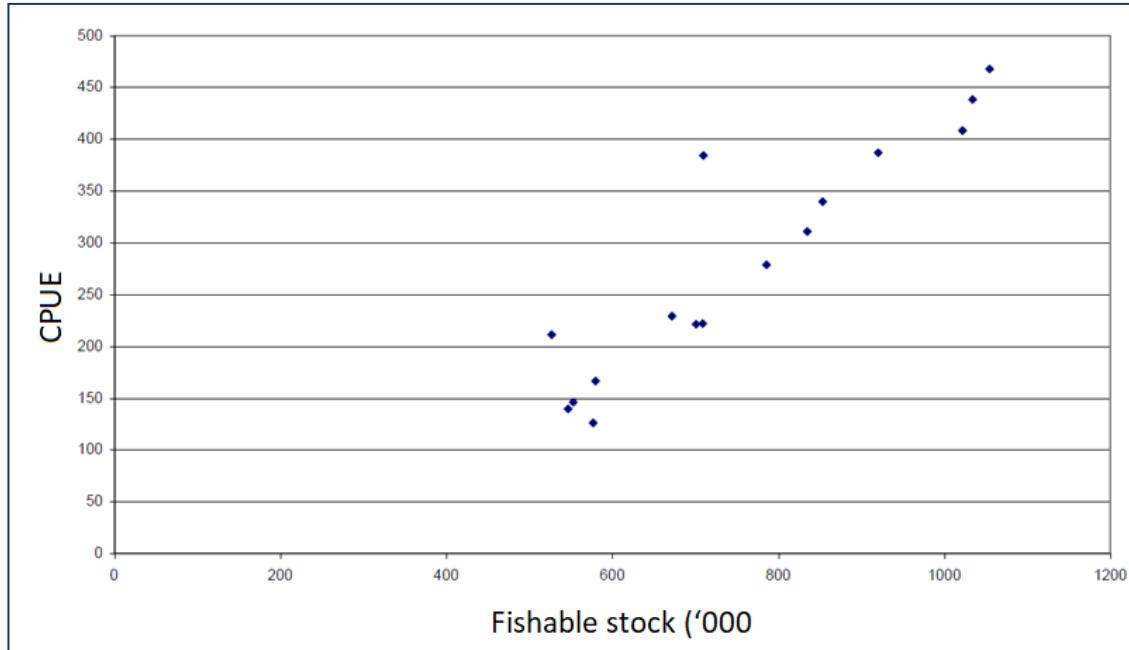
# Revenue

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# Cost

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$$C_{s,i,t} = 44,800 * \left( \frac{B_{s,1,2012}}{B_{s,i,t}} \right)^{0.8}$$

# Profit

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## Demersal species

$$Profit_{s,i,t} = \sum_w (Y_{w,s,i,t} * p_{w,s}) - C_{s,i,t} \sum_w (Y_{w,s,i,t} + D_{w,s,i,t})$$

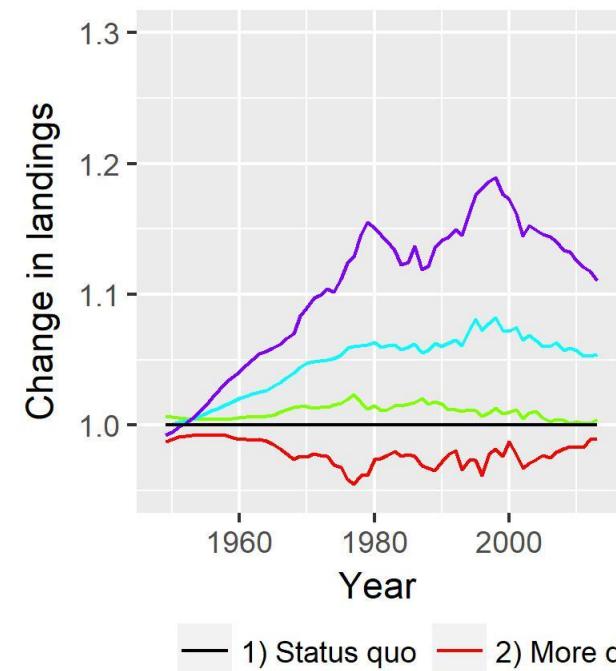
## Pelagic species

$$P_{s,i,t} = p_s * Y_{s,i,t} - C_s * (Y_{s,i,t} + D_{s,i,t})$$

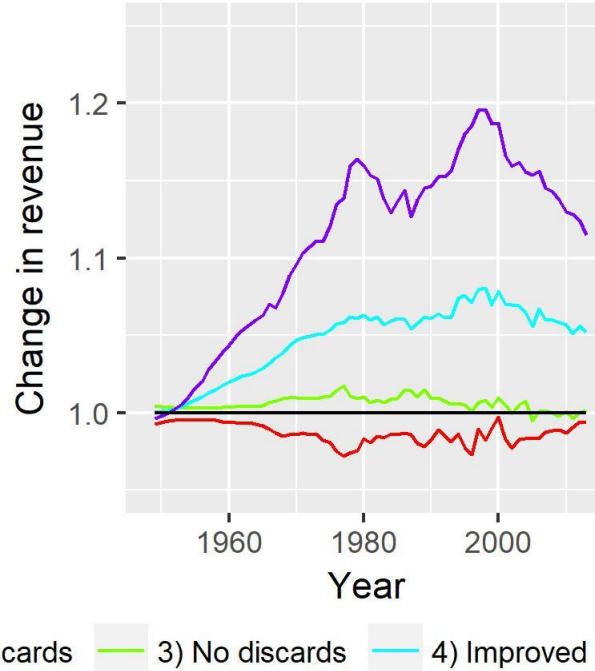


# Economic effects on cod fisheries

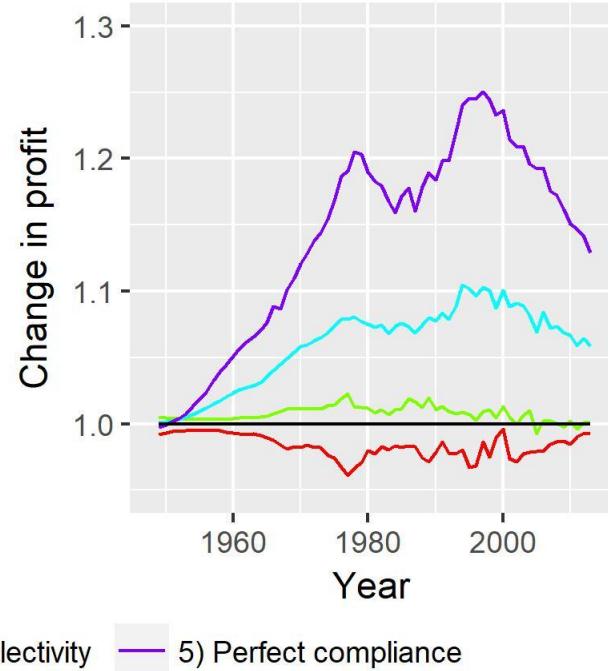
Cod - Landings



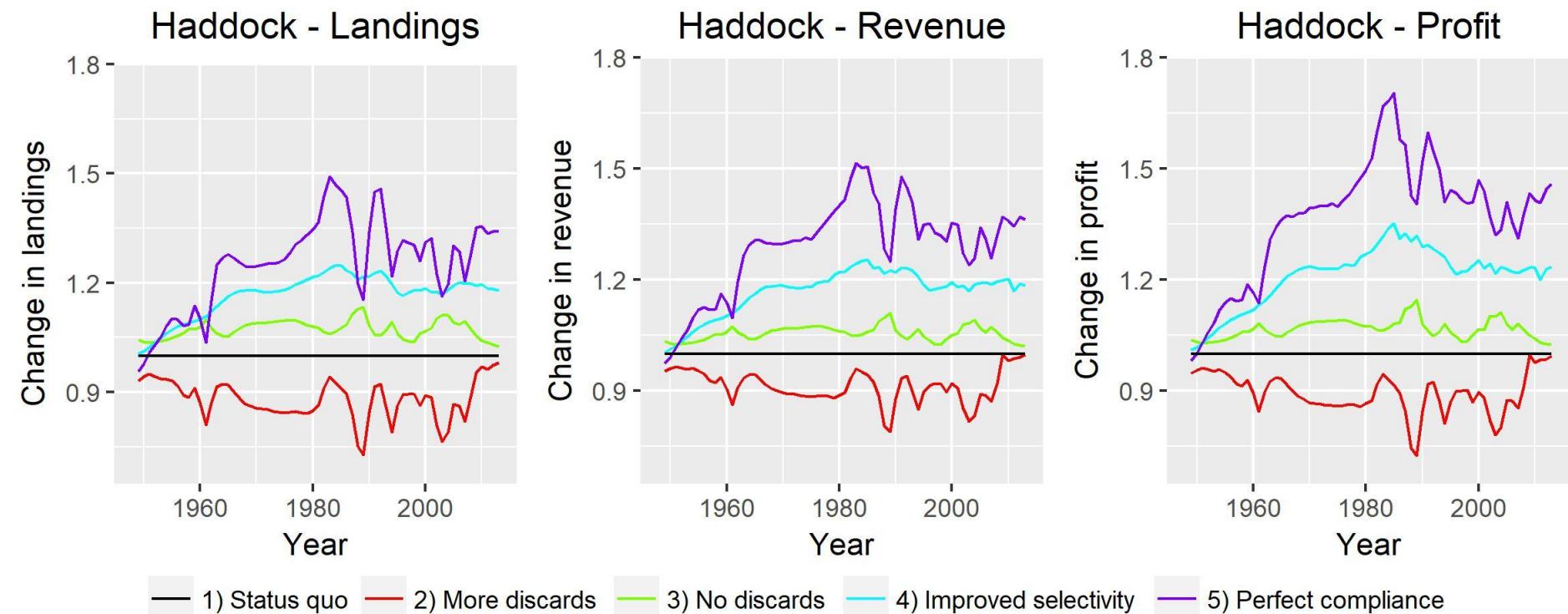
Cod - Revenue



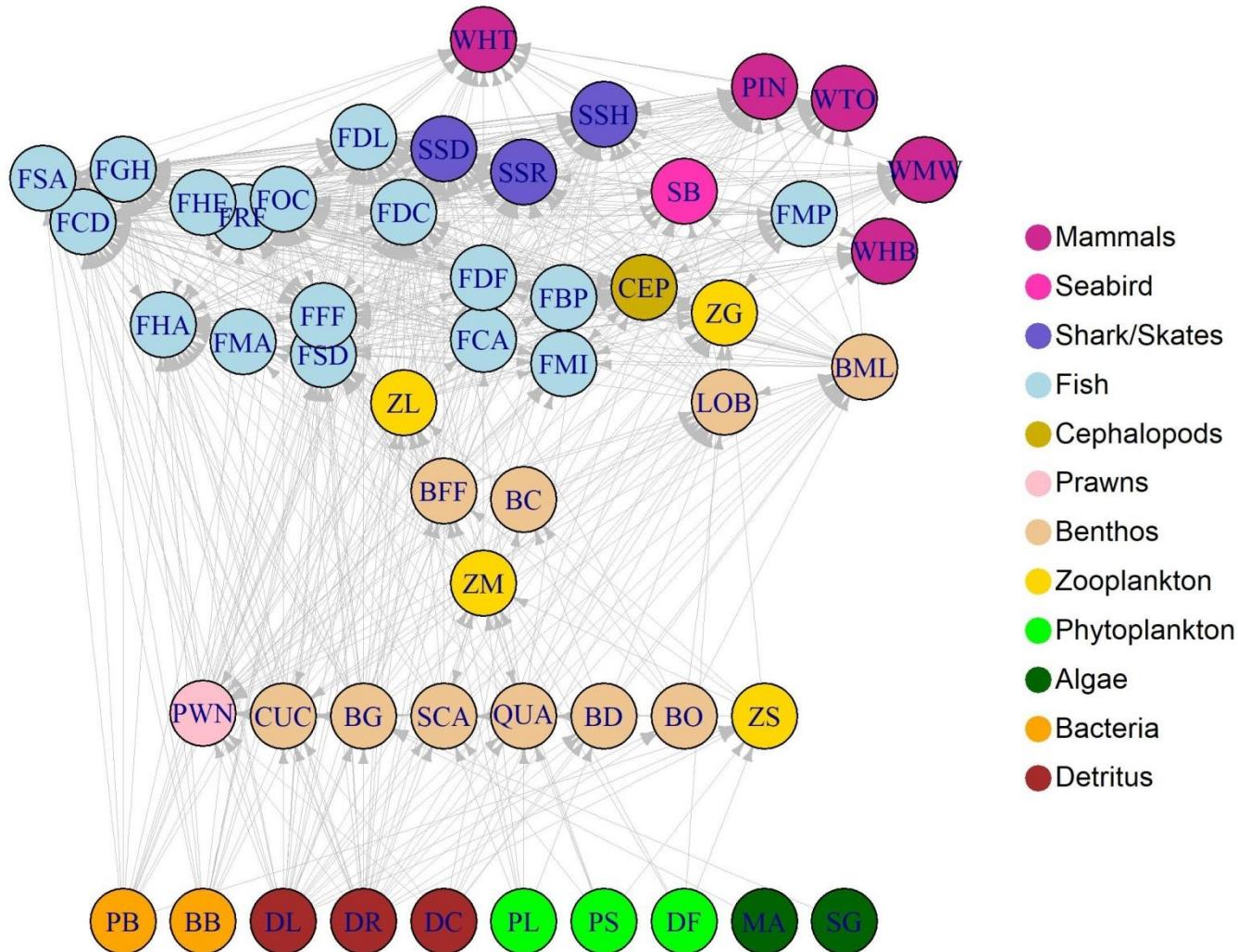
Cod - Profit



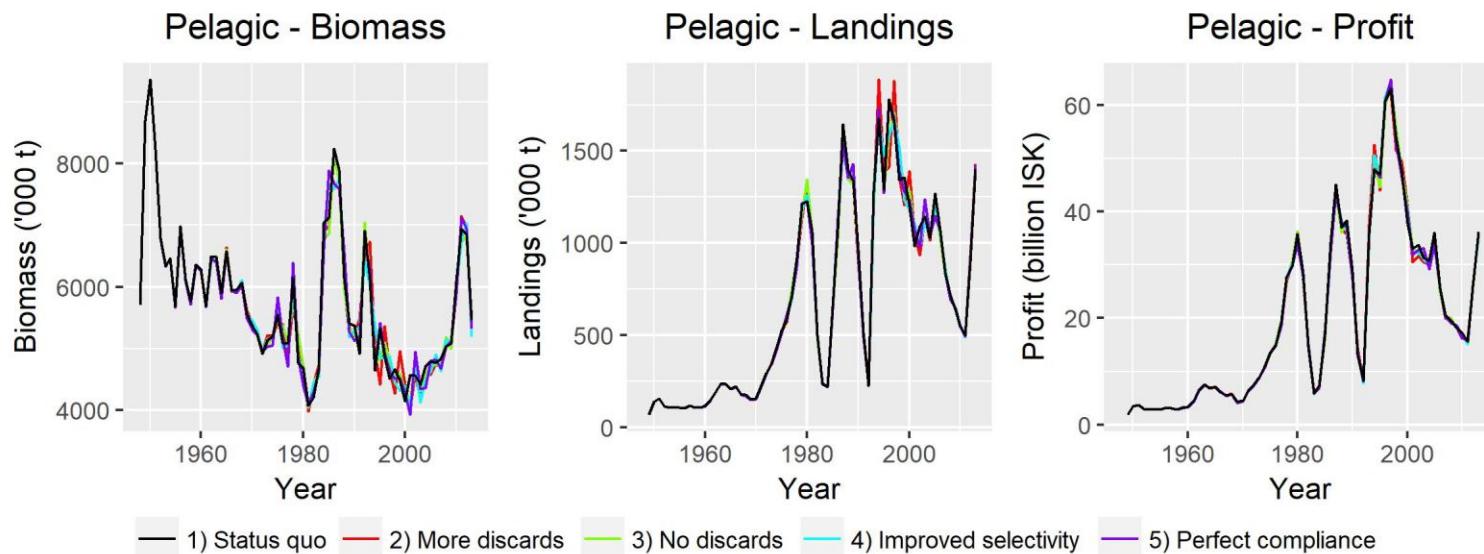
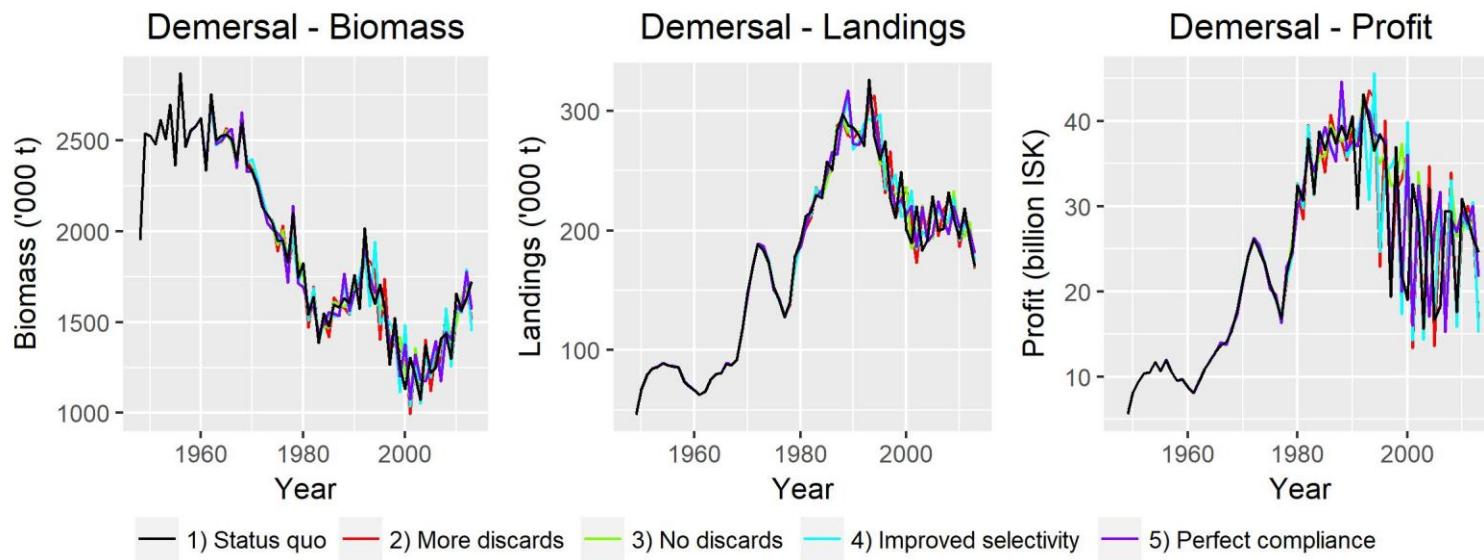
# Economic effects on haddock fisheries



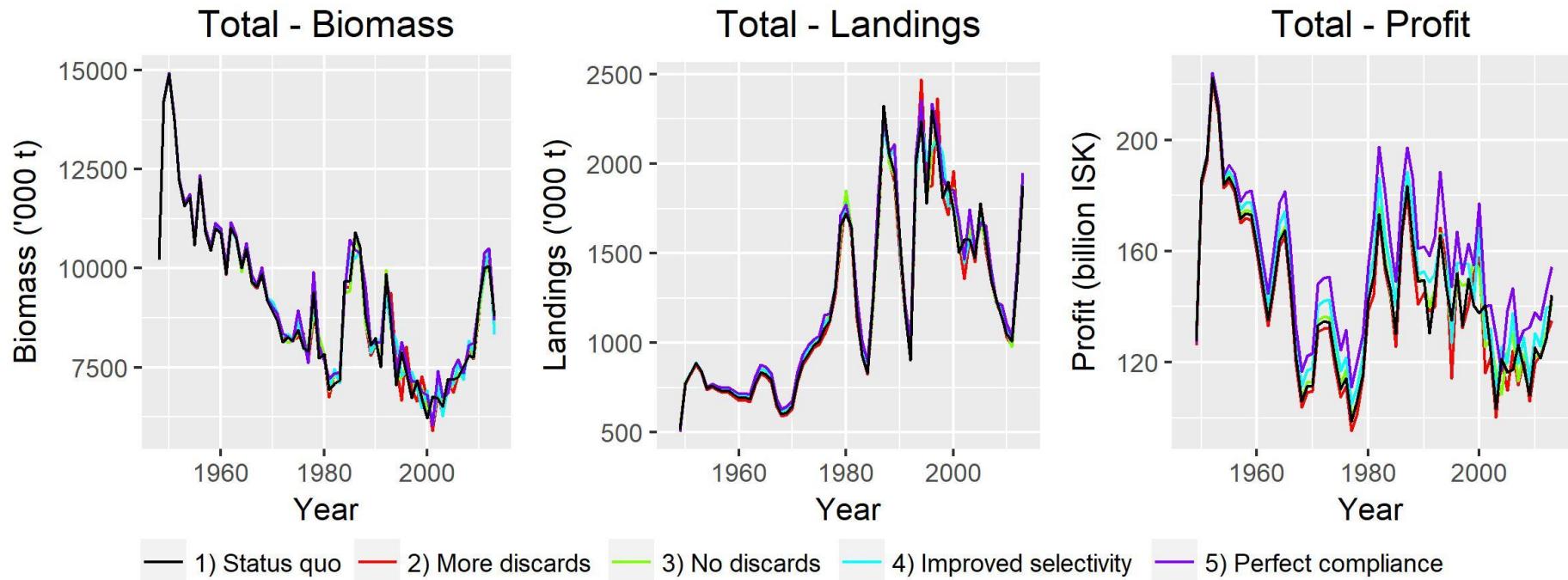
# Everything is connected



# Economic effects of other fisheries



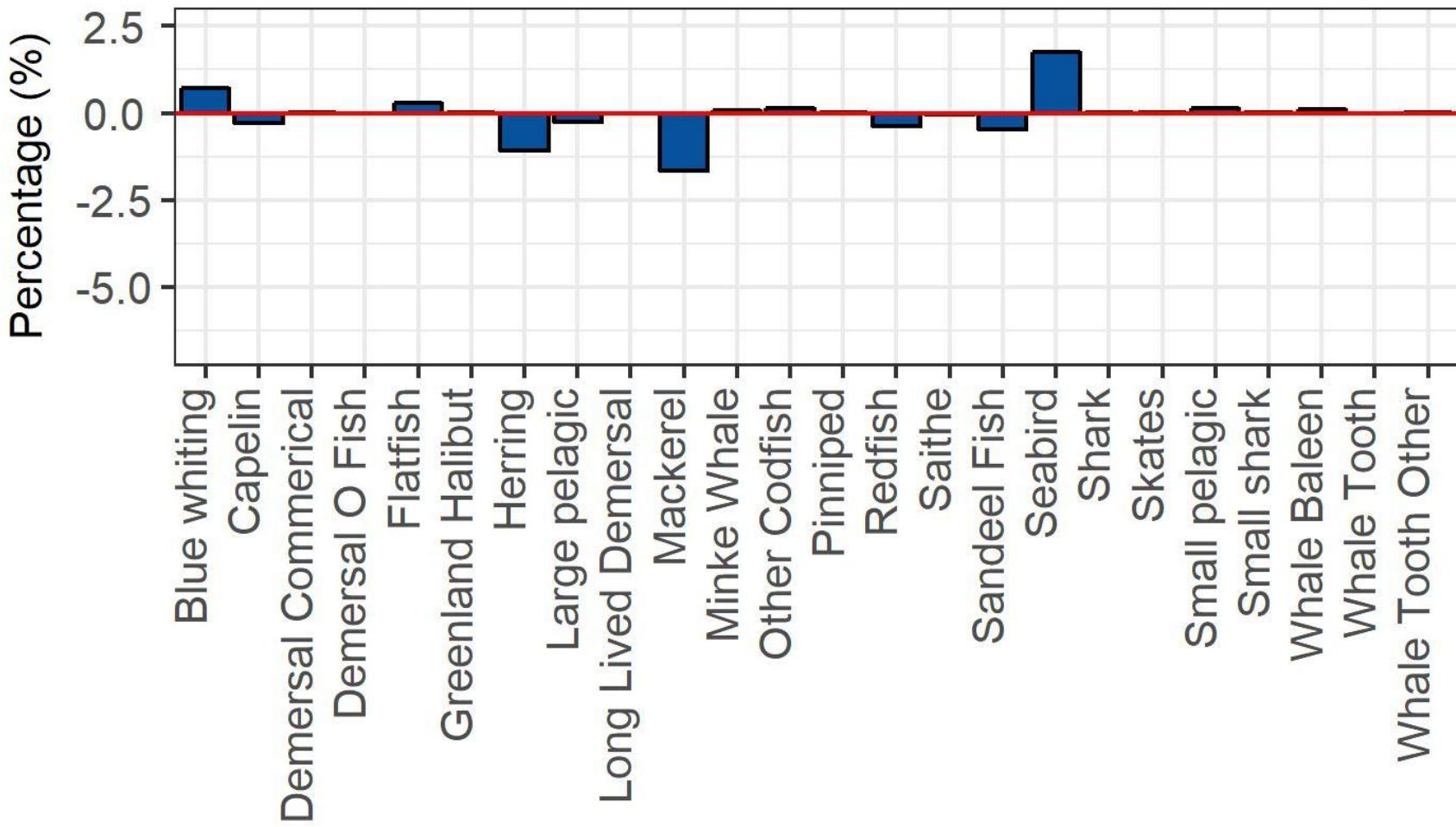
# Total economic effects



# Effects of more discards

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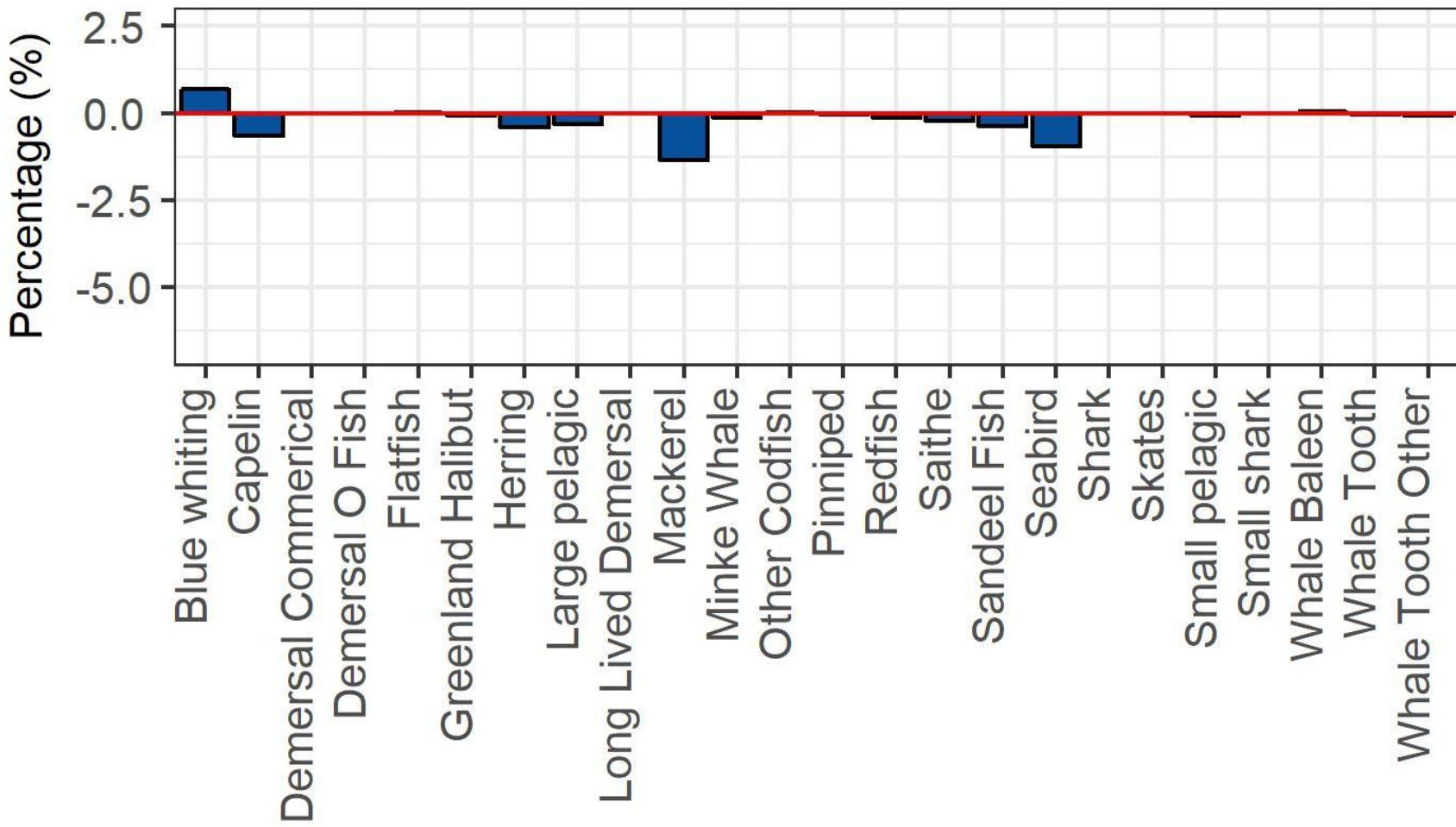
## 2) More discards



# Effects of no discards

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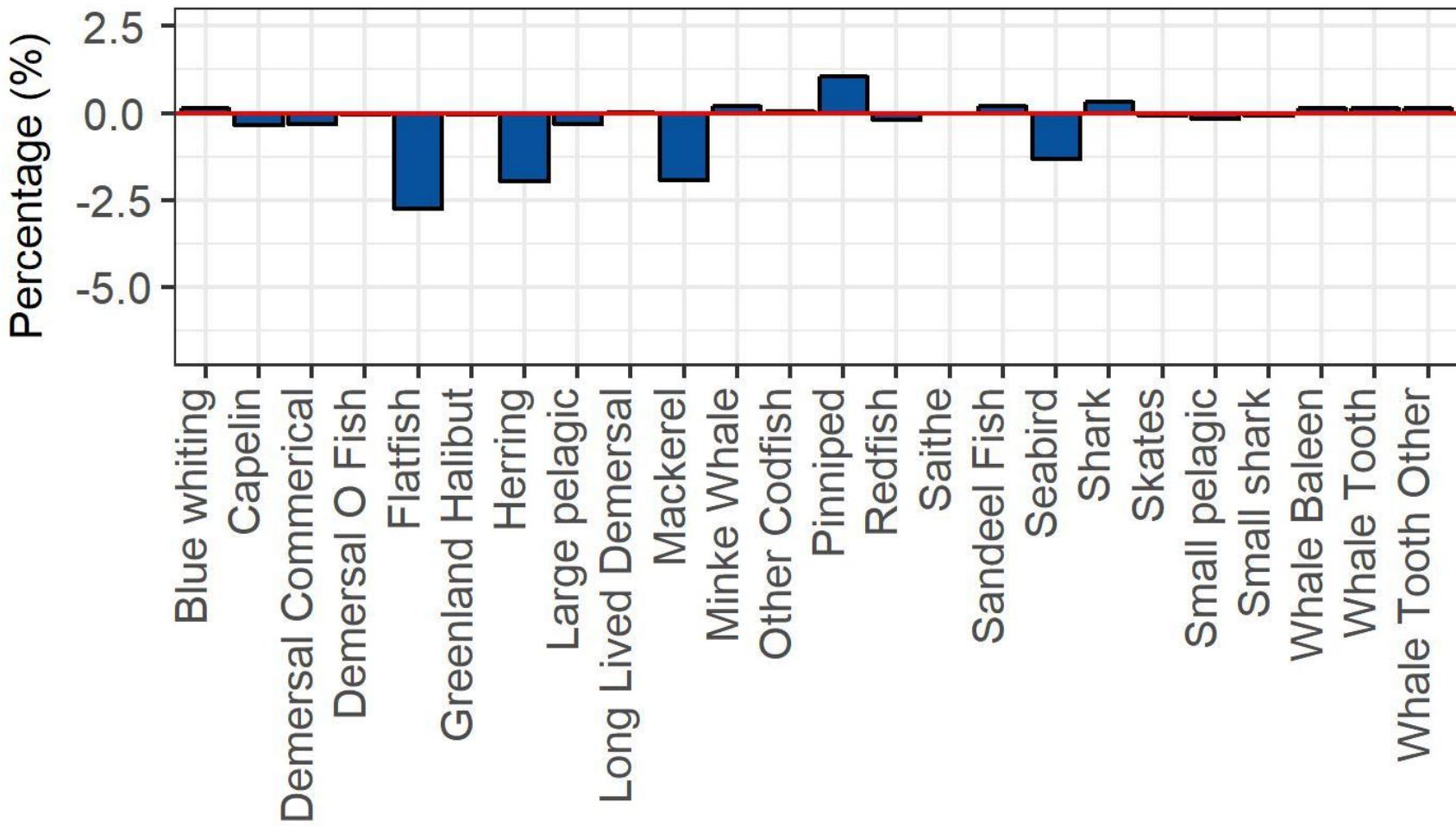
## 3) No discards



# Effects of improved selectivity

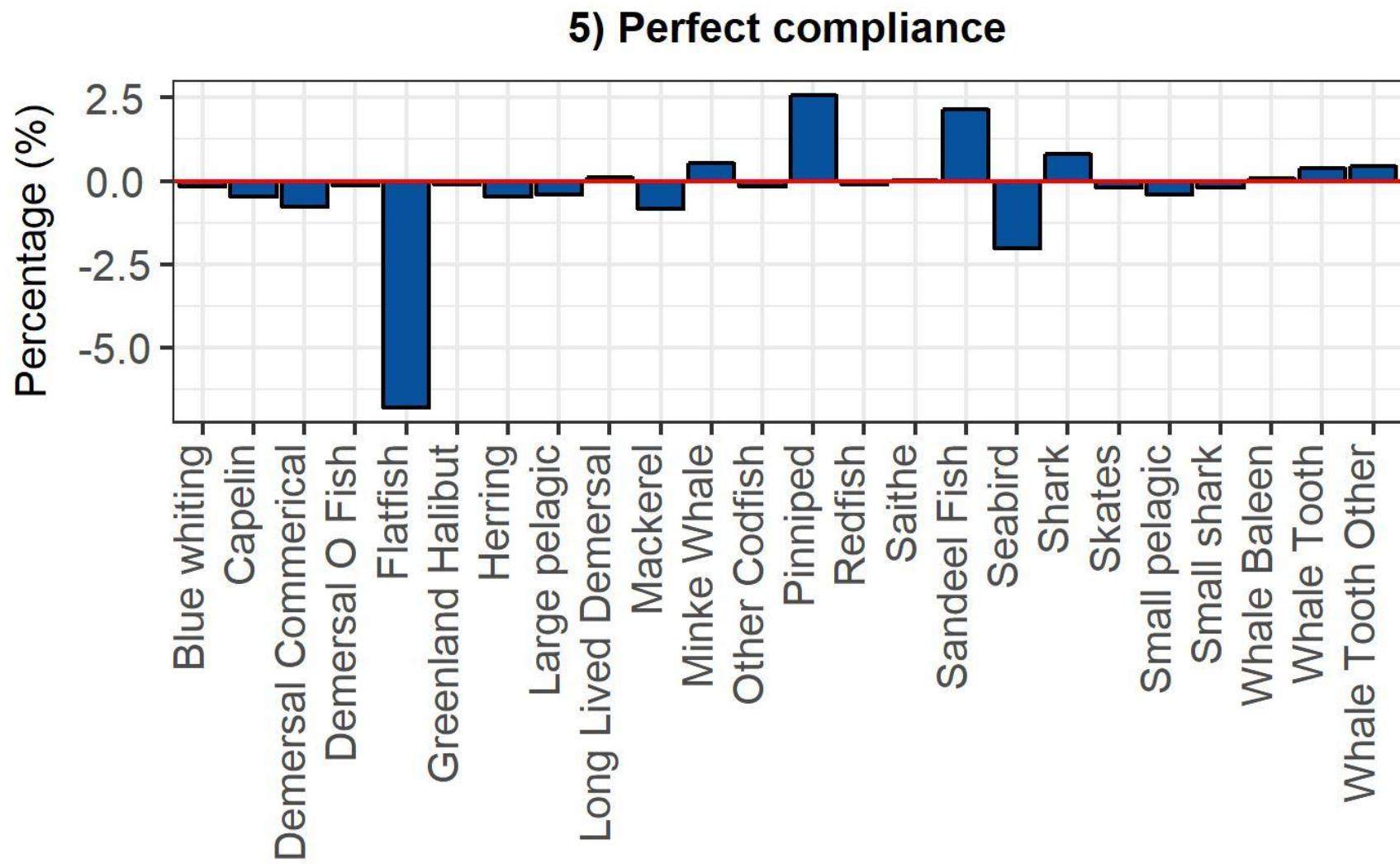
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## 4) Improved selectivity

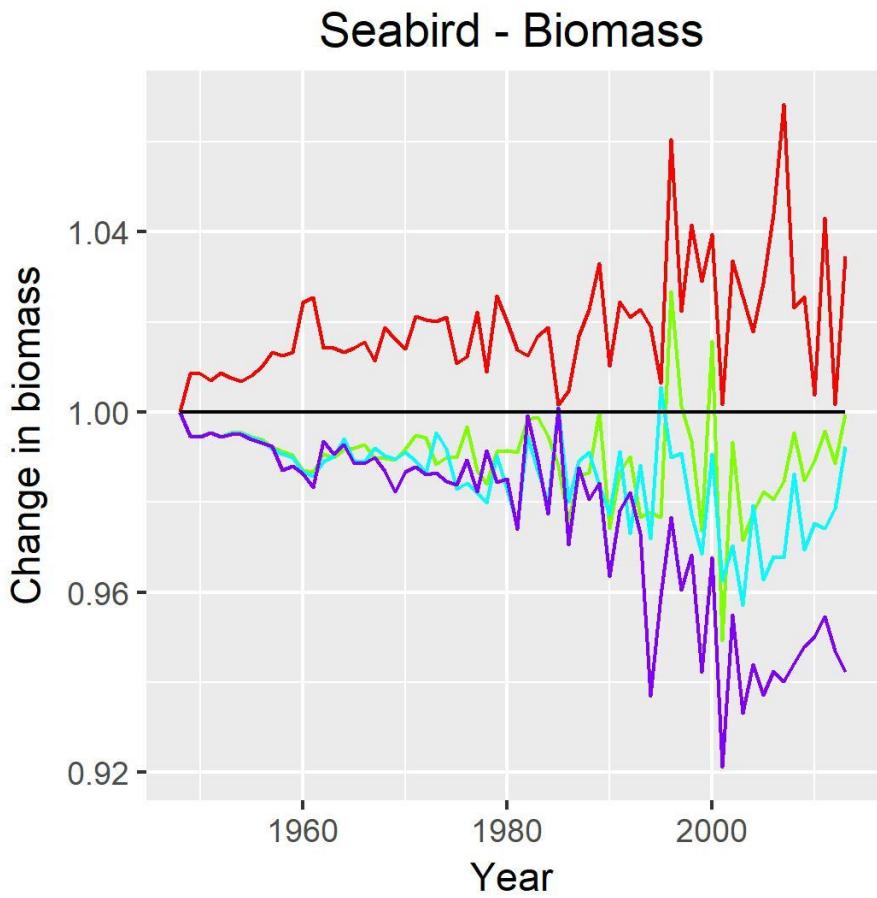
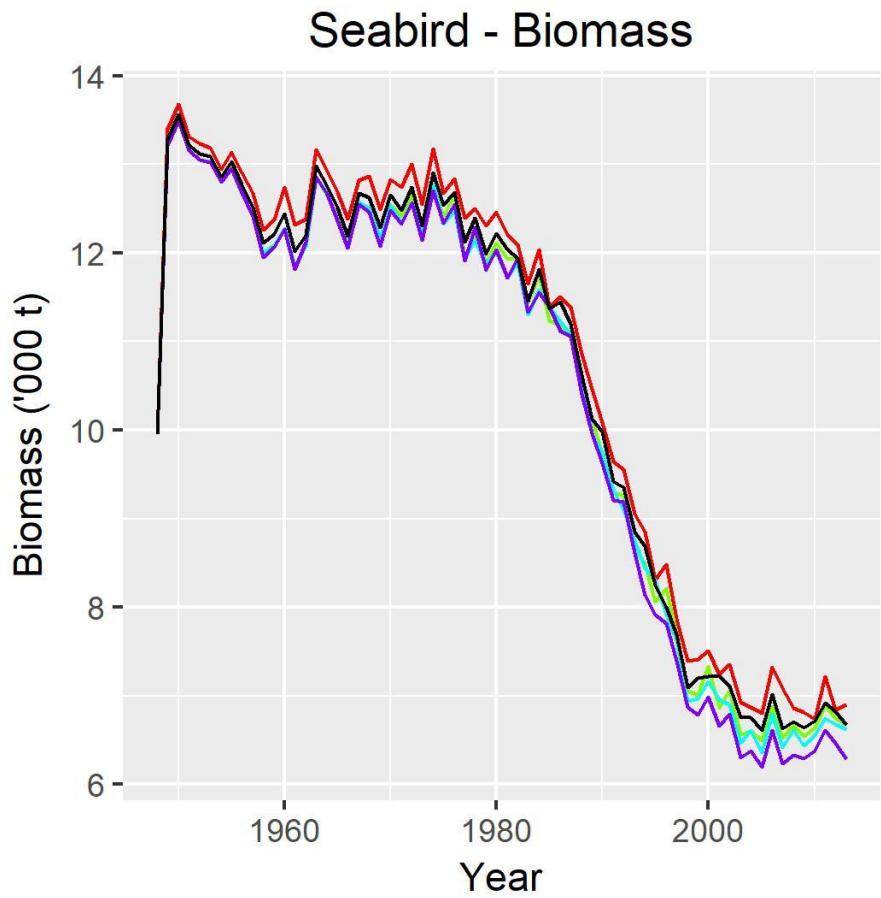


# Effects of perfect compliance

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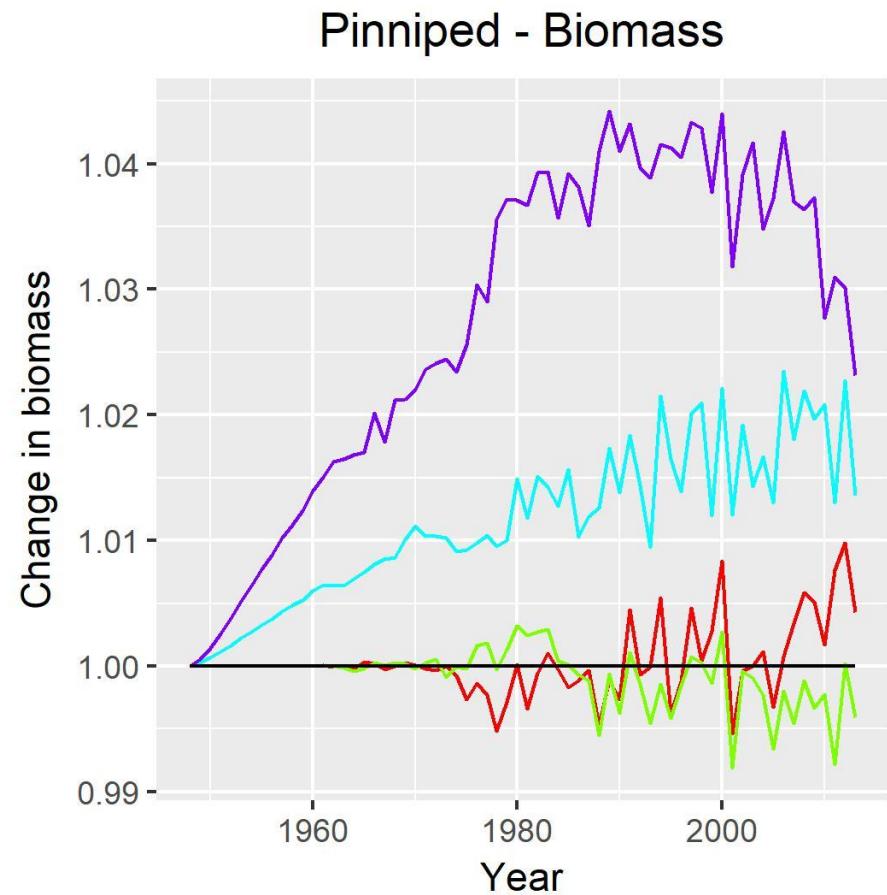
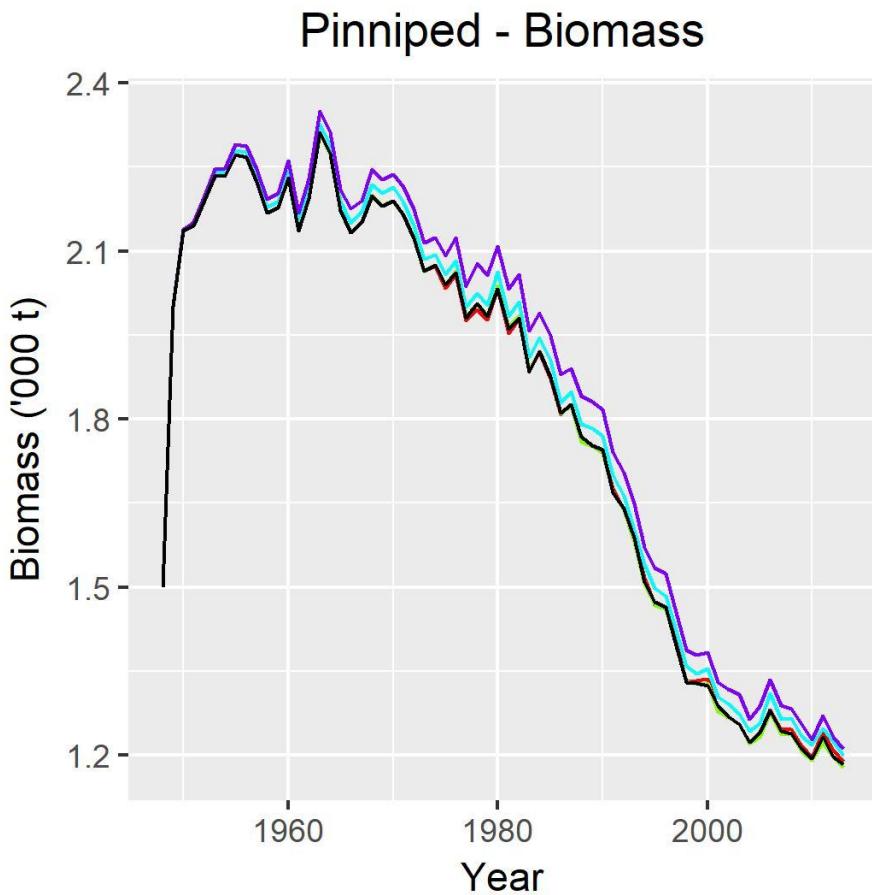


# Seabirds



— 1) Status quo — 2) More discards — 3) No discards — 4) Improved selectivity — 5) Perfect compliance

# Pinniped



— 1) Status quo — 2) More discards — 3) No discards — 4) Improved selectivity — 5) Perfect compliance

# Only discards of small cod and haddock!

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- Low discard rate.
- Discards of other groups expected.
- Only discarding of small fish.
- No estimation of other groups exists.
- More ecological effects expected if discards of all groups were modeled.

# Conclusion

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- Not discarding did not have much ecological or economic effects.
- Improved selectivity had economically beneficial effect.