Near-bottom light and groundfish catch

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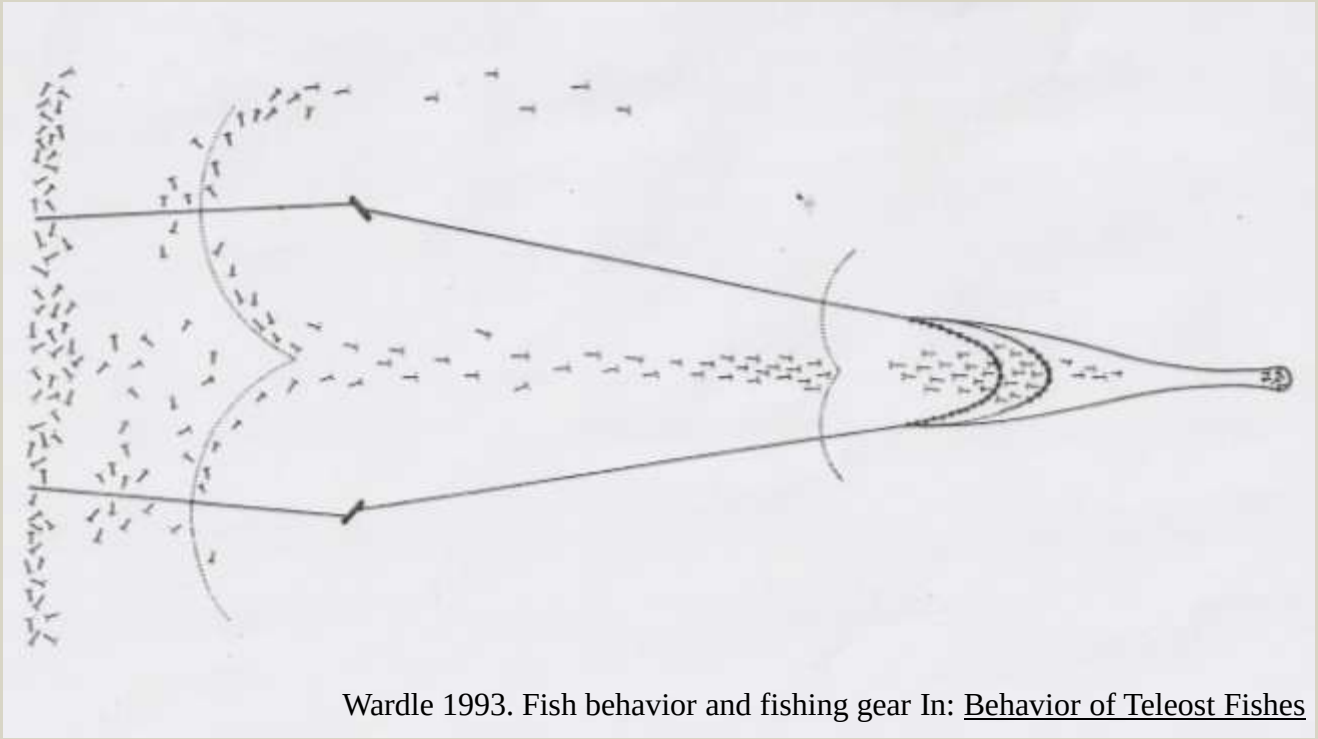
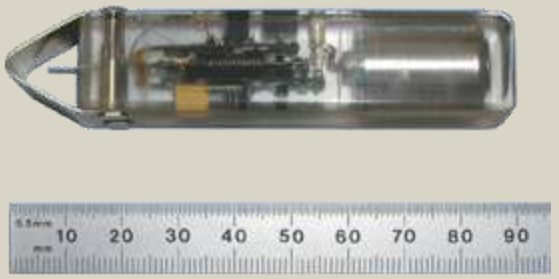
NWFSC-WCGBTS



Wardle 1993. Fish behavior and fishing gear In: Behavior of Teleost Fishes

Methods

- Measured near-bottom light for 335 hauls from 2009 WCGBTS
- Wildlife Computers MK9 sensor
- Haul depth < 400 m
- Tested relationship between cpue (kg/ha), depth, and lob



Why do fish enter the net

- Density
  - depth and light dependent
- Catchability (trawl efficiency)
  - light dependent (for some species)

Vision and Vulnerability

Footrope escape

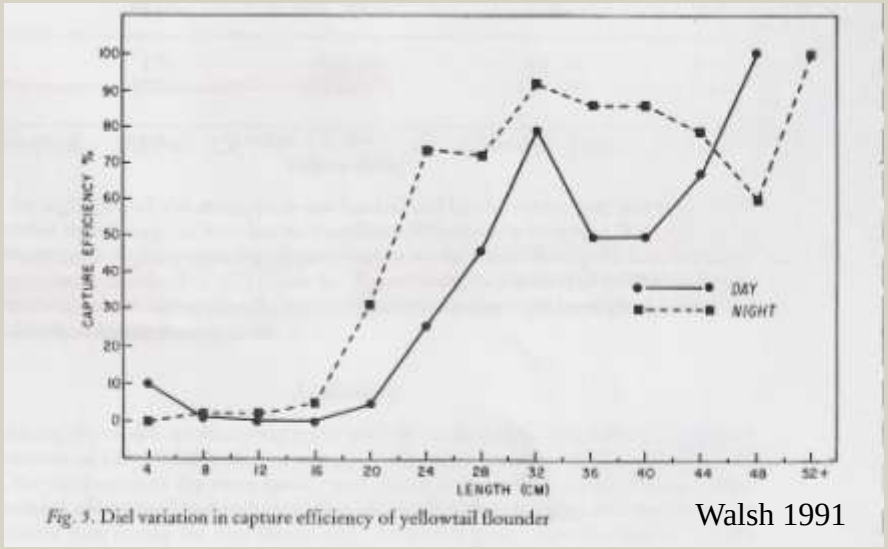


Fig. 3. Diel variation in capture efficiency of yellowtail flounder

Walsh 1991

Herding

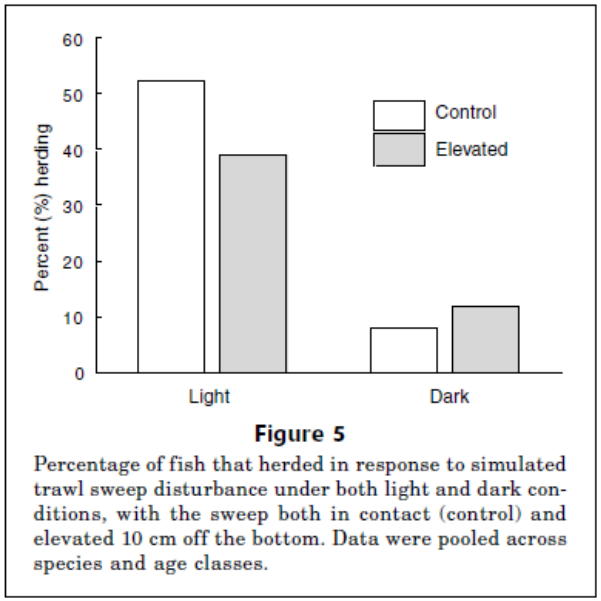
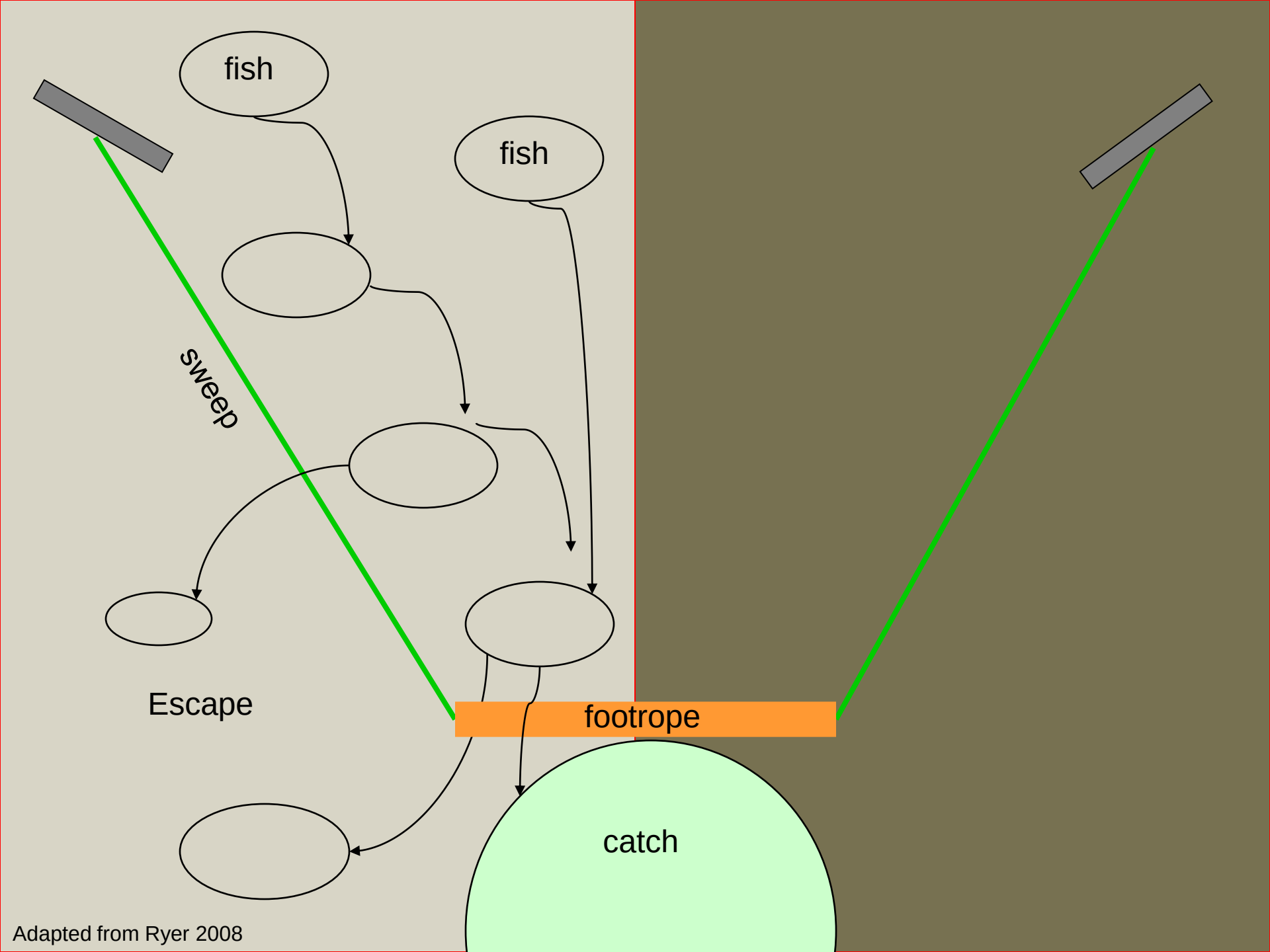


Figure 5

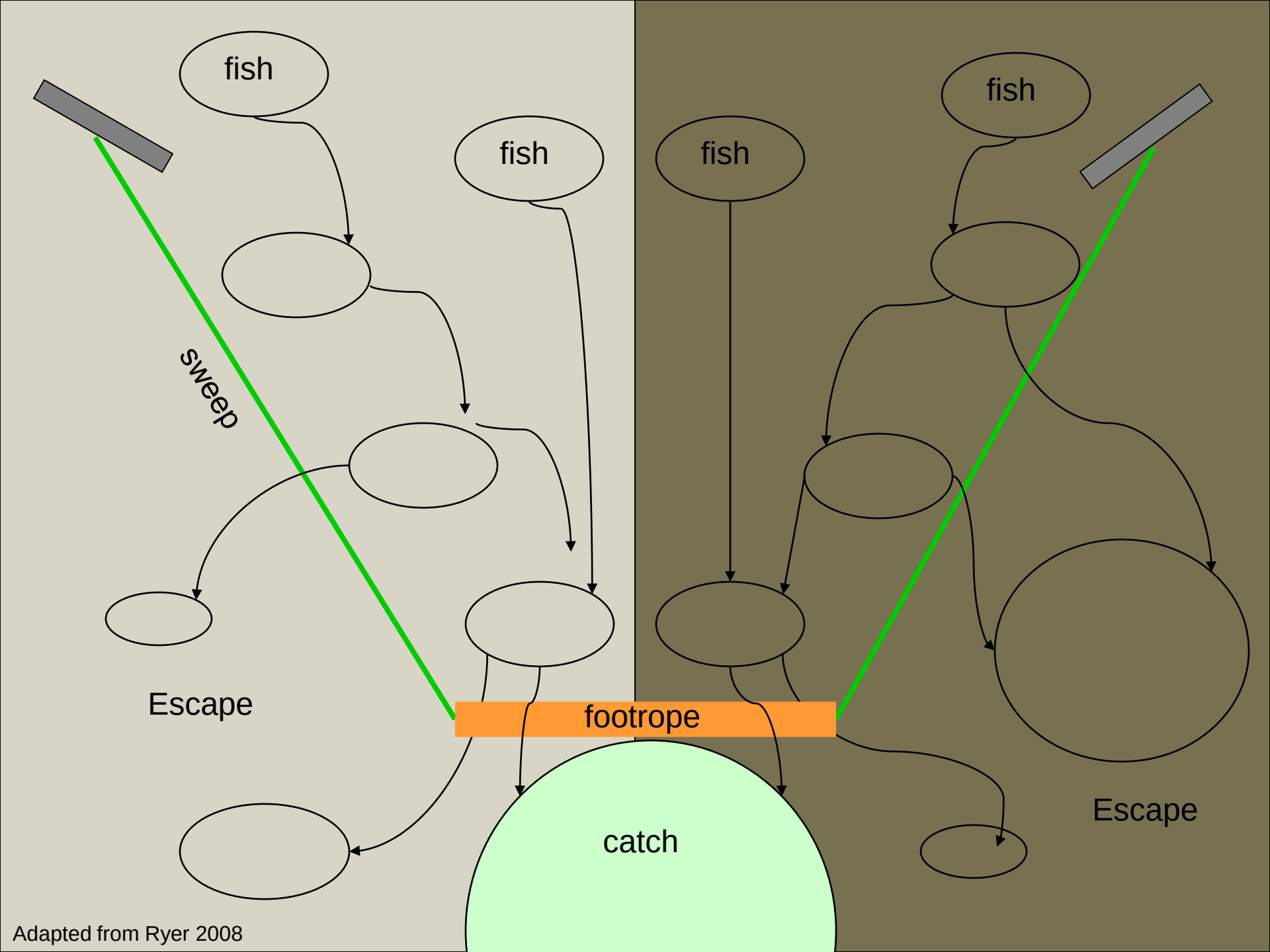
Percentage of fish that herded in response to simulated trawl sweep disturbance under both light and dark conditions, with the sweep both in contact (control) and elevated 10 cm off the bottom. Data were pooled across species and age classes.

Ryer et al. 2009

- More escapes during day hauls (solid line)
- Herding response more common in light
- Light-dependent behaviors



Adapted from Ryer 2008



Adapted from Ryer 2008

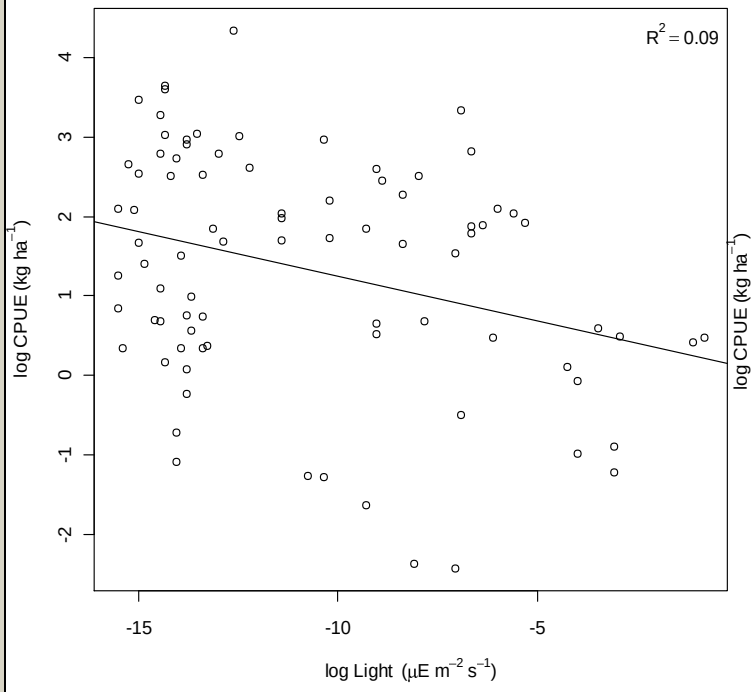
Hypothesis

H_A: cpue will be greater in the light, because of herding

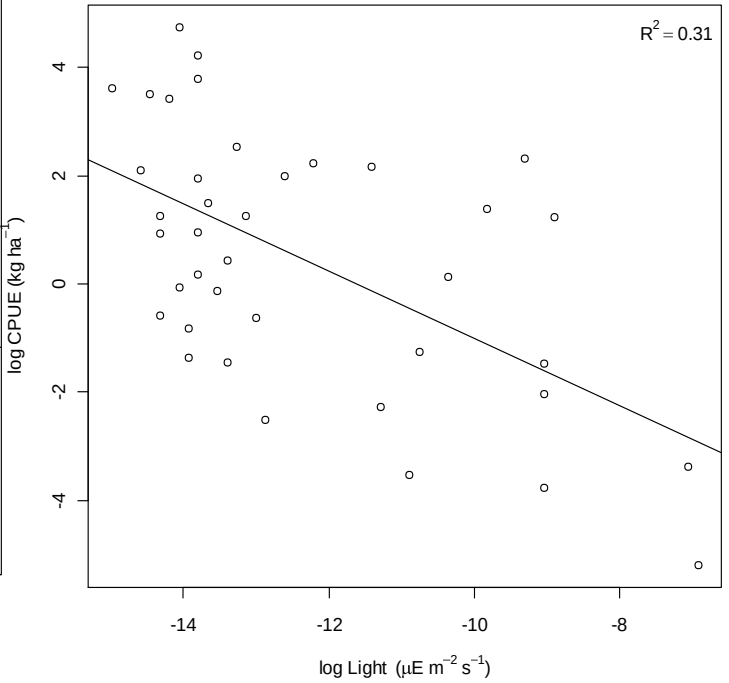
Results

Species	Model	adjusted R^2
Arrowtooth flounder	lm(formula = cpue ~ lob + depth + depth^2)	0.27
Curlfin sole	lm(formula = cpue ~ lob + depth + depth^2)	0.42
Dover sole	lm(formula = cpue ~ lob + depth + depth^2)	0.17
Longnose skate	lm(formula = cpue ~ lob)	0.09
Plainfin midshipman	lm(formula = cpue ~ lob)	0.18
Sandpaper skate	lm(formula = cpue ~ lob + depth^2)	0.19
Slender sole	lm(formula = cpue ~ depth + lob)	0.11
Splitnose rockfish	lm(formula = cpue ~ lob)	0.31
Spotted ratfish	lm(formula = cpue ~ lob + depth^2)	0.05

Longnose skate

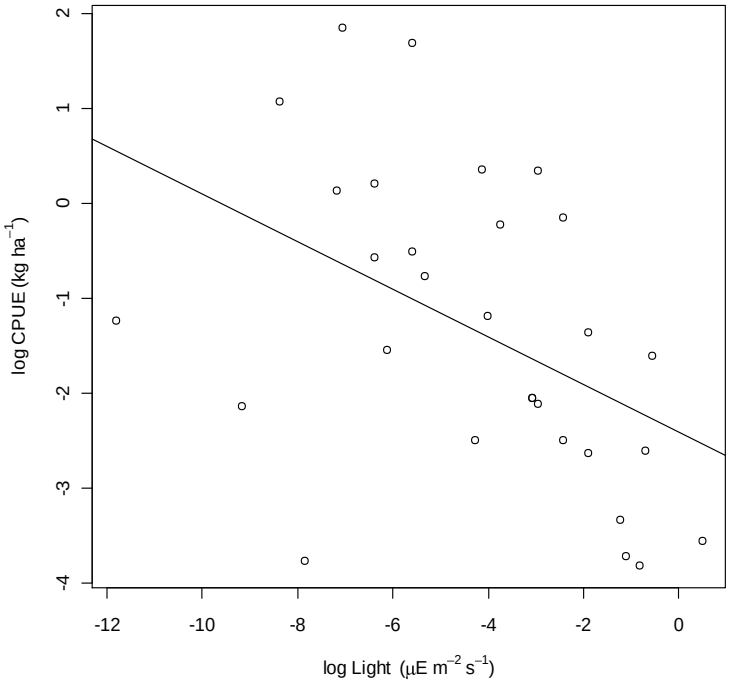


Splitnose RF



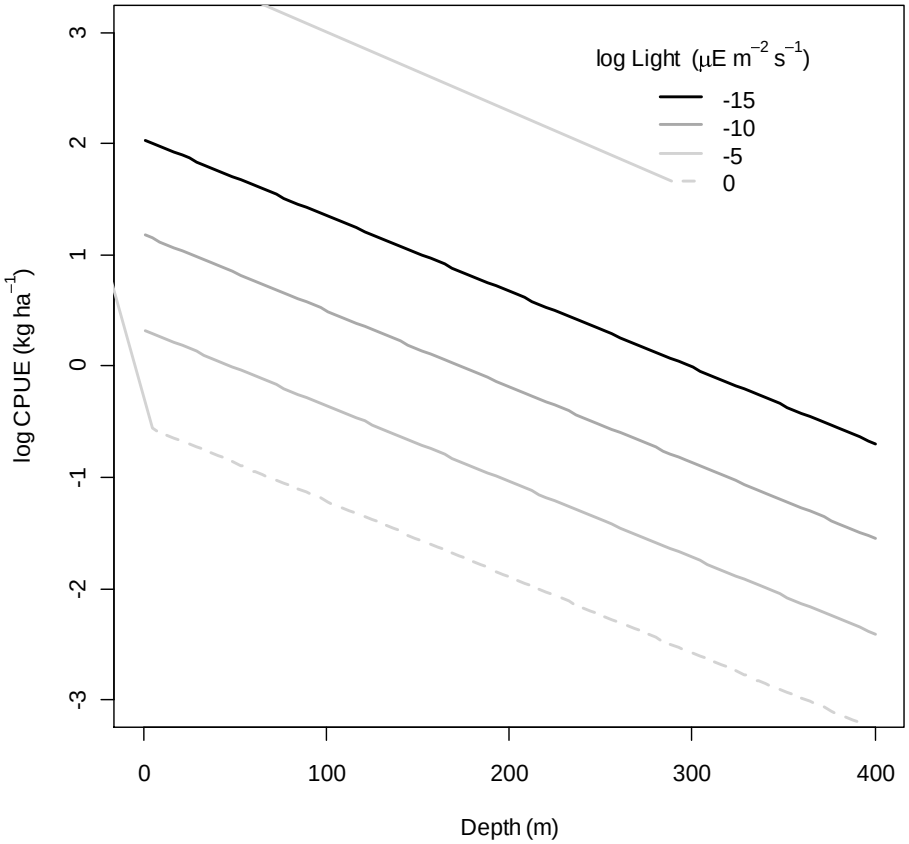
lm(formula = cpue ~ lob)

Plainfin midshipman



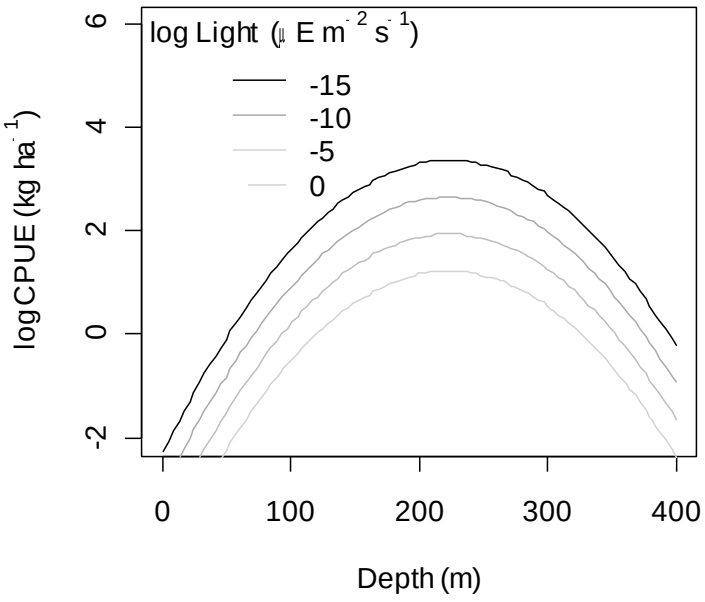
lm(formula = cpue ~ lob)

Slender sole

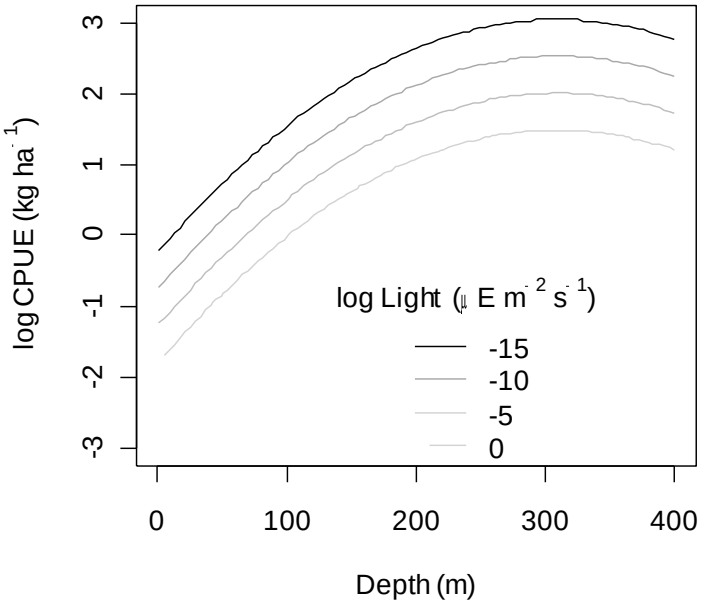


lm(formula = cpue ~ depth + lob)

ATF

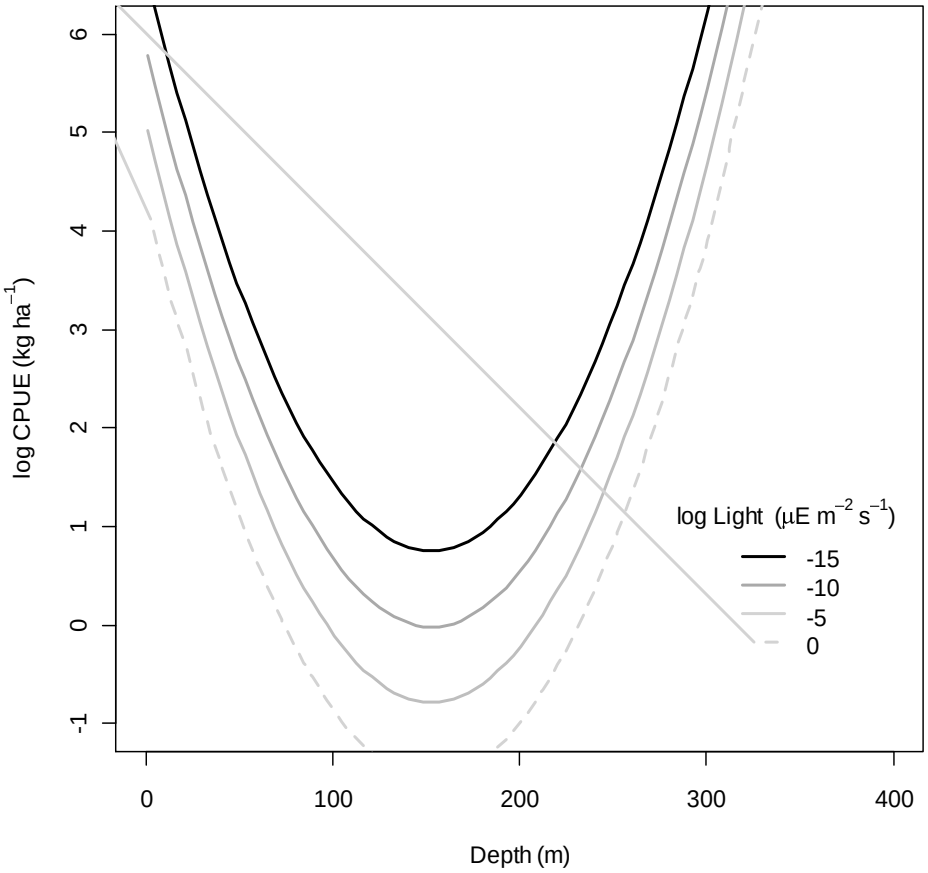


Dover sole



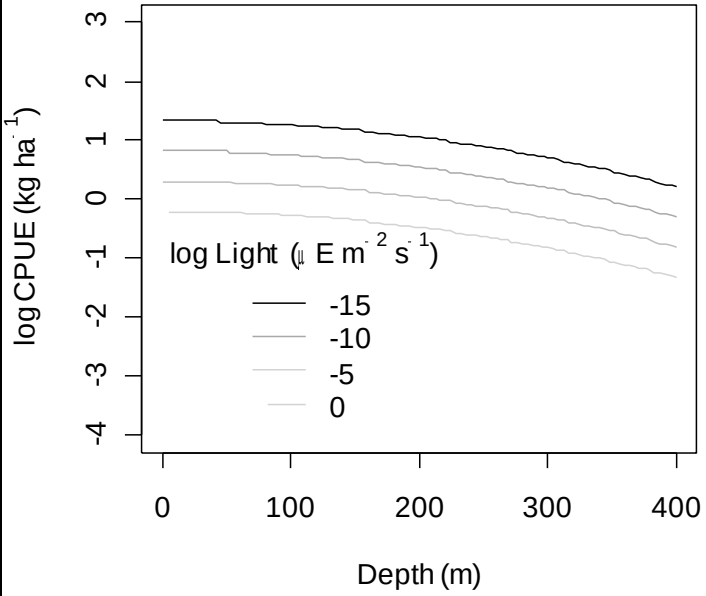
$lm(formula = cpue \sim lob + depth + depth^2)$

Curlfin sole

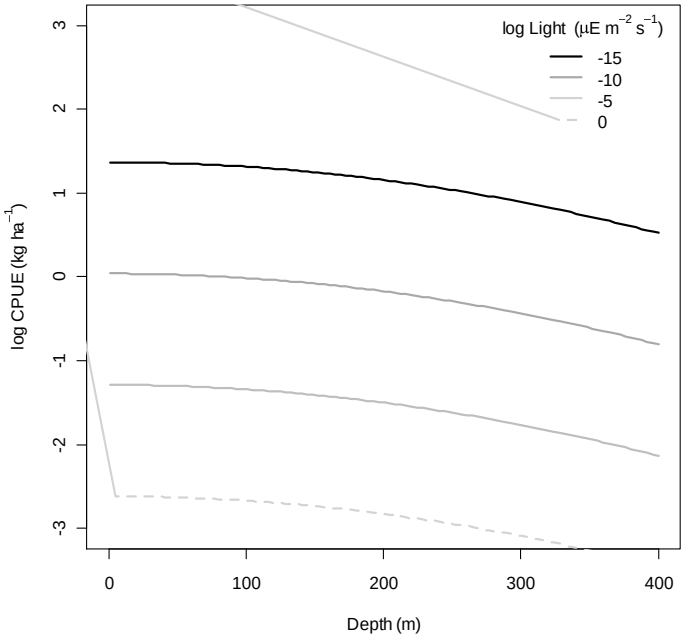


lm(formula = cpue ~ lob + depth + depth^2)

Spotted ratfish



Sandpaper skate



$$lm(formula = cpue \sim lob + depth^2)$$

Conclusions

- Negative relationship between near bottom light and cpue for 9 species
- Reject herding hypothesis
- Footrope escape in light?
- Short survey warps may diminish strength of ‘herding effect’

Results

Species	Model	adjusted R^2
English sole	no significant relationship with lob or depth	NA
Halfbanded rockfish	no significant relationship with lob or depth	NA
Pink sea perch	no significant relationship with lob or depth	NA
Redbanded rockfish	no significant relationship with lob or depth	NA
Rosethorn rockfish	no significant relationship with lob or depth	NA
Shiner perch	no significant relationship with lob or depth	NA
Shortbelly rockfish	no significant relationship with lob or depth	NA
Spiny dogfish	no significant relationship with lob or depth	NA
White croaker	no significant relationship with lob or depth	NA

Results

Species	Model	adjusted R^2
Big skate	lm(formula = cpue ~ depth + depth^2)	0.48
California skate	lm(formula = cpue ~ depth)	0.36
Chilipepper	lm(formula = cpue ~ depth)	0.33
Darkblotched rockfish	lm(formula = cpue ~ depth)	0.16
Greenstriped rockfish	lm(formula = cpue ~ depth)	0.03
Lingcod	lm(formula = cpue ~ depth)	0.19
Pacific hake	lm(formula = cpue ~ depth)	0.1
Pacific Ocean perch	lm(formula = cpue ~ depth)	0.27
Pacific sanddab	lm(formula = cpue ~ depth)	0.05
Petrale sole	lm(formula = cpue ~ depth)	0.01
Sablefish	lm(formula = cpue ~ depth + depth^2)	0.22
Shortspine thornyhead	lm(formula = cpue ~ depth + depth^2)	0.14
Stripetail rockfish	lm(formula = cpue ~ depth)	0.29