Reducing Pacific Halibut Bycatch in The West Coast Groundfish Bottom Trawl Fishery: A Review of Trawl Modifications

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IPHC PICES Workshop

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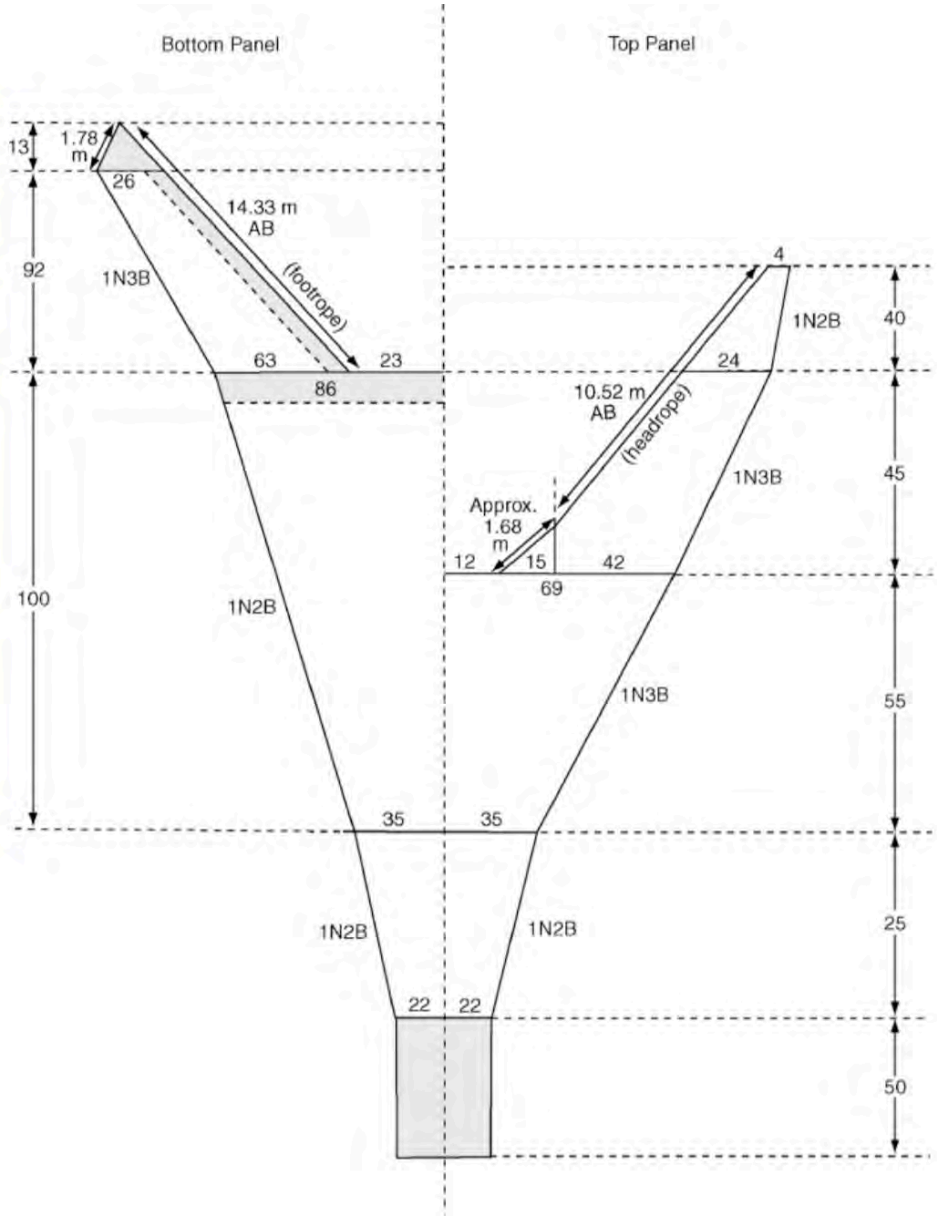
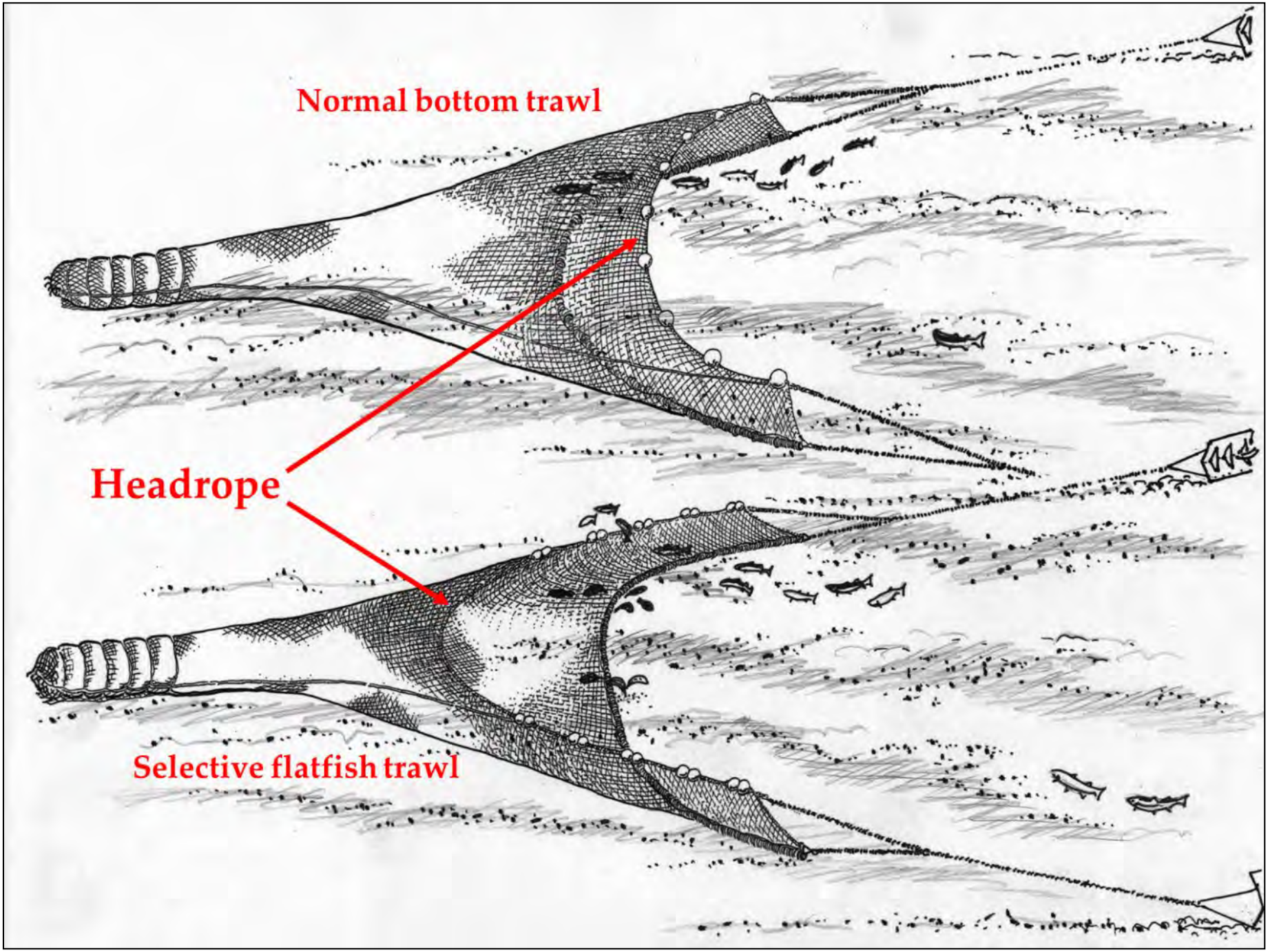
Canada
U.S.
Pacific Ocean
Mexico
Washington
Oregon
California
N
0
215
430
860 km

Selective Flatfish Trawl




Normal bottom trawl
Headrope
Selective flatfish trawl

Tactics to Reduce Bycatch

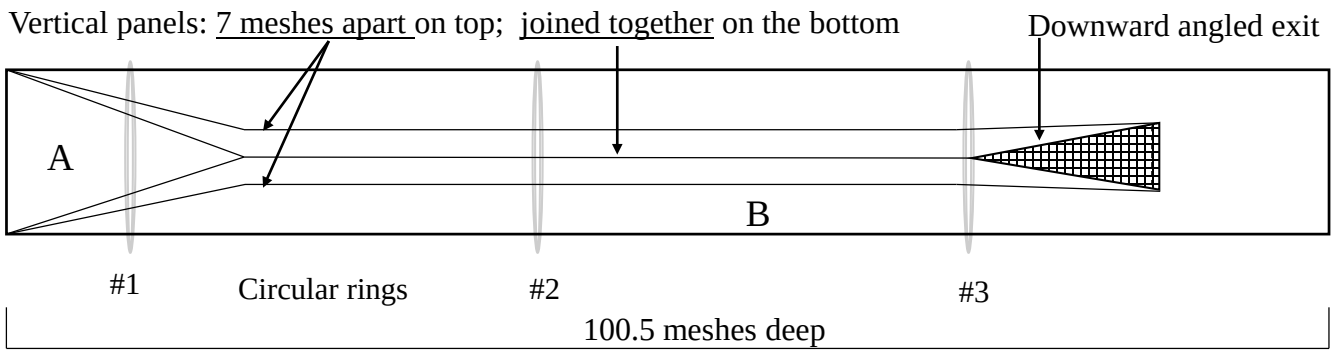
- Area fished
- Fleet communication
- Time of day
- Tow speed
- Temporal and spatial closures
- Gear modifications
  - Morphology – sorting grids, meshes
  - Behavior – response to trawl gear components

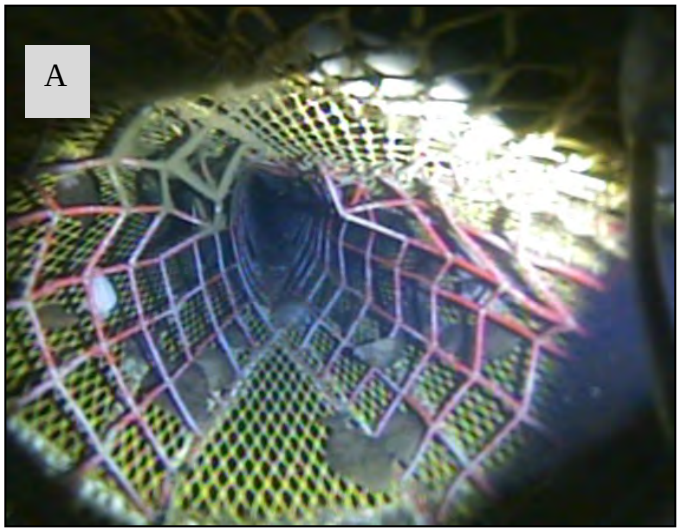
Sorting Grids – Exploiting Fish Morphology

Sorting Grid Device for Targeting Flatfishes and Roundfishes

- Square grids 7.5 x 7.5” in opening

Top view





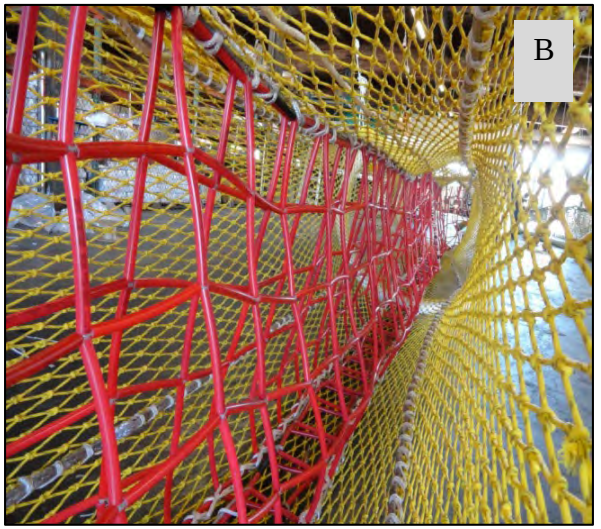
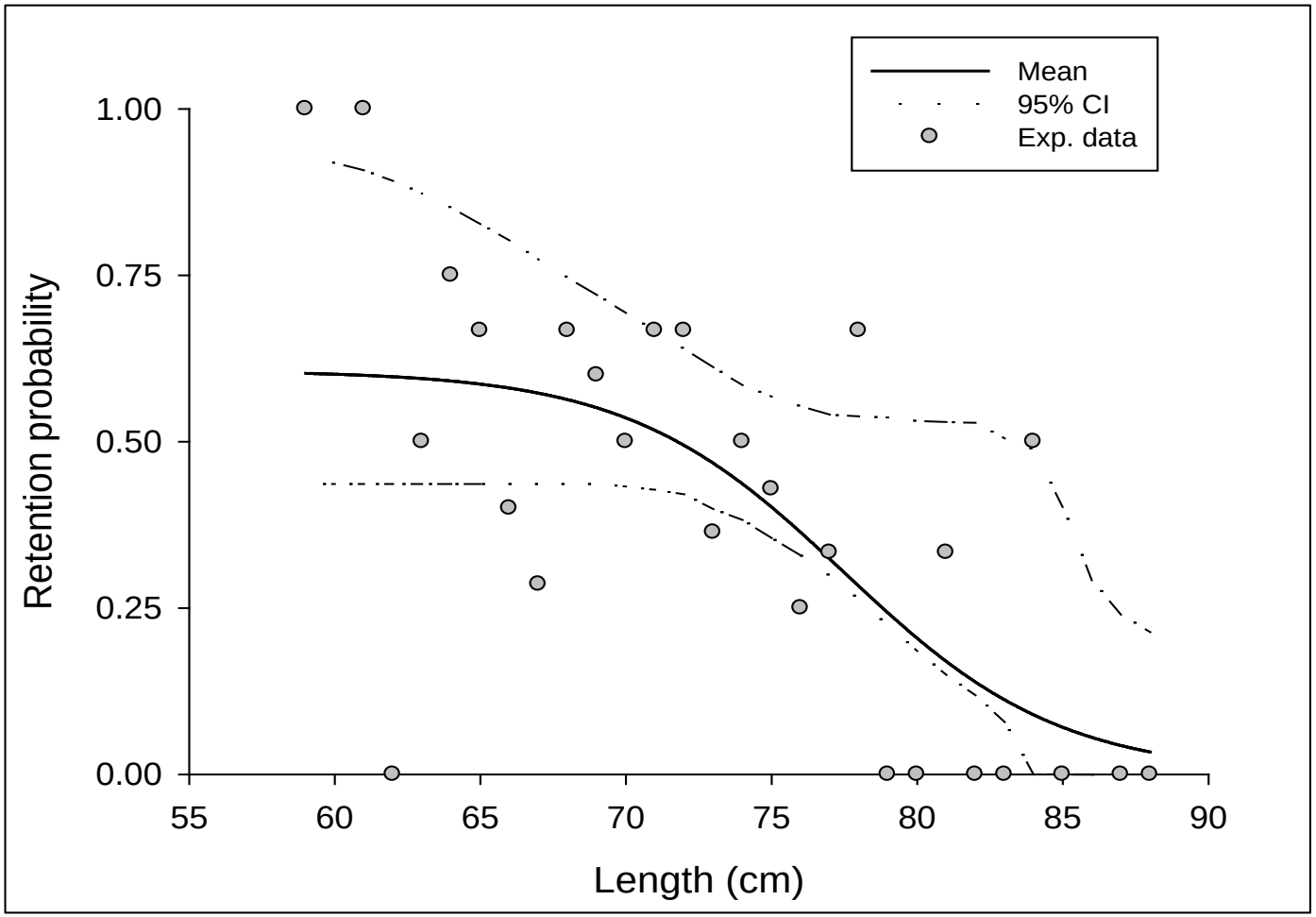


Image courtesy Dantrawl Inc.

Pacific Halibut Selectivity

- L_{50} (cm) = 71.8 (* - 83.4)
- L_{75} (cm) = 78.8 (78.3 - 86.5)



Haul 10

Trawl net

Target species retention = 89%

Recapture net

Halibut reduction = 61%

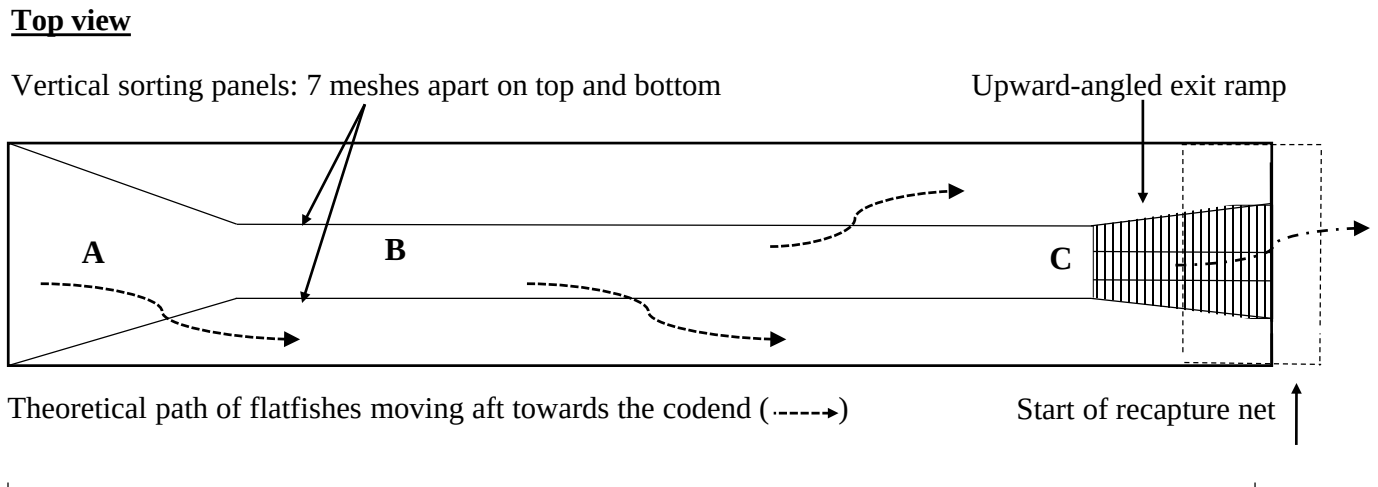
Results

- Retention of target species by weight:
  - Flatfishes = 76-86%
  - Roundfishes = 82-89%

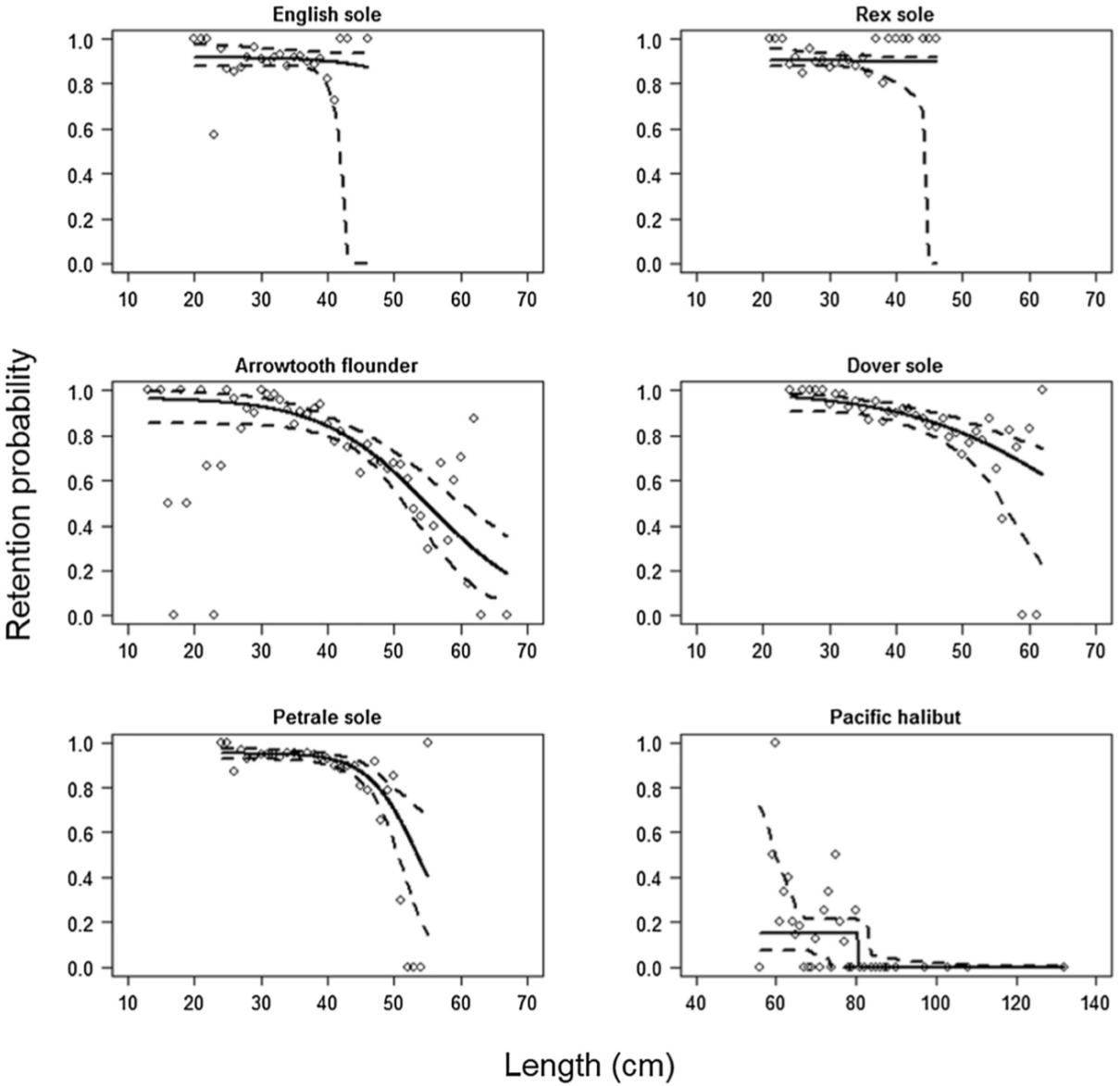
- Reduction of Pacific halibut:
  - 61% by weight, 57% by numbers

Sorting Grid Device for Targeting Flatfishes

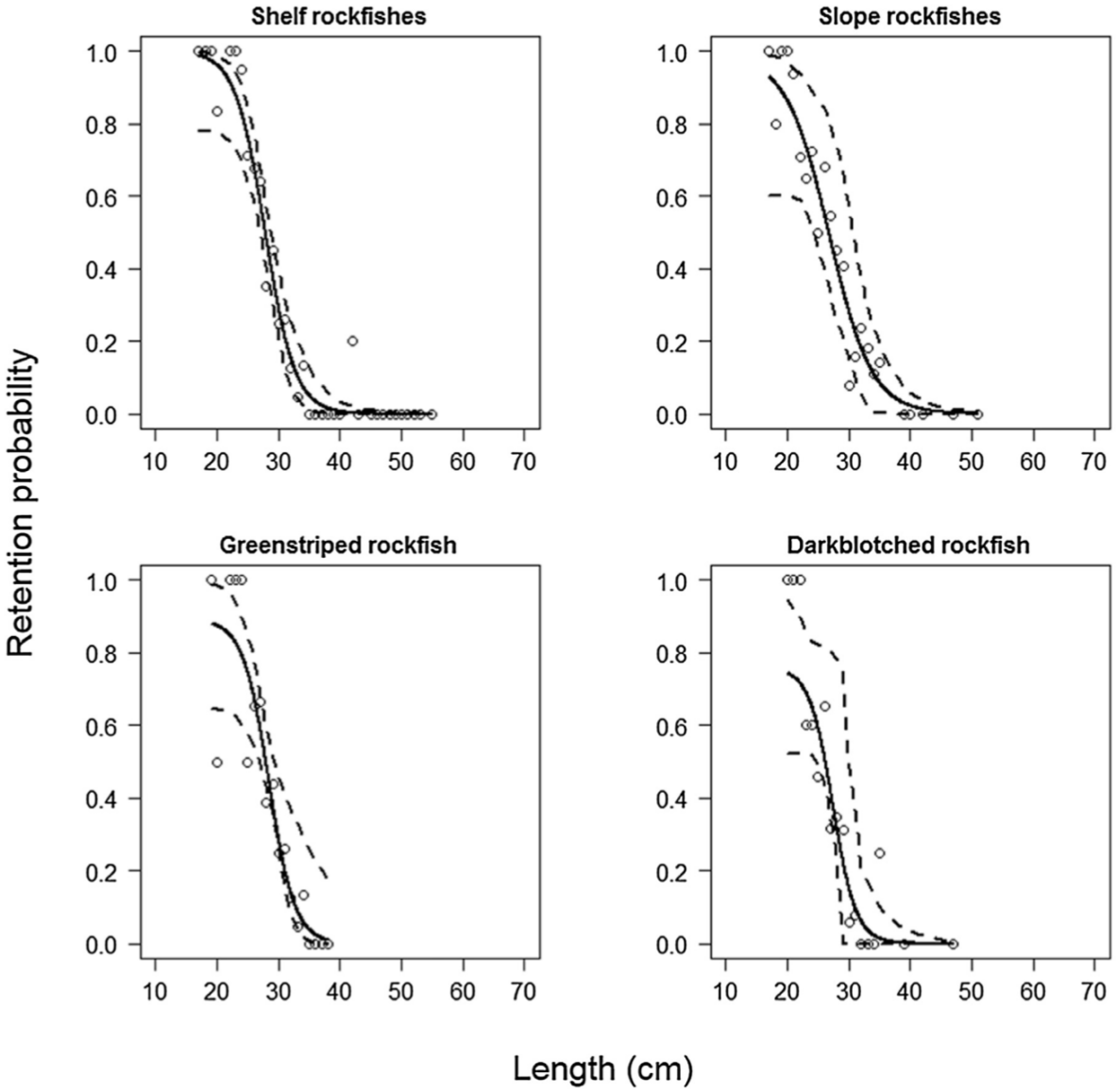
- Elongated slots with 2 x 10” openings
  - 1.75 x 8.5” and 2 x 12” slots have also been tested



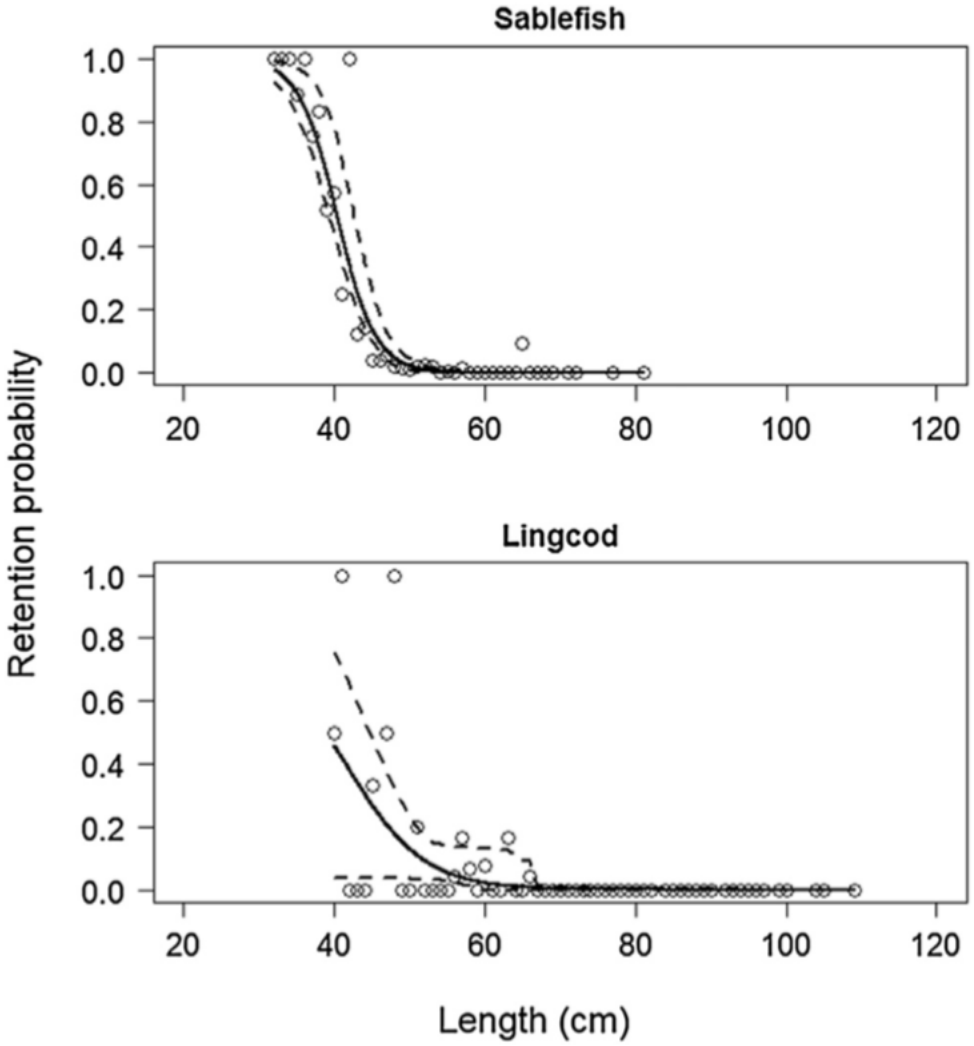
Results - Flatfishes



Results - Rockfishes



Results - Roundfishes



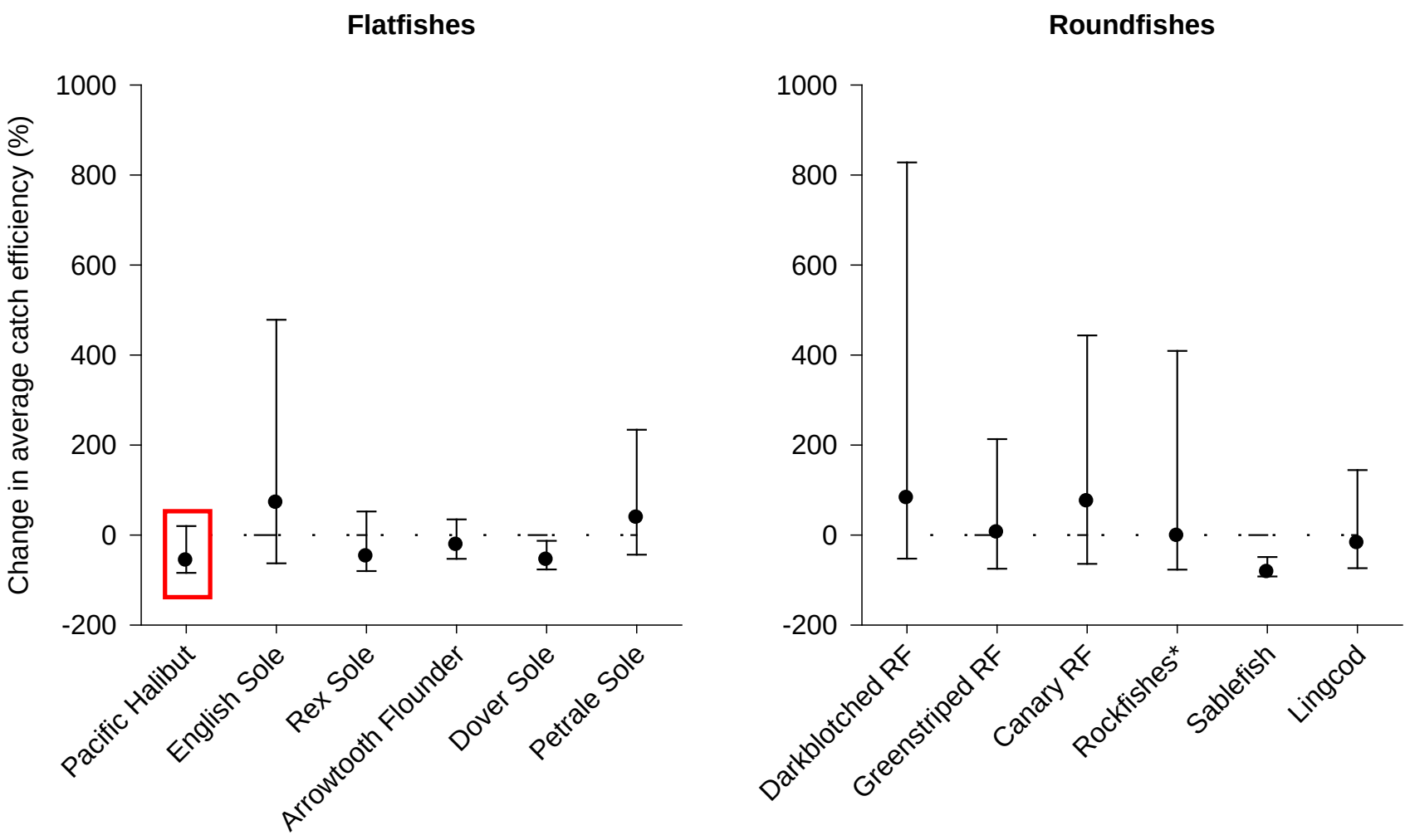
Results

- Retention of target flatfishes by weight:
  - Overall mean = 85%
  - As high as 92% for petrale sole

- Reduction of non-target species by weight:
  - Pacific halibut = 90%
  - Rockfishes = 64 – 80%
  - Sablefish = 97%
  - Lingcod = 99%

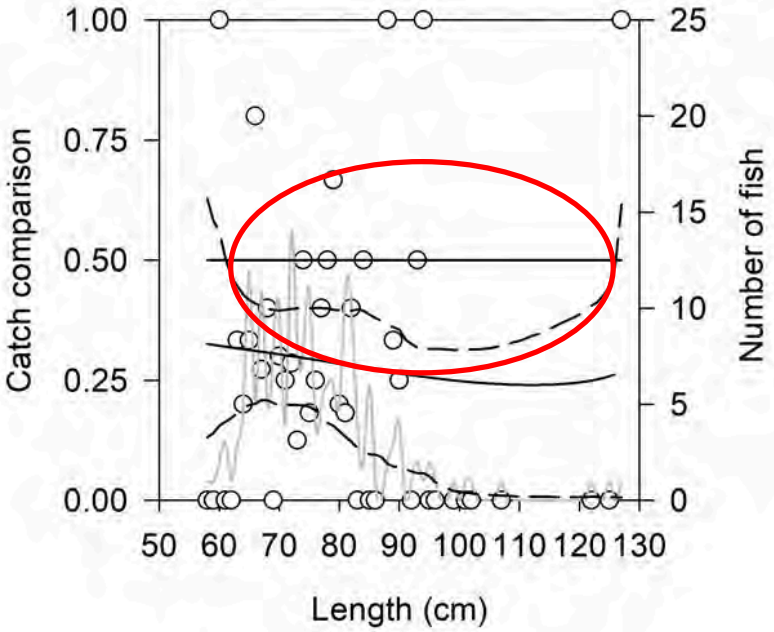
Reducing Bycatch Using Fish Behavior

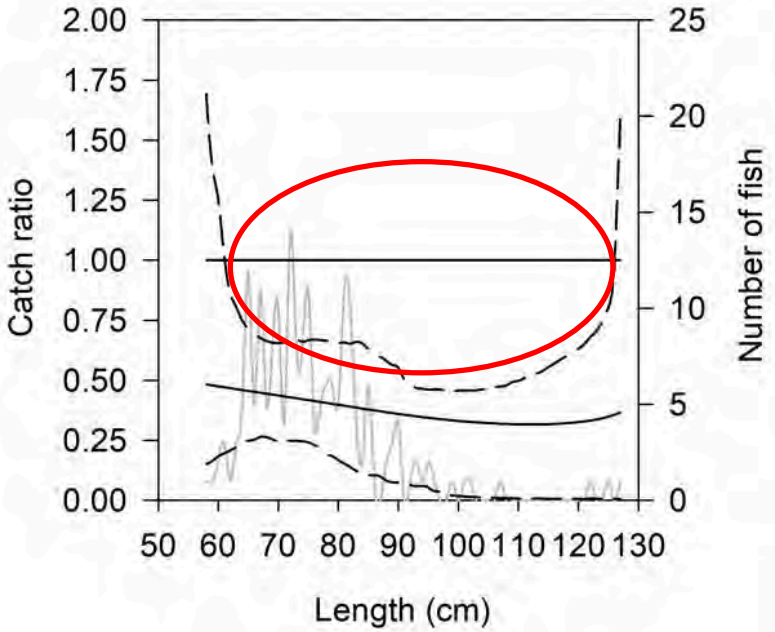
Illuminating the Headrope of a Selective Flatfish Trawl: Effect on Catches of Groundfishes


Flatfishes
Roundfishes
Change in average catch efficiency (%)
1000
800
600
400
200
0
-200
Pacific Halibut
English Sole
Rex Sole
Arrowtooth Flounder
Dover Sole
Petrale Sole
Darkblotched RF
Greenstriped RF
Canary RF
Rockfishes*
Sablefish
Lingcod


1
2
3
4
5
6

Pacific Halibut Bycatch (*n*=195)



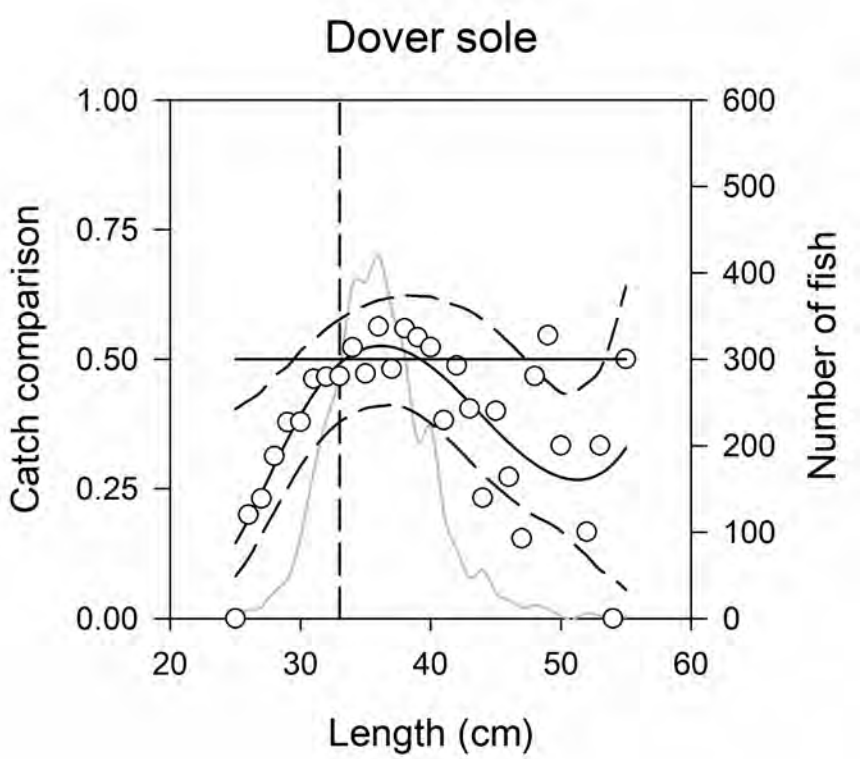


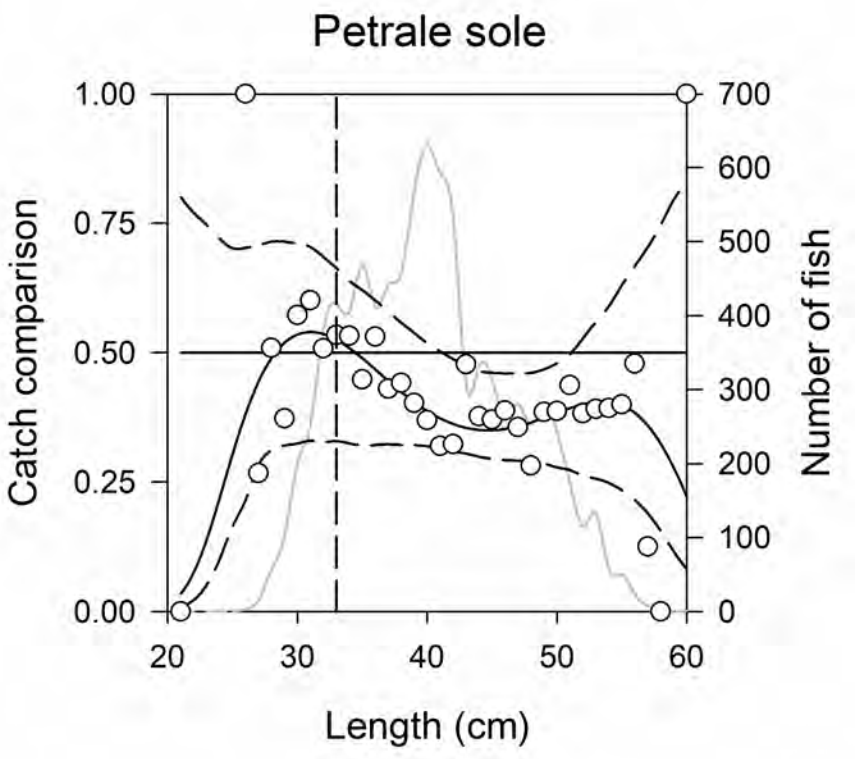
Significant length-dependent catch effect for fish 62-126 cm with fewer halibut caught in the illuminated trawl across these lengths

Further, the illuminated trawl is only catching 36.8% of the number of halibut that the unilluminated trawl is catching

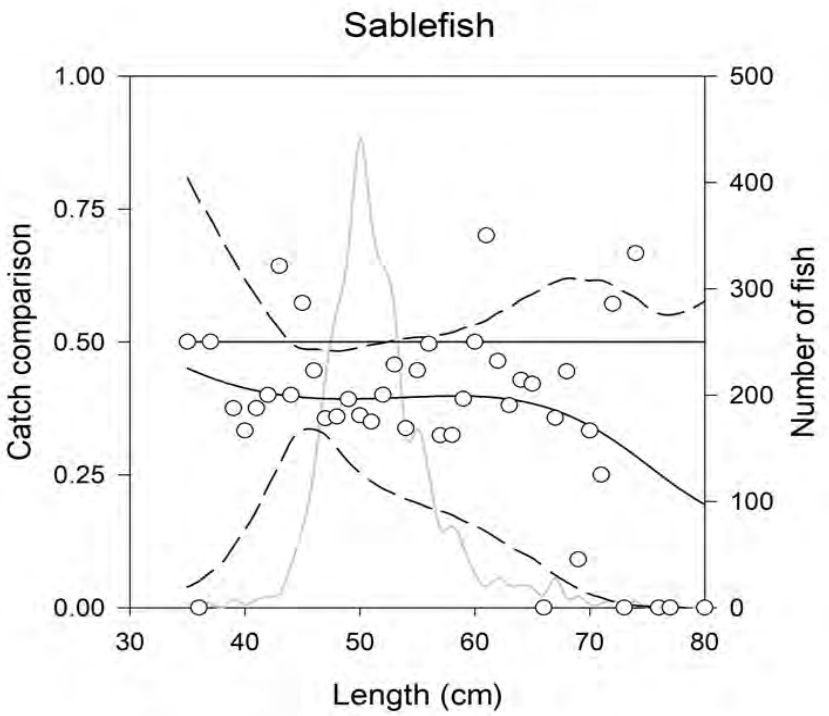
Target Catches

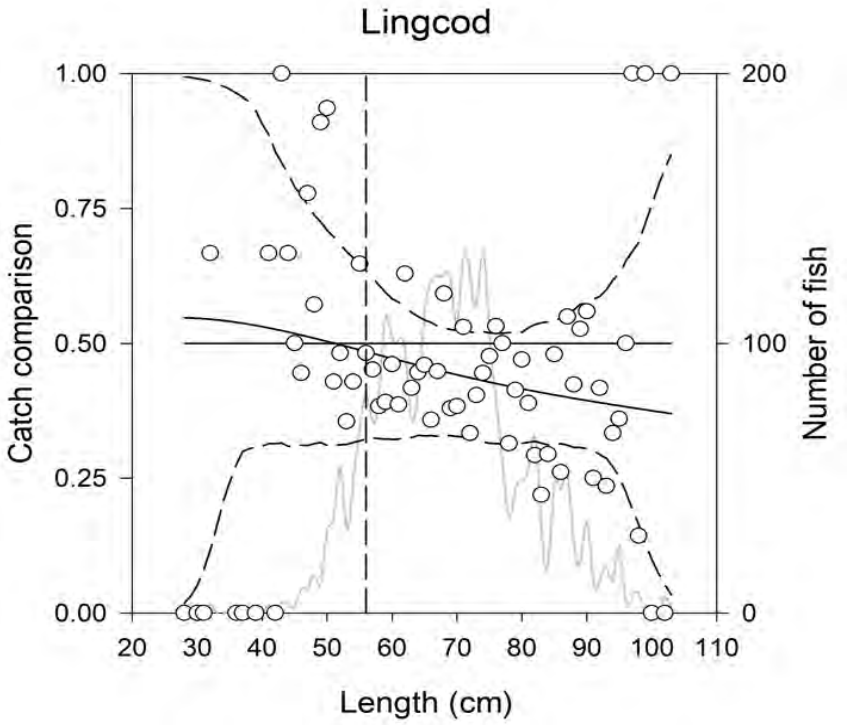
Dover sole and Petrale Sole

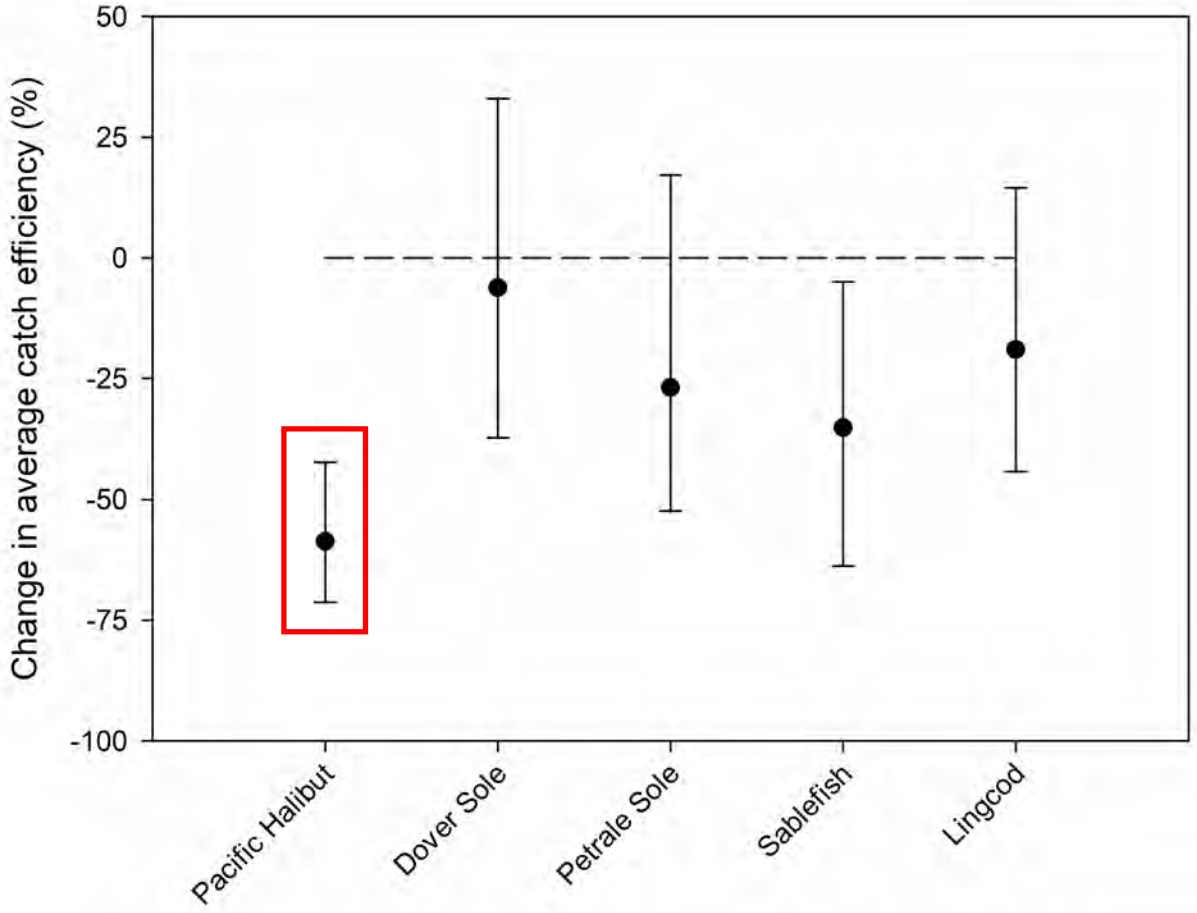




Sablefish and Lingcod





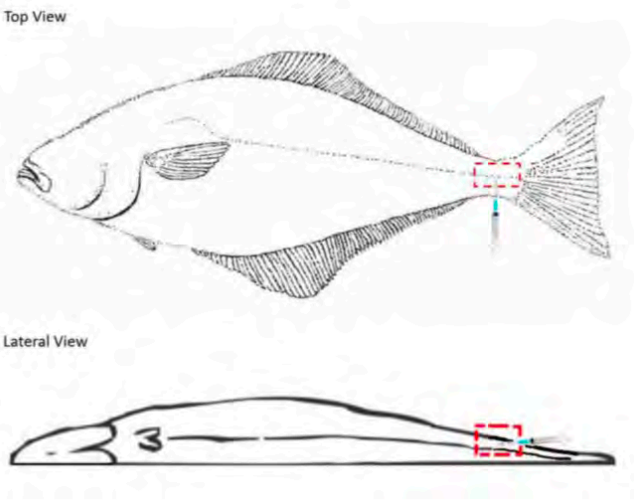


Unilluminated trawl is catching 58.7% (95% CIs 42.3-71.3) more halibut than the illuminated trawl

Biological Data

- Blood samples were collected from 51 Pacific halibut to measure stress indicators lactate and cortisol

- A Distell Fatmeter was used to measure % fat content from 201 Pacific halibut
  - Two measurements per white side and dark side
  - Indirect measurement of energy available to the fish




DISTELL
FISH FATMETER

Summary

- Sorting grids can be effective at reducing Pacific halibut bycatch (particularly larger-sized individuals) while maintaining relatively high catches of target species
- Artificial illumination can be used to reduce Pacific halibut bycatch before trawl capture
- Data collected on condition and stress hormones of trawl caught Pacific halibut bycatch


Thank You
• IPHC PICES Workshop Organizers

Questions