Catch efficiency of a small-sized Danish seine

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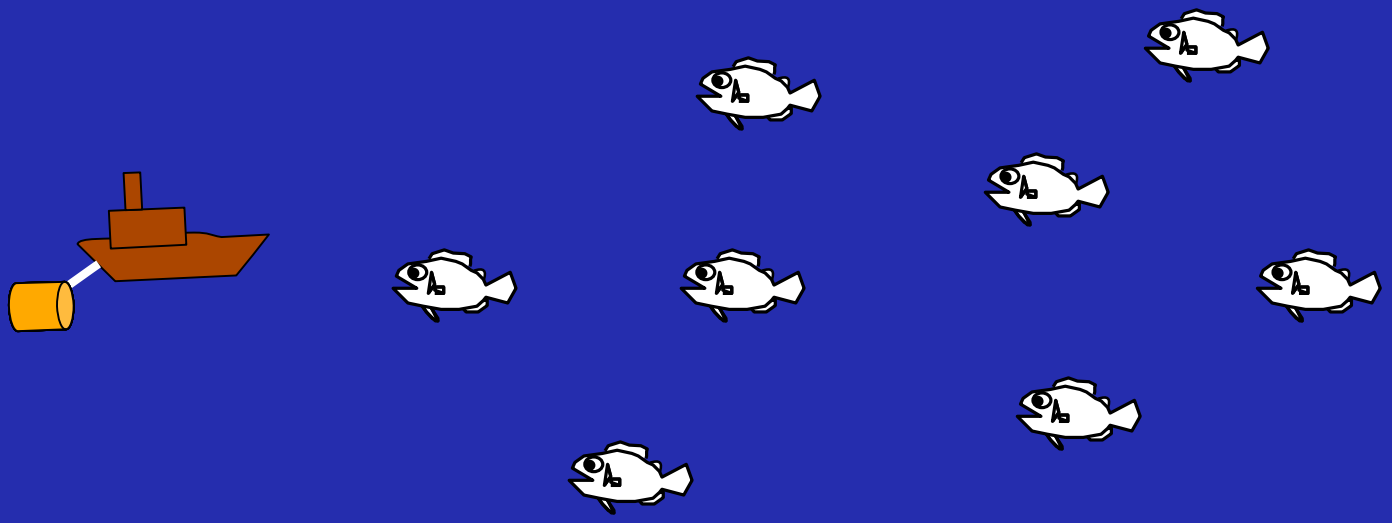
- Background
  - –DoCoFis: Comprehensive projects to understand population dynamics of commercially important stocks
  - –Focusing on recruitment processes of walleye pollock
  - –Predation impact on post-settlement juvenile walleye pollock in the the coastal area, where
    - fishing gears are densely deployed
    - otter trawling is excluded

Small-sized Danish seine

- Originally used for *shishamo* smelt (*Spirinchus lanceolatus*) fishery
- Consists of a barrel, a pair of herding ropes and a net
- Handy, easily operated
- Suitable for fish collection in the coastal area
- Fishing efficiency has been still unknown

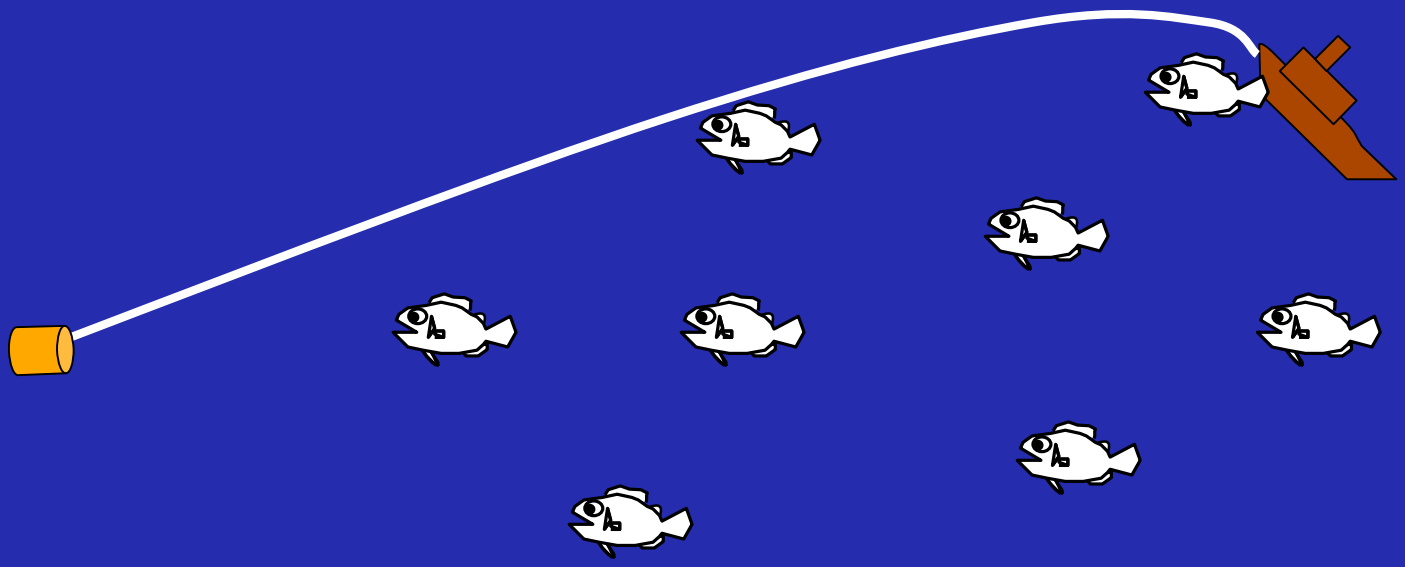
Danish seine operation

1. Let the barrel go



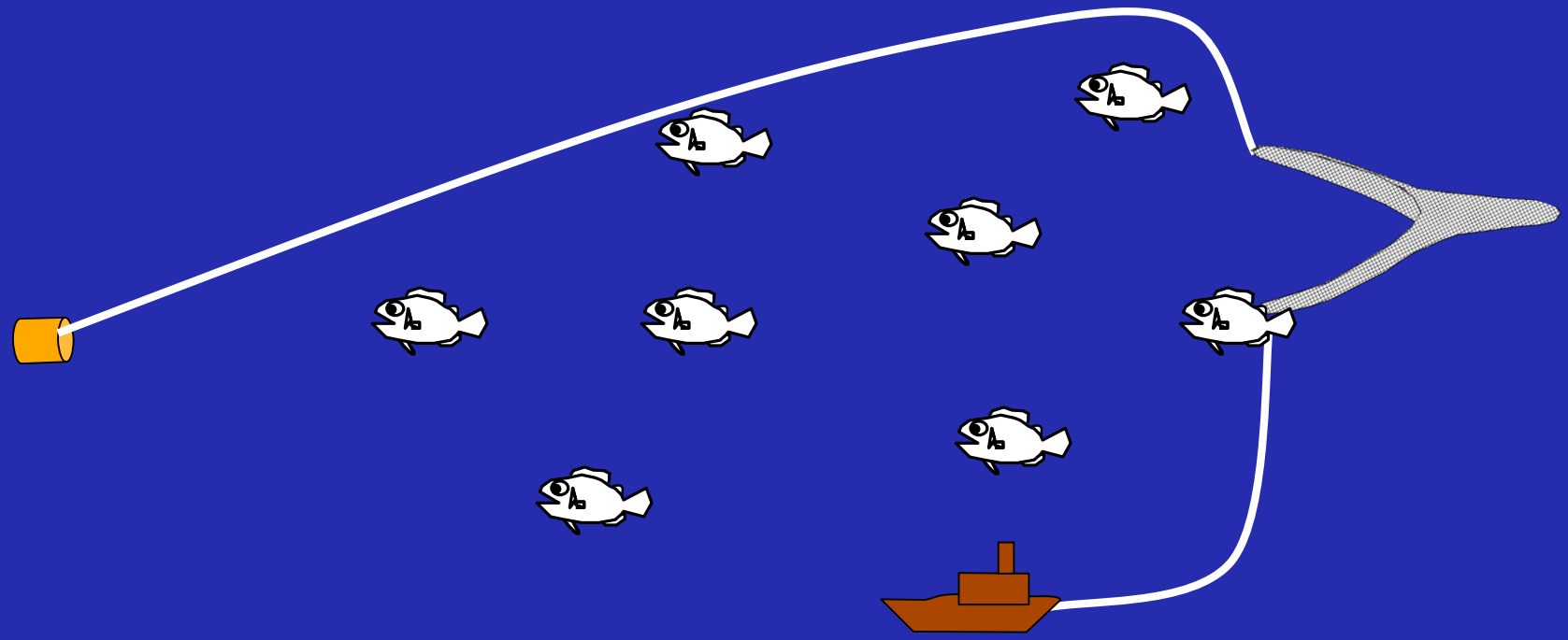
Danish seine operation

1. Let the barrel go
2. After running 2/3 length of the rope, turn and let the net go



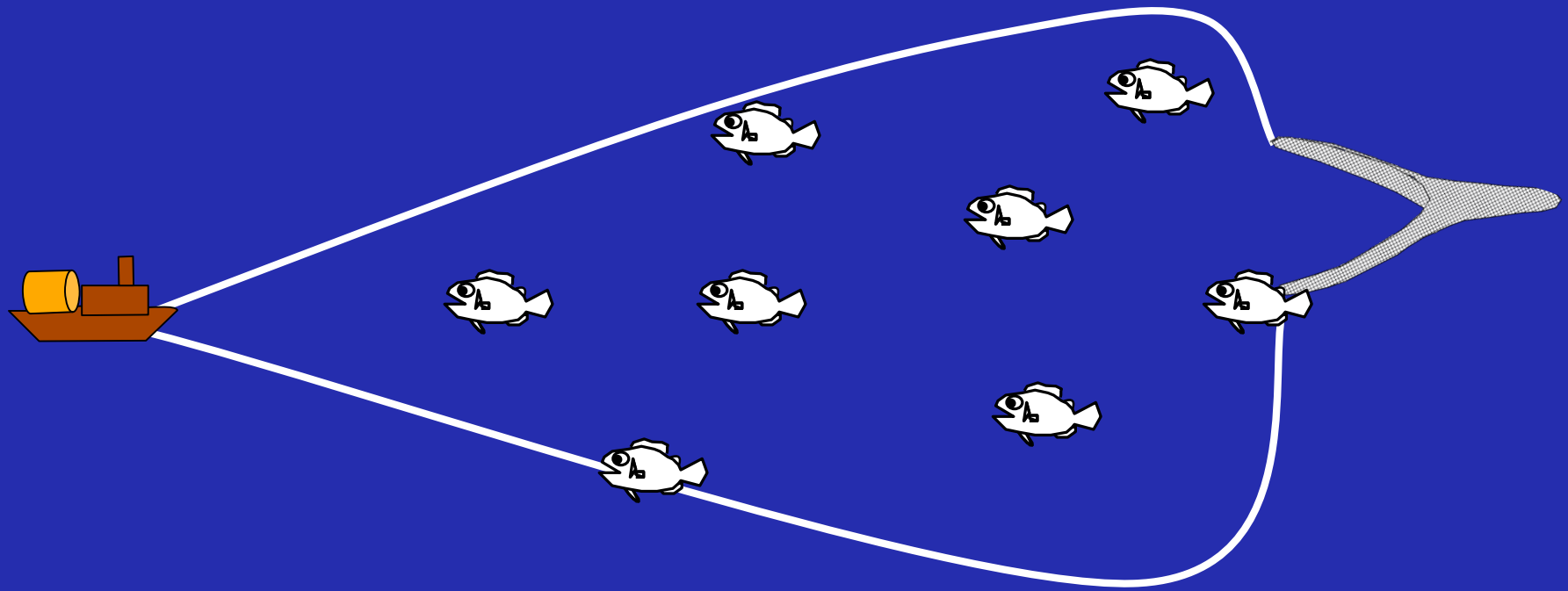
Danish seine operation: Cont'd

1. Let the barrel go
2. After running 2/3 length of a rope, turn and let the net go
3. Return to the barrel



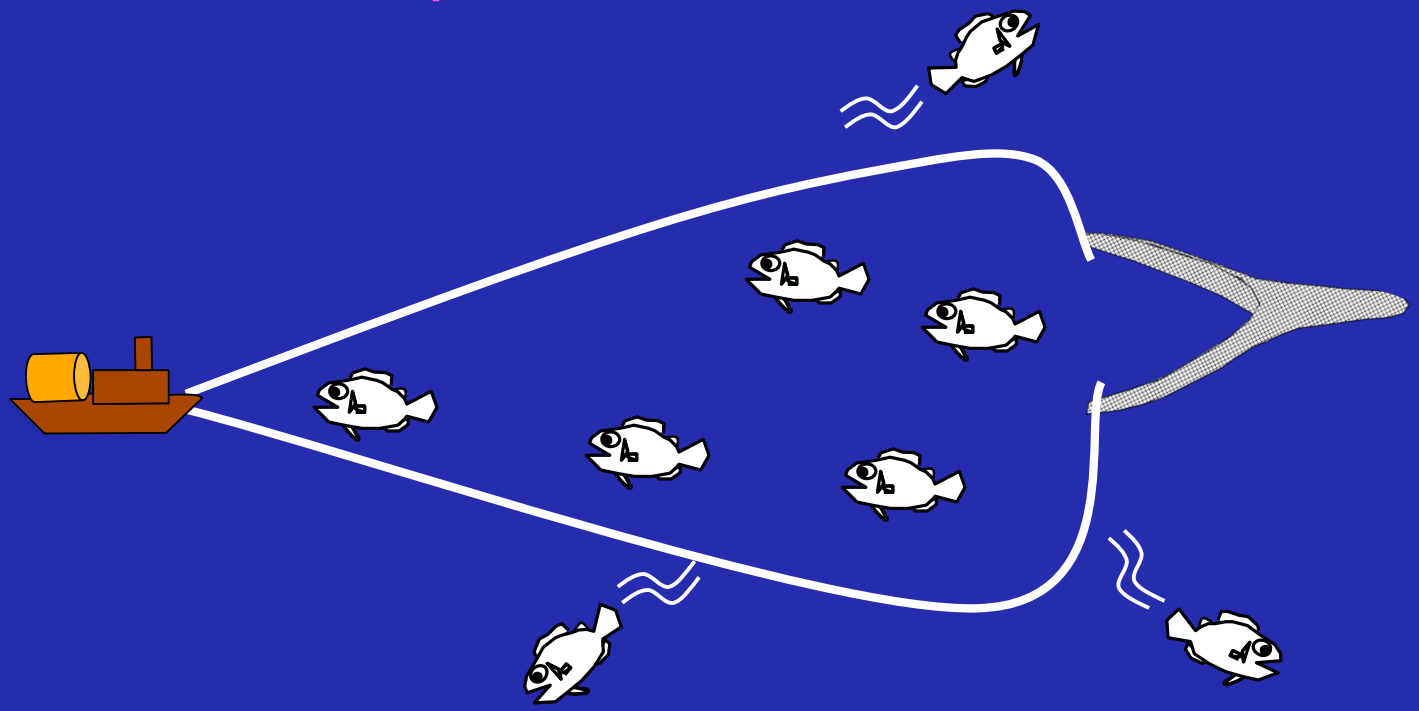
Danish seine operation: Cont'd

1. Let the barrel go
2. After running 2/3 length of the rope, turn and let the net go
3. Return to the barrel
4. Retrieve the barrel
5. Hold for a while to let the ropes sink



Danish seine operation: Cont'd

1. Let the barrel go
2. After running 2/3 length of the rope, turn and let the net go
3. Return to the barrel
4. Retrieve the barrel
5. Hold for a while to let the ropes sink
6. Go ahead slowly, wind up the ropes, sweep and herd fish



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2. After running 2/3 length of the rope, turn and let the net go
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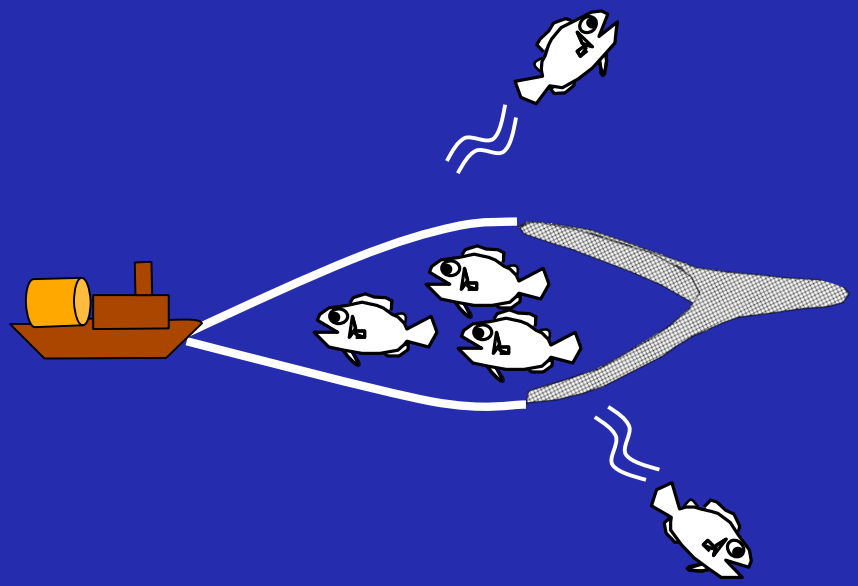
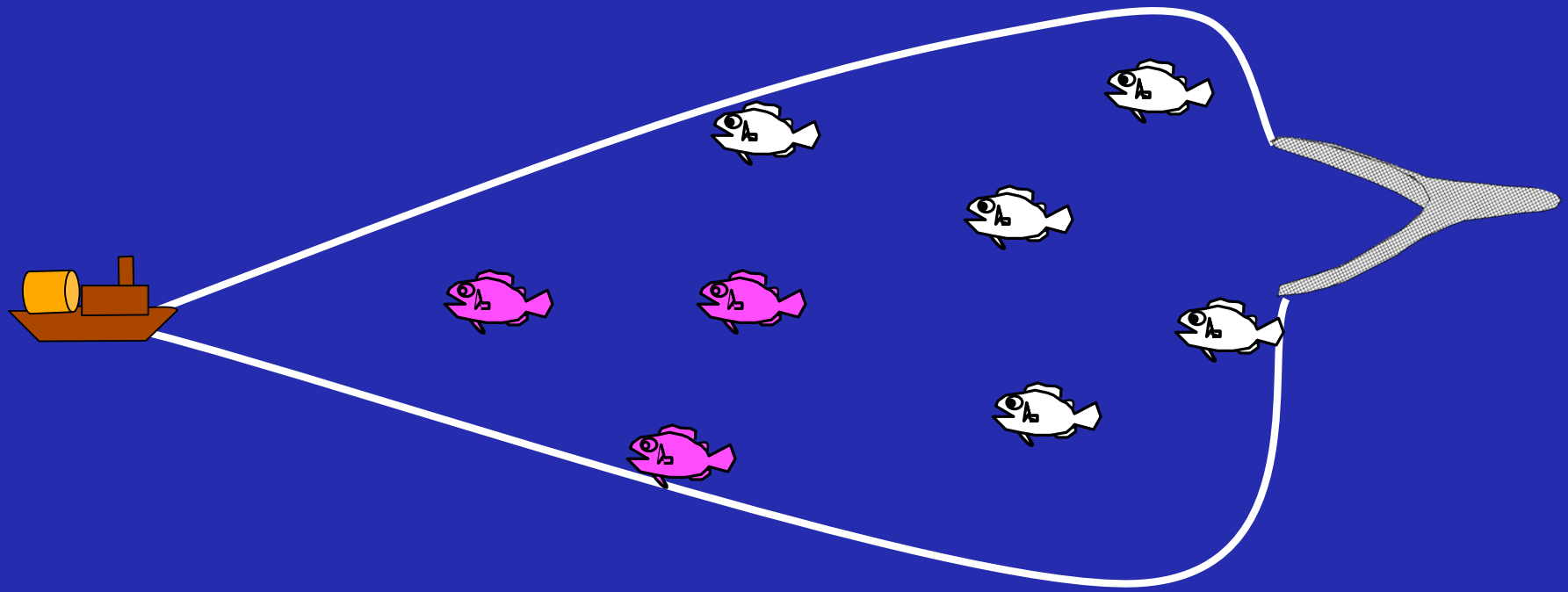
5. Hold for a while to let the ropes sink
6. Wind up the ropes, sweep and herd fish
7. Retrieve the net



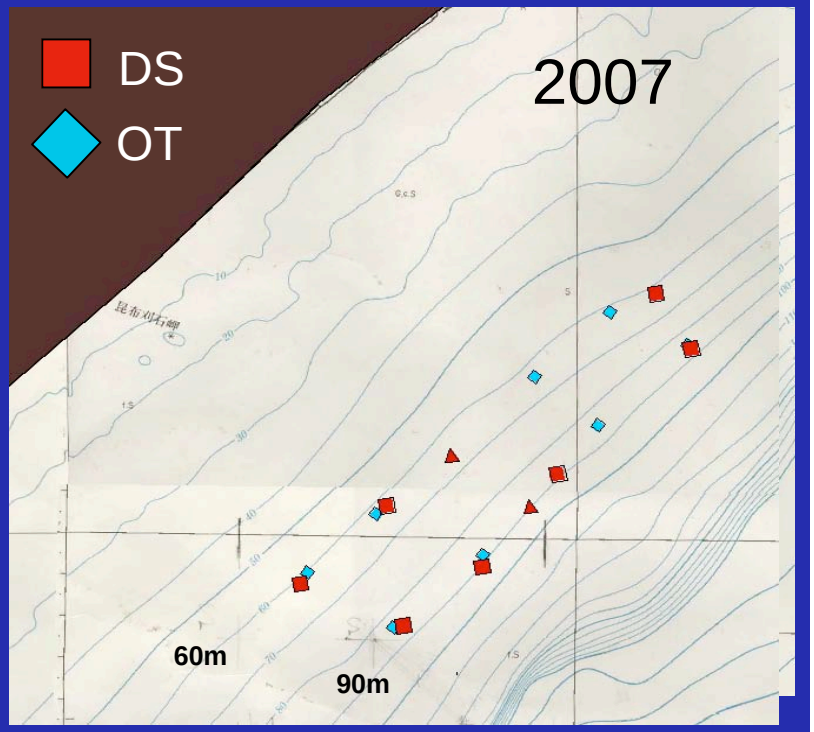
Purpose of the present study

- To obtain catch efficiency of the Danish seine to quantify the coastal predator of post-settlement juvenile walleye pollock, by comparing with catches of otter trawling



Survey design

- 2006
  - Otter trawling
    - FRV *Hokko-maru* (HNFRI: 902t)
    - Oct 30 ~ Nov. 1
    - 6 tows (60m x 3, 90m x 3)
    - Wingspread
  - Danish seine
    - FMV *Yutaka* (Kushiro City Fish Coop: 7t)
    - Oct 24 & Nov 16
    - 8 tows (60m x 4, 90m x4)
- 2007
  - Otter trawling
    - *Hokko-maru*
    - Sep. 3~6
    - 8 tows (60m x 4, 90m x 4)
  - Danish seine
    - *Yutaka*
    - Aug 24 & Sep 11~12
    - 9 tows (60m x 4, 90m x5)

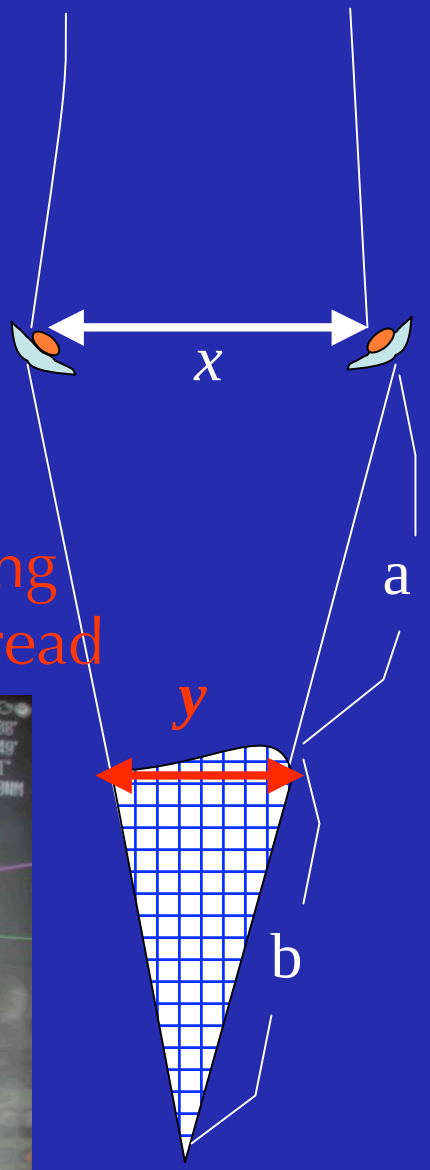


Survey design

- Measurement of area sampled by the nets
  - Otter trawling
    - *SCAMMER*® sensor
    - Attached to the doors
    - Wing spread was estimated by:

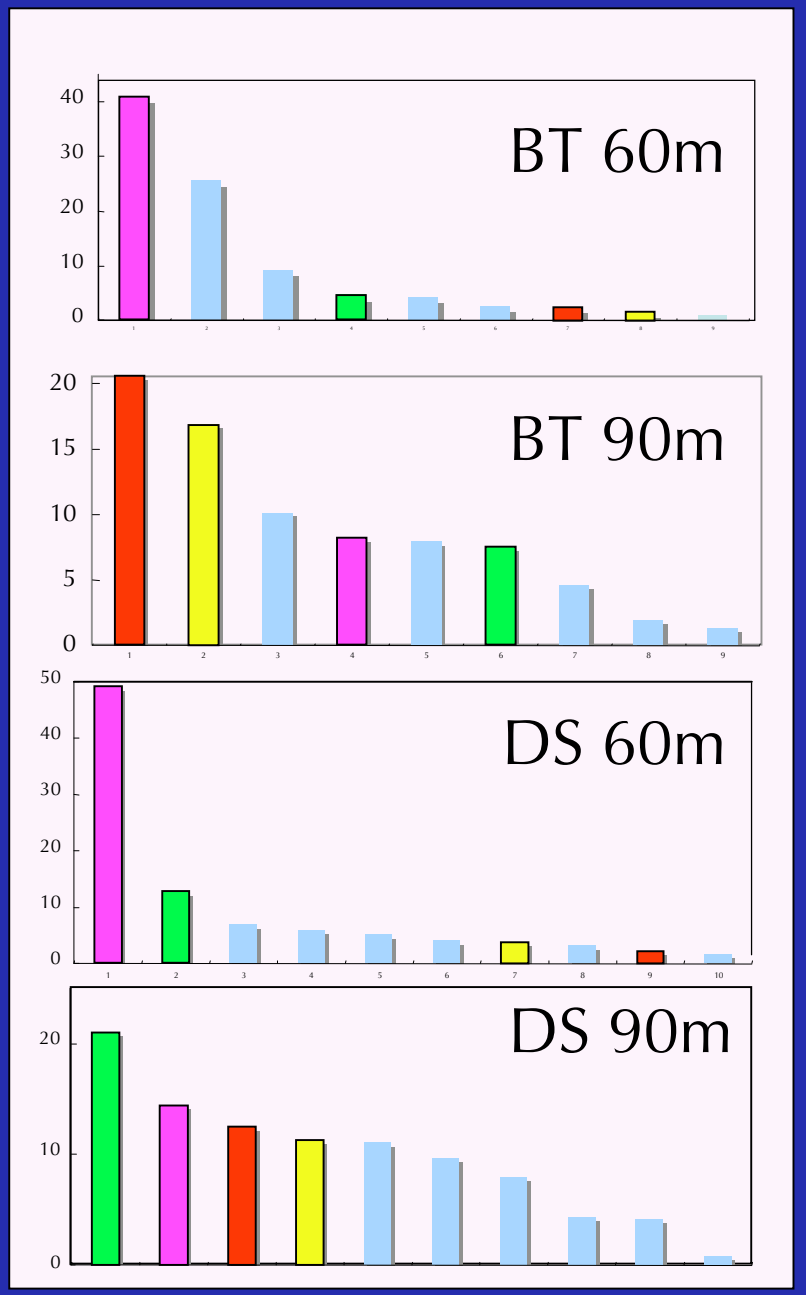
$$y = \frac{b}{a+b}x$$

  - Danish seine
    - The area surrounded by the herding ropes
    - Approximated by digitizing GPS track of the vesse
- Data comparison
  - Used gravimetric density



2006 Catch composition

- Species compared for catch
  - Plain sculpin *Myoxocephalus jaok*
  - Horned sculpin *Enophrys diceraus*
  - Kamchatka flounder *Atheresthes evermanni*
  - *Blackfin flounder Glyptocephalus stelleri*



Density comparison (2006)

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Apparent catch efficiency of Danish seine for sculpins

Average: 37.1

Average density within the herding rope (t/km2)	60m	90m
Plain sculpin	0.16	0.03
Horned sculpin	0.05	0.04
Kamchatka flounder	0.01	0.02
Blackfin flounder	0.01	0.03

OT / DS ratio	60m	90m
Plain sculpin	69.70	30.04
Horned sculpin	27.60	20.90
Kamchatka flounder	35.47	78.82
Blackfin flounder	72.27	90.74

Ave. density estimated by otter trawling (t/km^2)	60m	90m
Plain sculpin	11.35	0.97
Horned sculpin	1.27	0.91
Kamchatka flounder	0.41	1.95
Blackfin flounder	0.69	2.48

Average: 69.3 ≒ 70

Apparent catch efficiency of Danish seine for sculpins

Catch composition 2007

- Anomalous thermal condition
  - Sporadic occurrence of fishes except for Plain sculpin
  - Comparison was possible only for plain sculpin

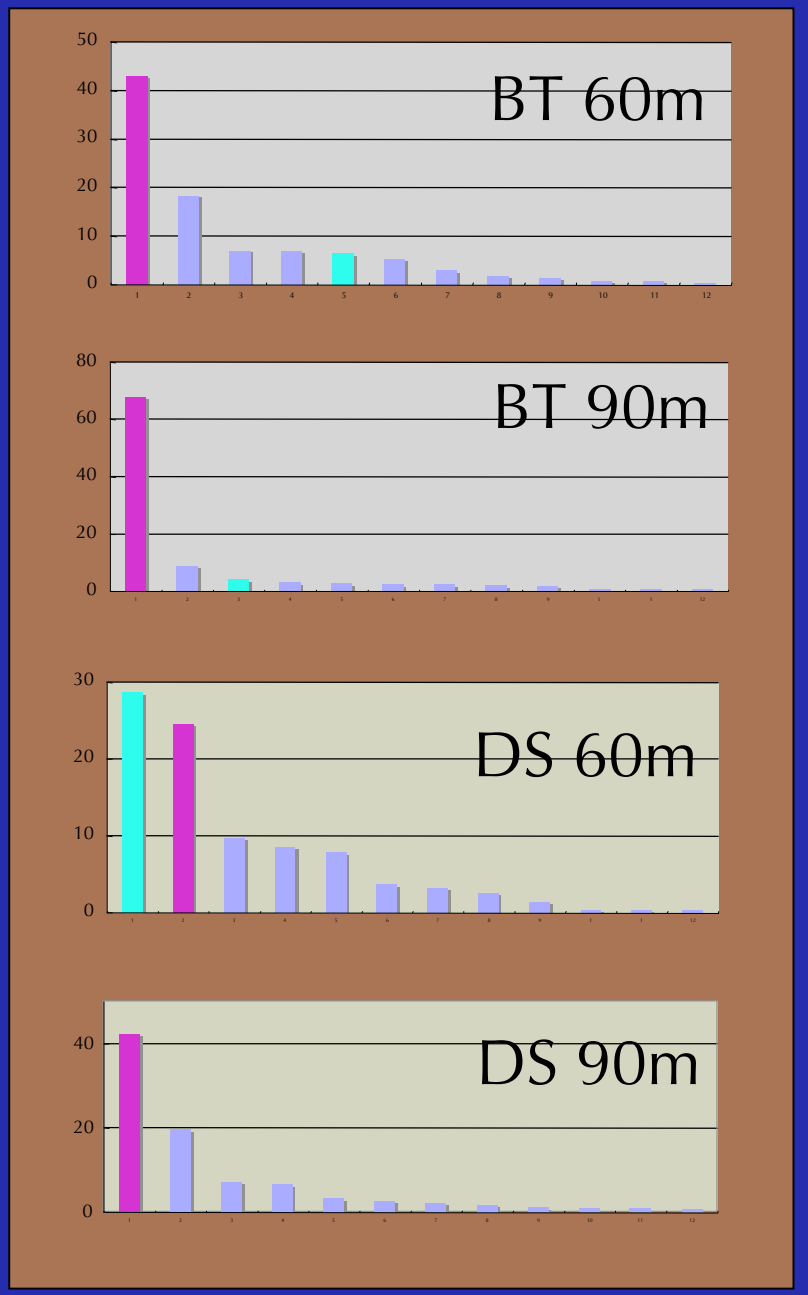
Fish density (t km^2)

	60m	90m
DS	0.15±0.04	0.38±0.09
OT	3.45±1.66	18.64±7.27

DS - OT ratio

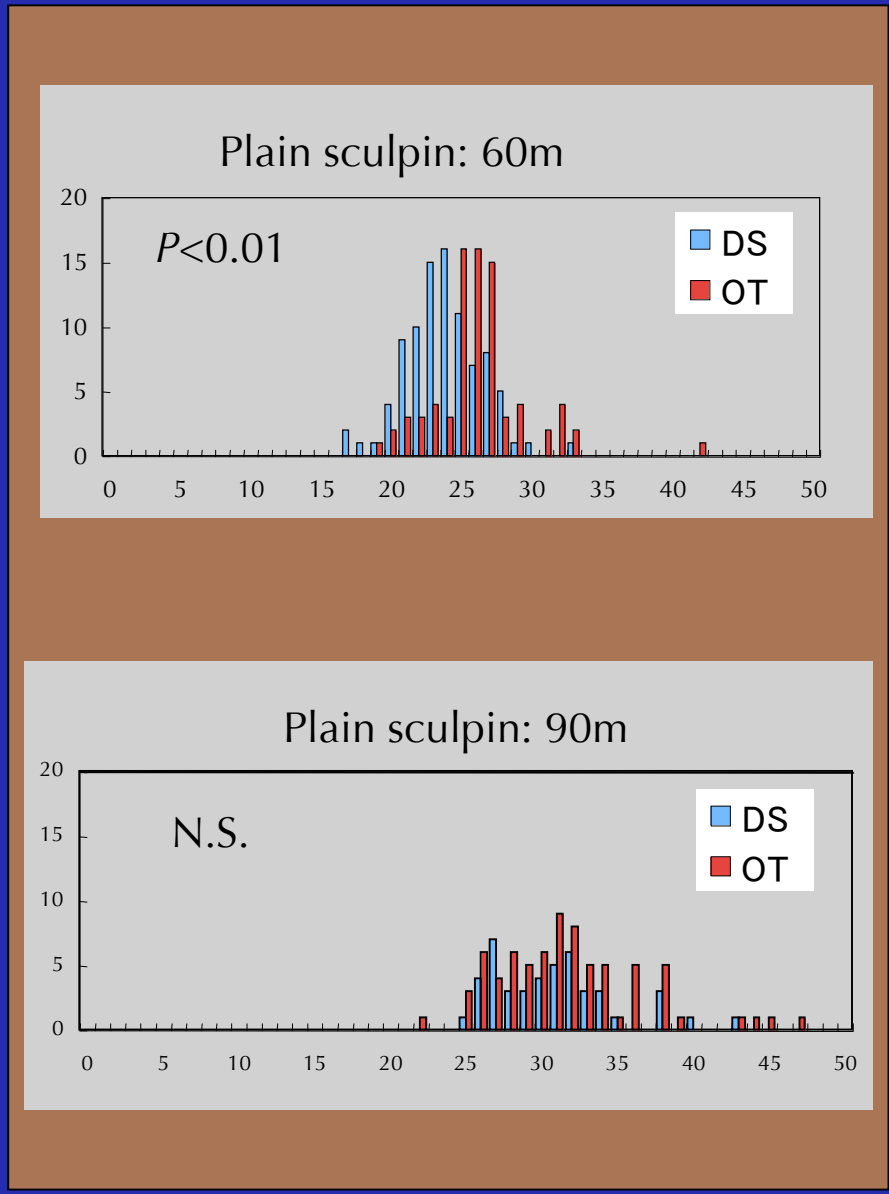
1: 23.7 1: 48.1

Ave = 36.3



Comparison of fish size

- Plain sculpin caught in 60m and 90m strata (2006)
  - Significant difference in 60m
  - N.S. in 90m
  - OT catches rather large-sized fish
    - Complete comparison is still needed (Mean LFD from all Stns. weighted by catch)



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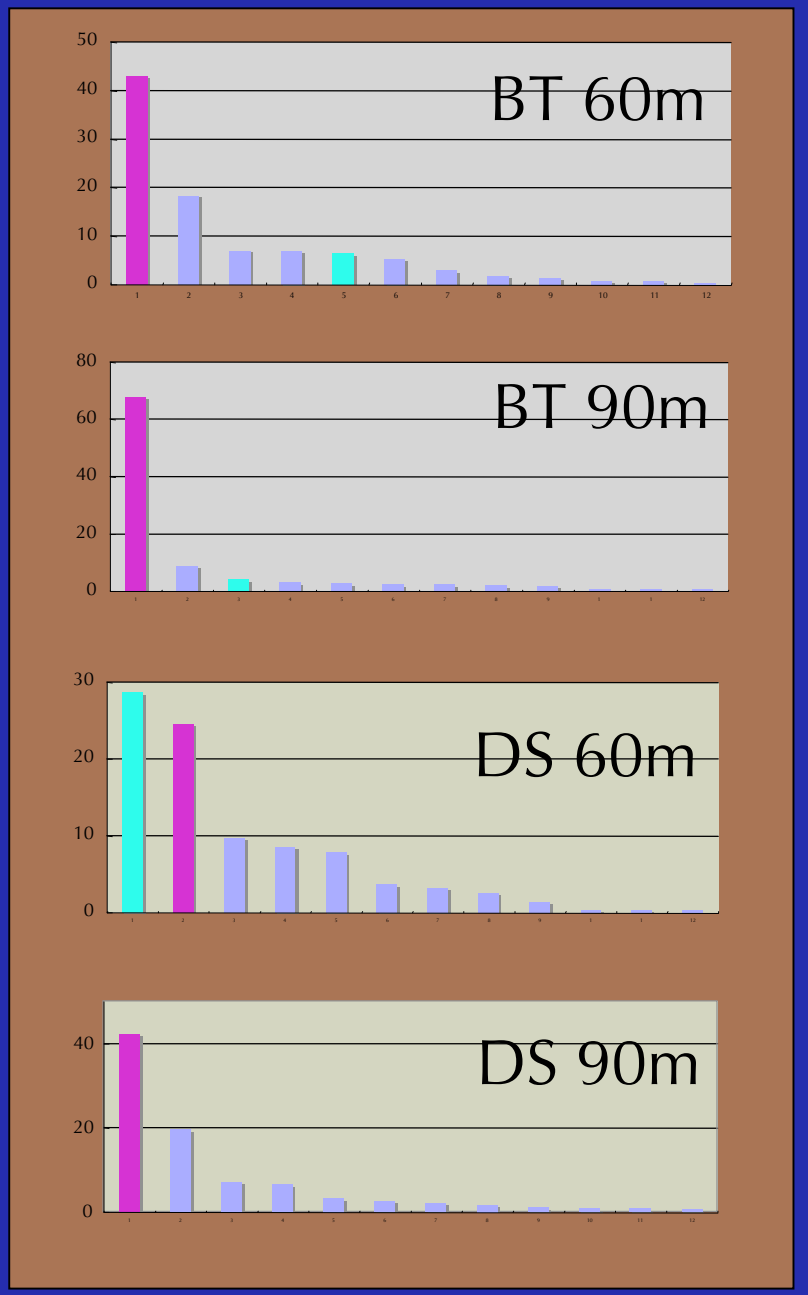

Conclusion

- Density estimate was compared for an otter trawling net and Danish seine
- The density of fish within the area swept by OT was:
  - 36 times higher for sculpins
  - 70 times higher for flatfishes,

    comapred with DS
- These factors are used for density estimate by DS, assuming the catch efficiency of OT (q_{OT}) to be 1.0
- However, q_{OT} is fairly below 1.0, so the density estimate by DS would be still conservative
- q_{OT} is still needed for more precise density estimate!