

Pooling arrangement in co-management: Inducing efficiency to overcome adverse conditions

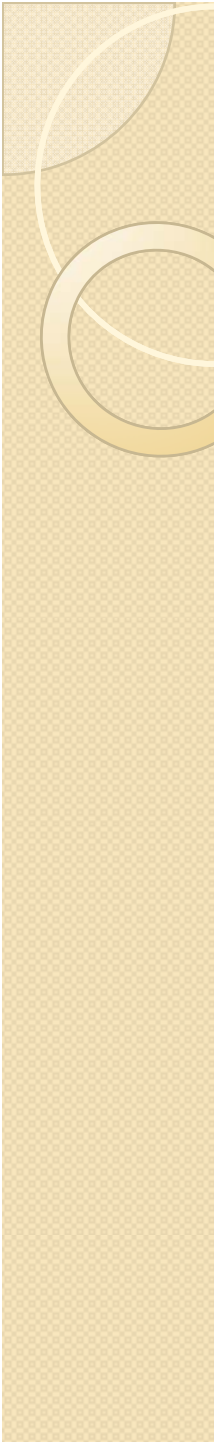
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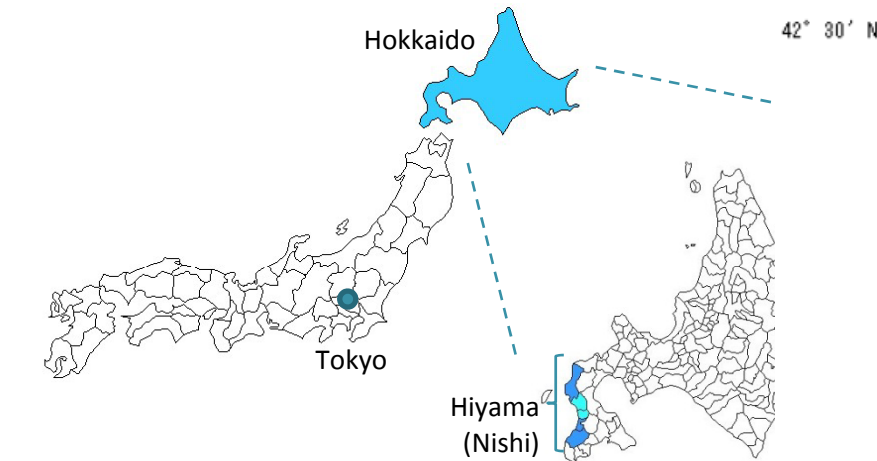


Introduction

- Pooling (sharing) arrangement
- Literature on pooling arrangement
 - “Good” shirking (e.g., Gaspart and Seki 2003)
 - Supporter of fishing effort coordination (Platteau and Seki 2001)
 - Aligns individual and group incentives (Kaffine and Costello 2008)
- Case study: pollack fishery in Hokkaido, Japan.

Pollack fishery in Hiyama

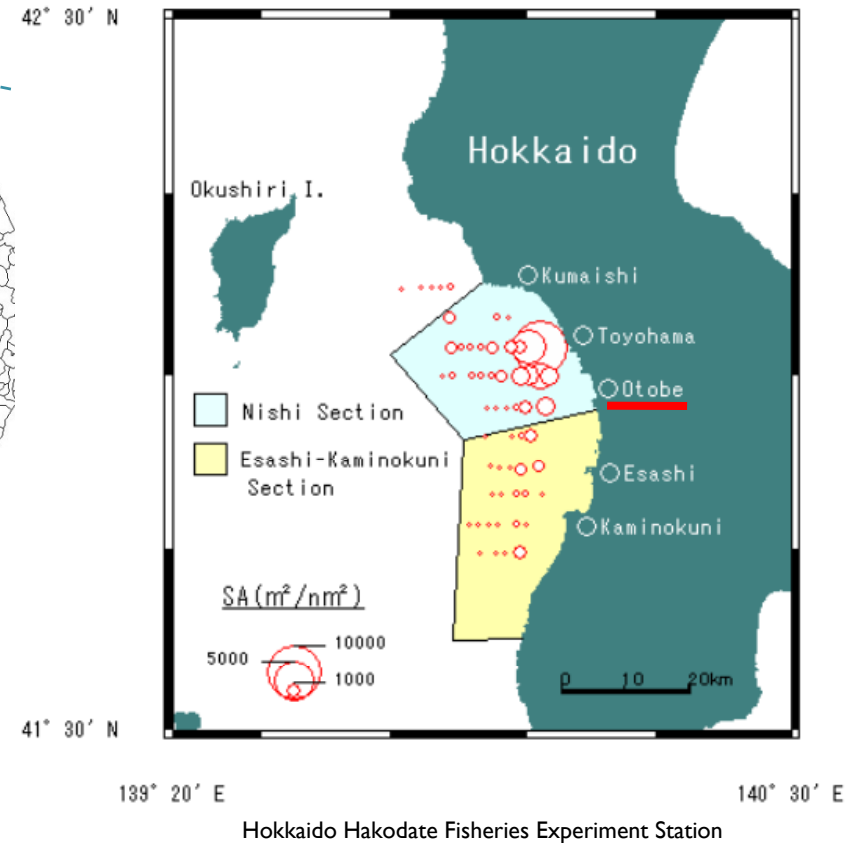
Location of studied area



Walleye pollack
(*Theragra chalcogramma*)

Photograph: Hokkaido Hakodate Fisheries Experiment Station

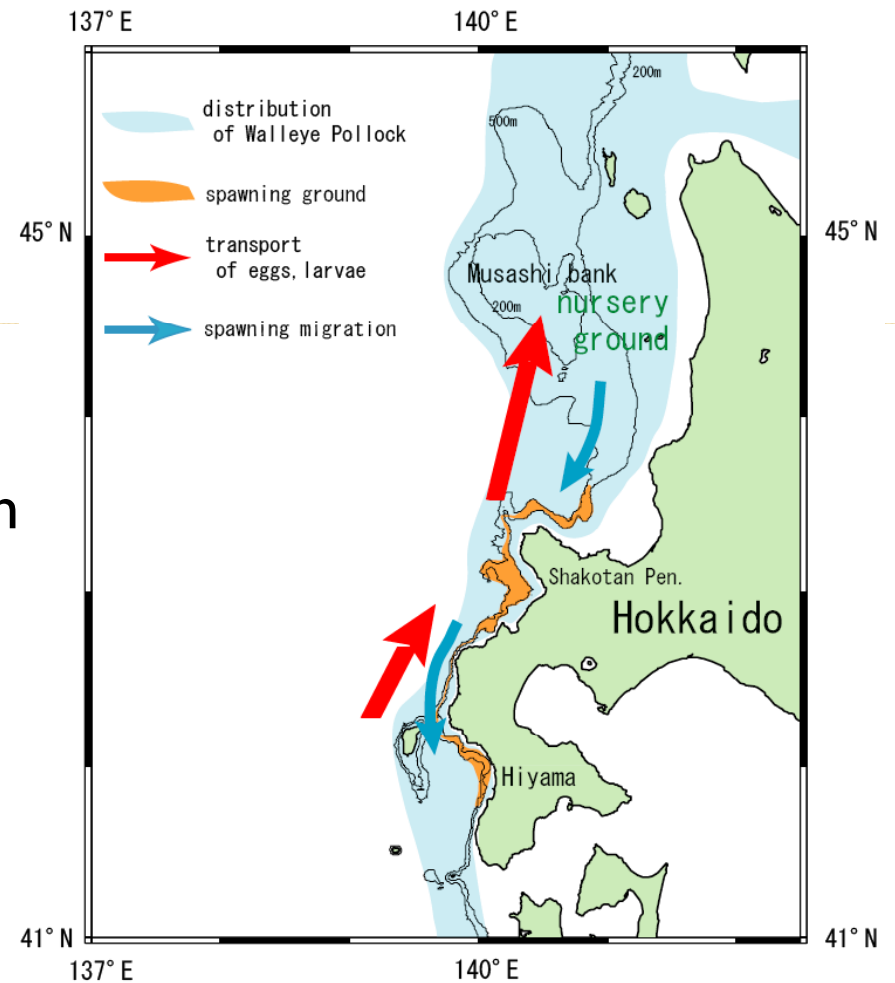
Fishing grounds in the area



- Fishing season: November, December, January
- Fishing gear: longline

Pollack fishery in Hiyama (2)

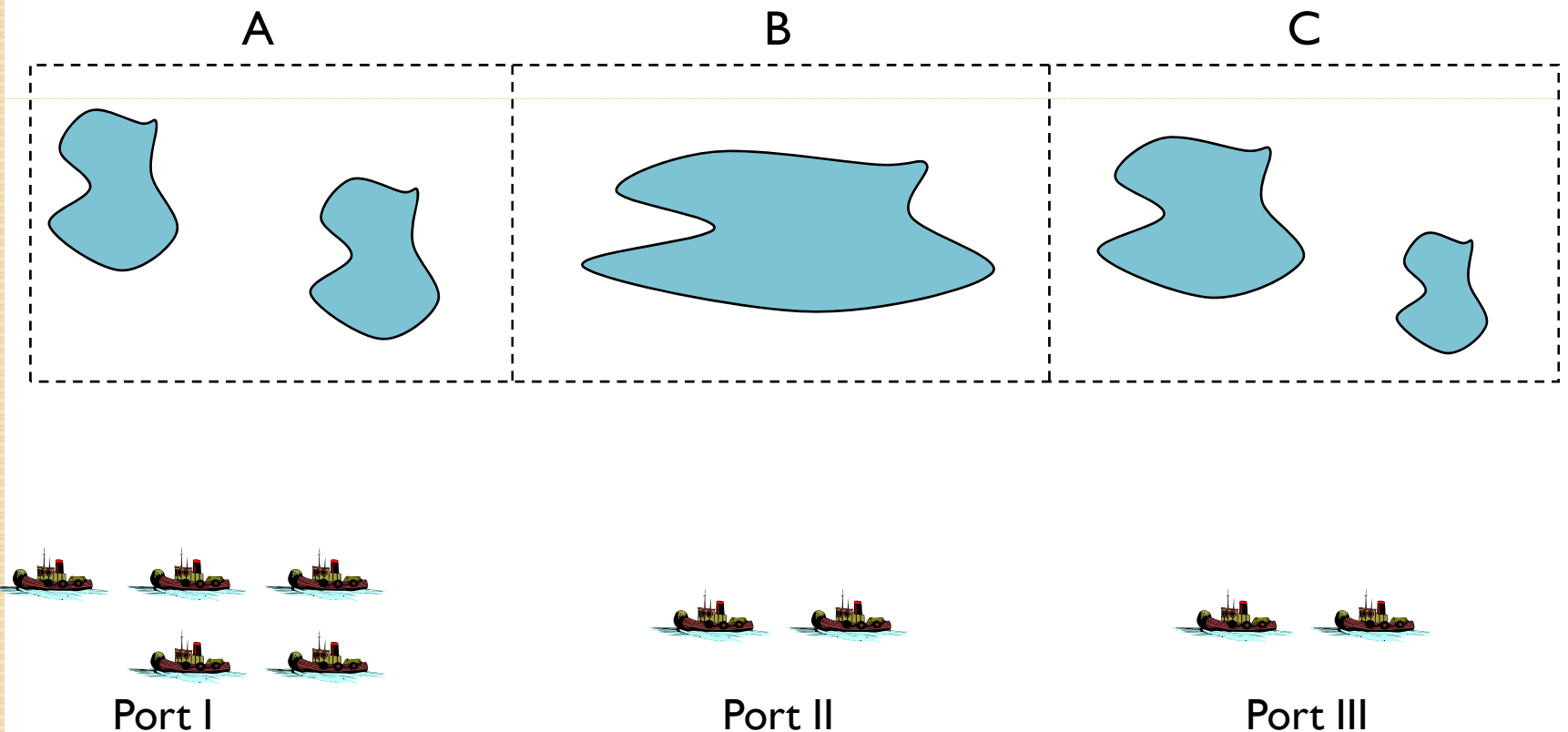
- Belongs to Northern Sea of Japan stock group.
- Hiyama region is the major spawning ground.
- Main target is pollack roe.
- Harvest volume: 3,712 tons in Hiyama; about 14% of total catch from this stock group (2005).
- 1,894 tons in Nishi (2005).



Hokkaido National Fisheries Research Institute

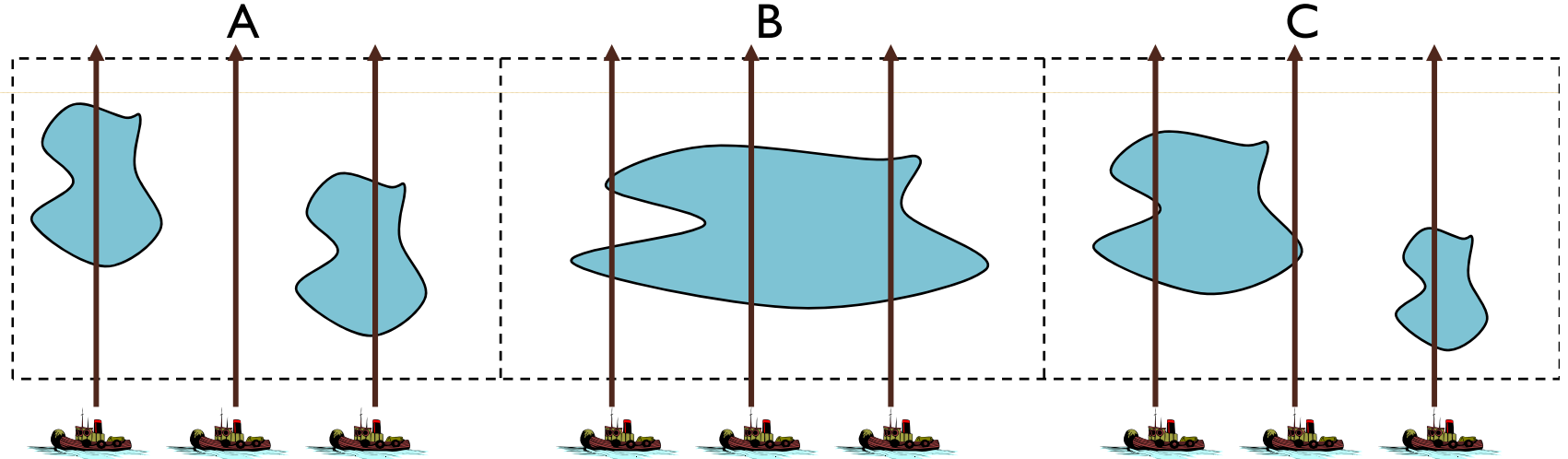
Rotation scheme (I)

- Objectives: avoid congestion, equal opportunity
- Step I: assignment of fishing grounds



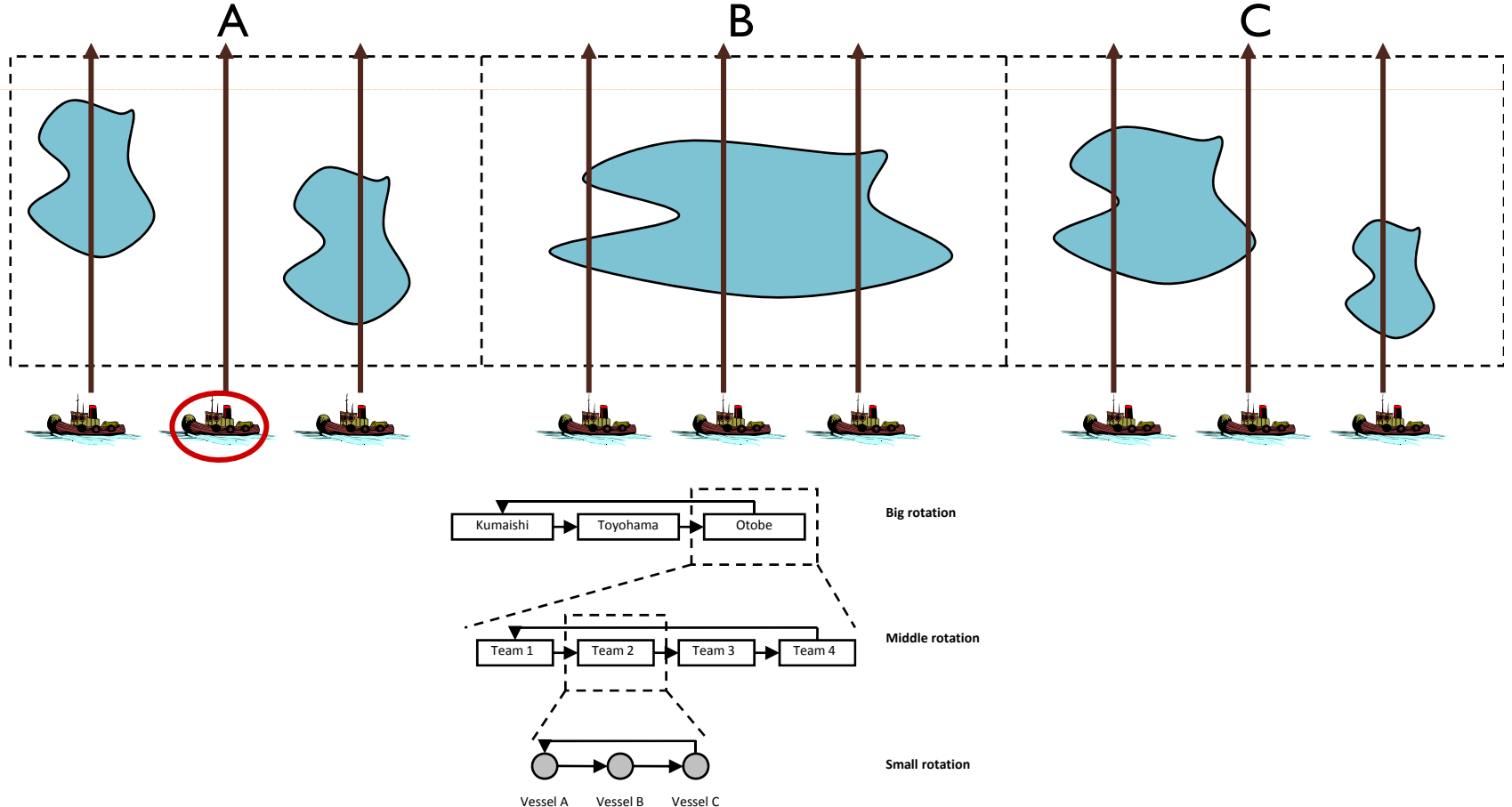
Rotation scheme (2)

- Step 2: equalizing opportunities via rotation (3 layers).
- First layer: “big” rotation



Rotation scheme (3)

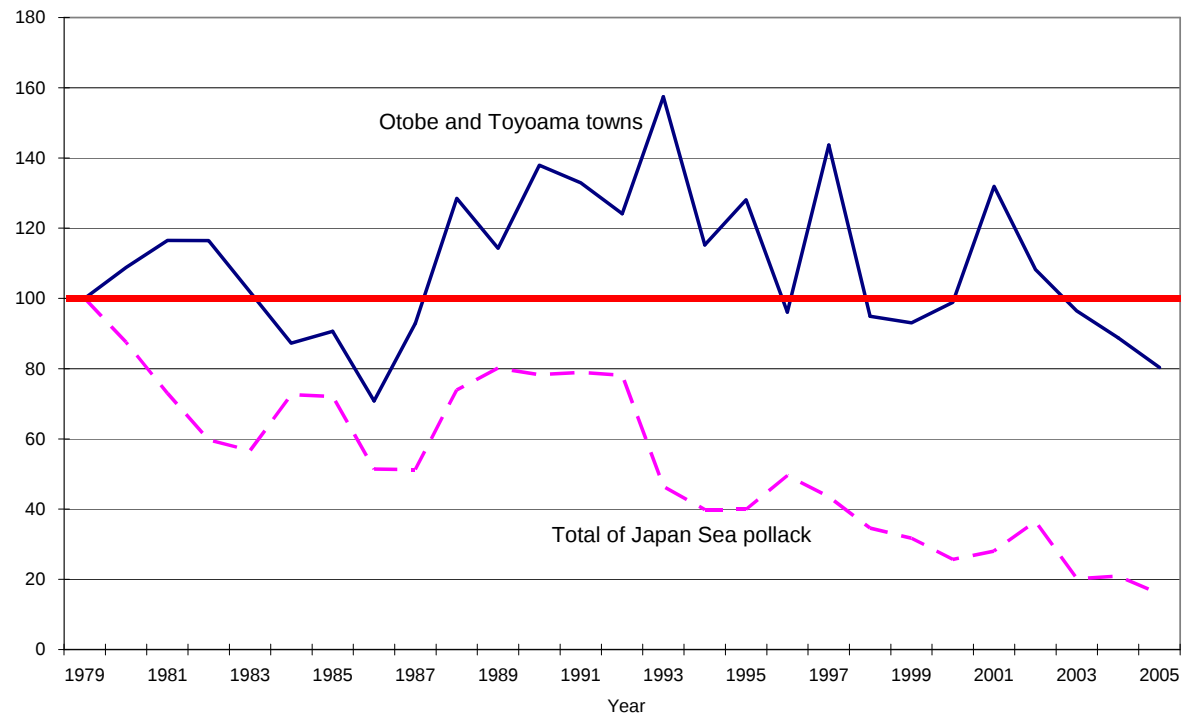
- Second & third layers: “medium” and “small” rotations.
- Objectives were met, but very rigid system.



Performance pre-2004/05

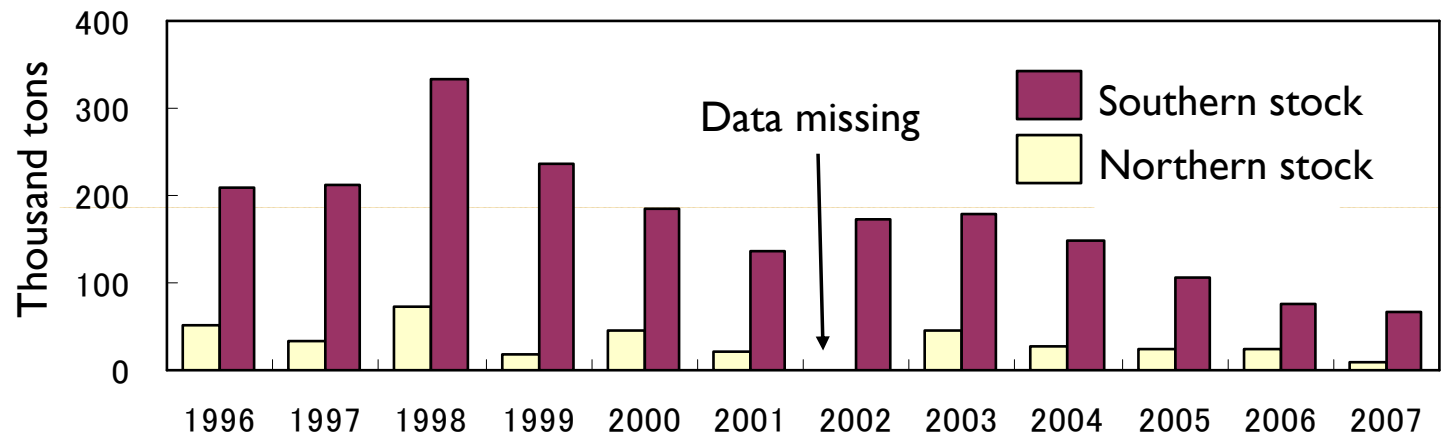
- Compared to pollack fisheries in other northern regions, Hiyama was doing fairly well.

Percentage change in total harvest volume (1979=100)
(For Otobe and Toyohama towns in Hiyama region)



Depreciating conditions...

- Continuously declining stock level.



Source: Hokkaido Hakodate Fisheries Experiment Station

- Rising fuel cost

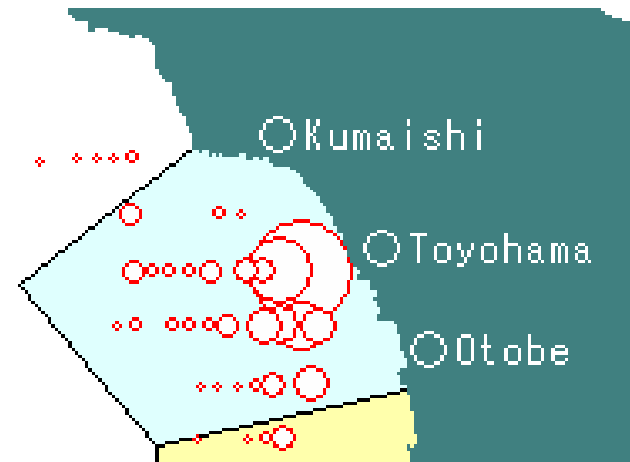
	2002	2003	2004	2005	2006	2007
Fuel price	42.2	44.5	51.6	62.7	68.6	76.9
Cost share	8.1%	8.1%	9.1%	12.0%	15.3%	20.8%

Fuel price is per liter, and average of November, December, and January months.
Cost share is the proportion to total operation costs.

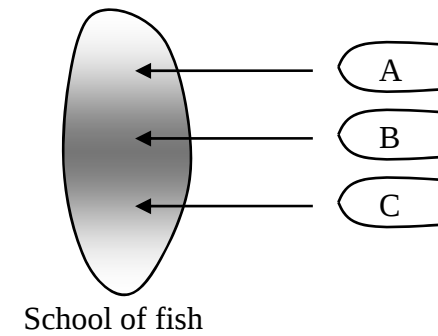
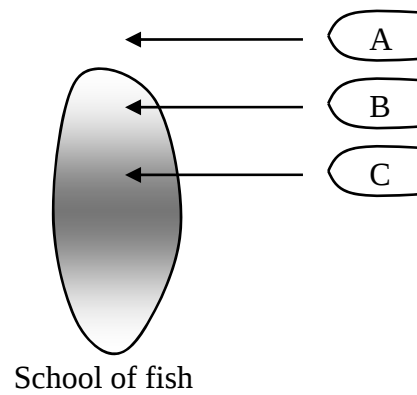
...necessity for change

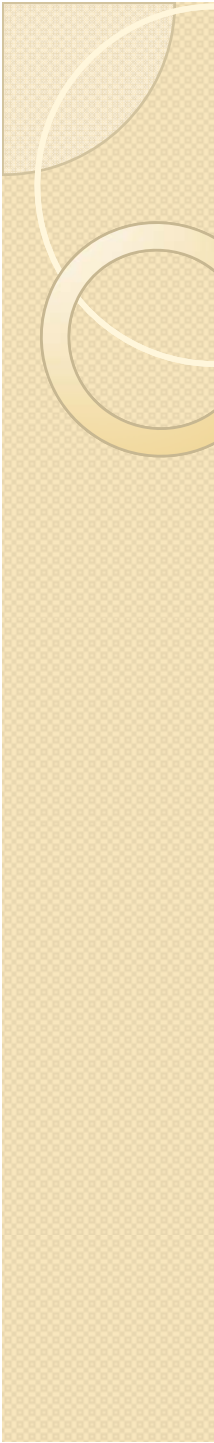
- Rigidity of rotation scheme became too costly.

- Large rotation



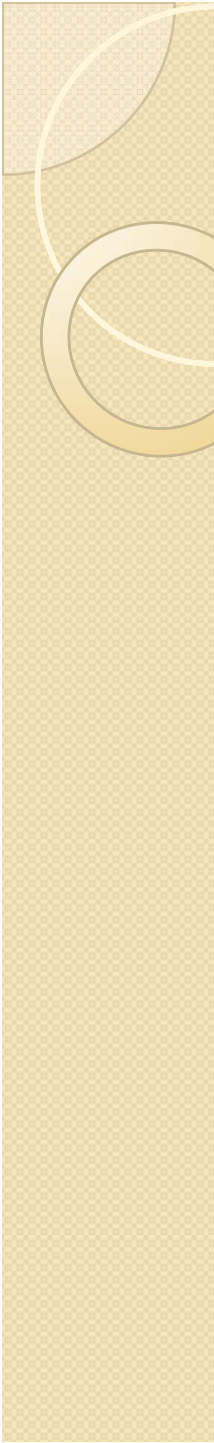
- Rigid locations





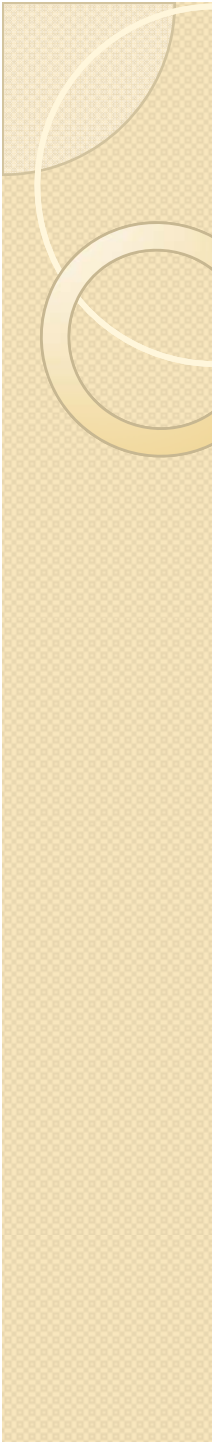
(Total) pooling arrangement

- Region-wide pooling arrangement implemented from 2005 season.
- Pooling (general):
 - Proceeds from all vessels are pooled at once.
 - Distributed back to vessels according to certain rule.
- Nishi region of Hiyama's case:
 - Harvest revenues are pooled at once.
 - Distributed back equally per unit of longline.
 - Post-distribution adjustments in 2005-06.



Objectives

- How did fishing efficiency change before and after the pooling arrangement?
 - Did pooling arrangement benefited all fishermen?
-



Data

- Data for 19 vessels registered to Otono FCA.
 - Harvest volume and value
 - Itemized costs
 - Analysis only focused on larger vessels (19 tons, 5 crew members—16 vessels).
- Panel for six seasons (2002-07)
 - Covering before and after the implementation of pooling arrangement.

Anecdotes

- Revenue declined as harvest volume declined.
- Cost savings have been significant.
 - Use of gear and fuel.
- Profitability improved.
- Information (skill) exchange → performance variance within this group declined.

Descriptive statistics

	2002	2003	2004	2005	2006	2007
Volume (t)	--	--	110.0	108.0	86.3	79.4
Revenue (M)	35.2	26.4	28.5	27.0	18.4	18.5
Total cost (M)	14.4	14.2	14.2	13.8	10.8	9.9
Profit (M)	20.7	12.2	14.2	13.2	7.6	8.6
Fishing days	58	71	69	66	50	43
Profit/day (K)	357.1	172.1	206.3	199.9	152.6	201.1
Fuel use (KL)	10.6	12.8	12.5	12.6	10.5	9.6

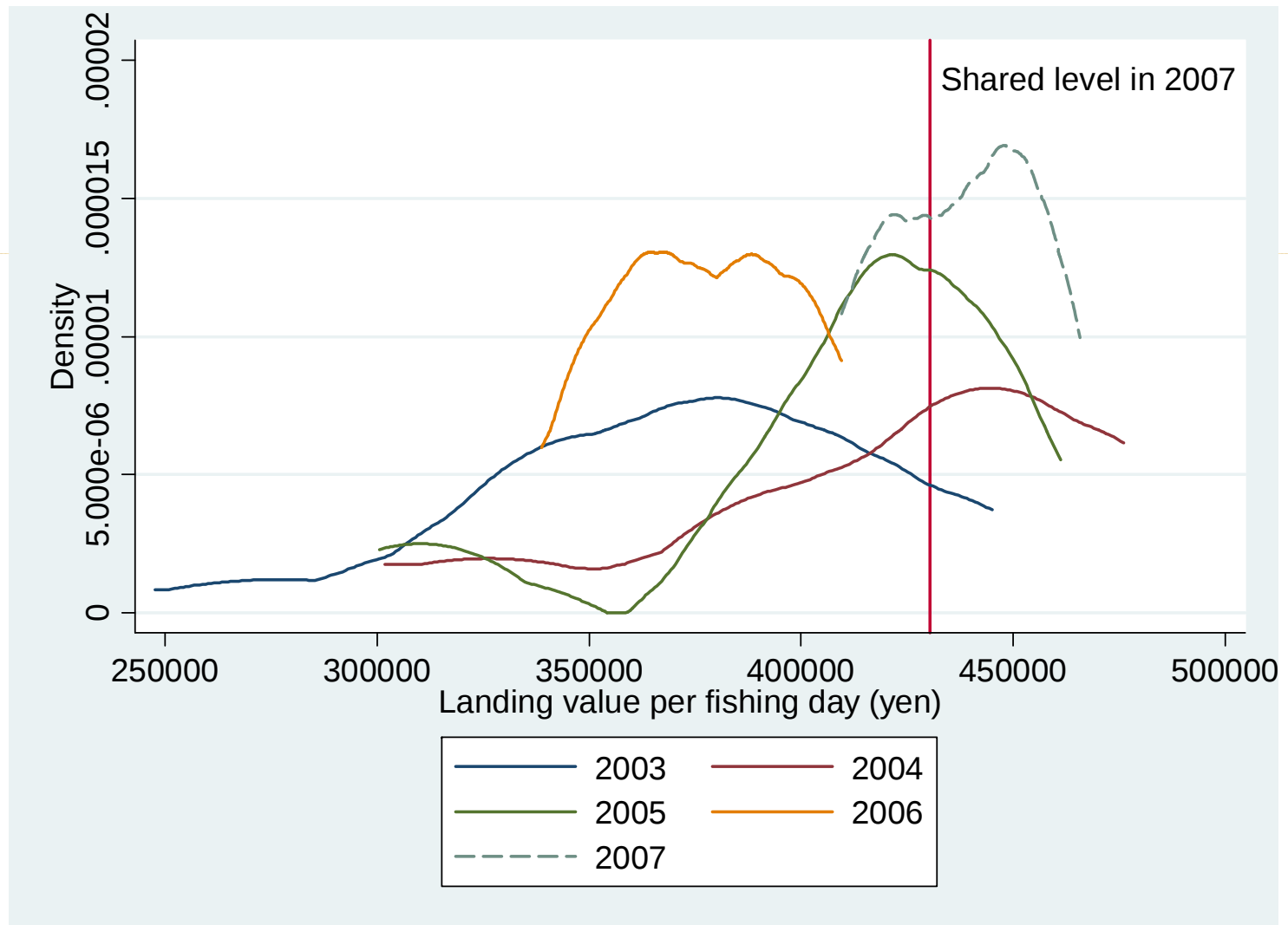
- Harvest volume and fuel use has declined as fishing days became fewer.
- Revenue declined; total cost shrank.
- Total profit declined (recovered slightly in 2007), but profit per fishing day was somewhat maintained.

What affected profits and profitability?

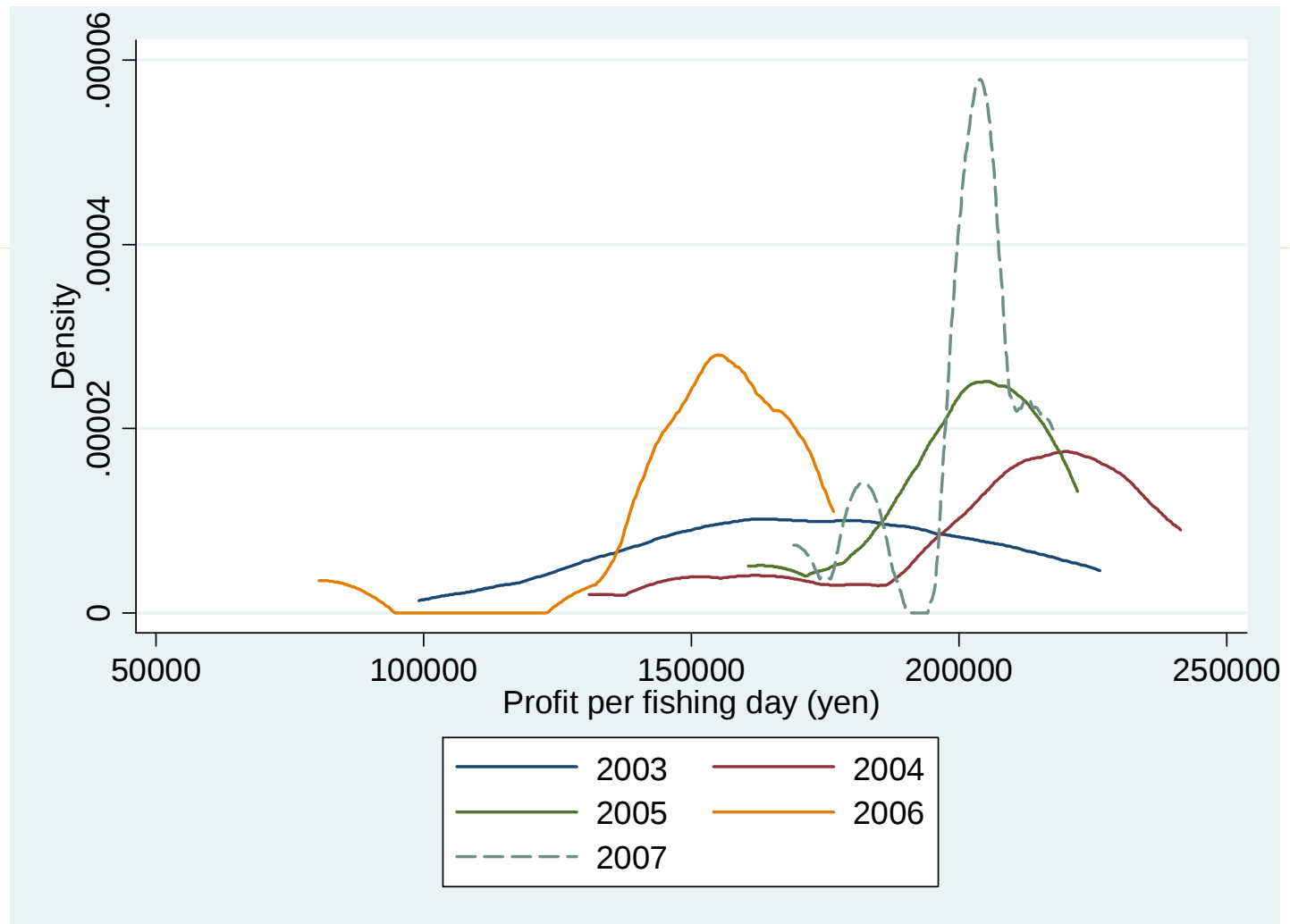
- Log-FE model

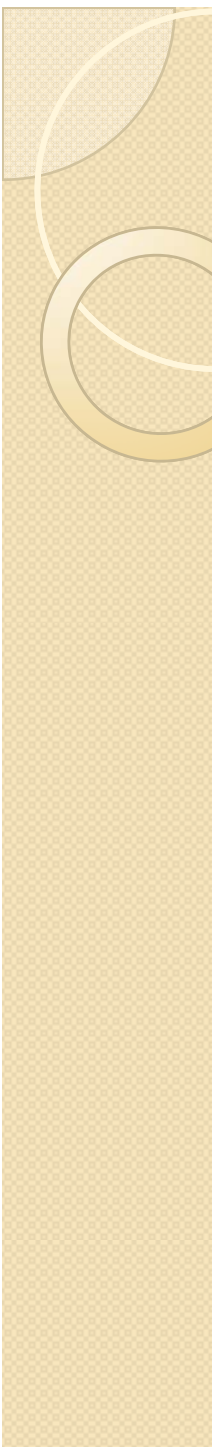
Variables	Dependent variable	
	Profit	Profit/day
Market price	11.54***	11.72***
Harvest volume	1.95***	1.97***
Fuel price	0.07	-0.09
Fuel use	-0.11***	-0.12***
Cost: bait	-0.10***	-0.09****
Cost: gear and setup	-0.16***	-0.16****
Cost: miscellaneous	-0.41***	-0.42***
Fishing days	-0.11	--

Pooling and performance distribution



Pooling and performance distribution





Conclusion

- Significant cost savings after implementation of pooling arrangement.
 - Some learning process.
 - Maintained profitability in the face of increasing fuel cost & declining stock size.
- Challenges
 - Can they maintain?
 - “Old habit to break” & majority dislike pooling.
 - Cost pooling?



Otobe town (June 2006)

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