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Economic strategies for avoiding climate change effects on Japanese salmon fisheries

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Content

- (1) Background and Objective
- (2) Climate change and fishery /Released salmon fry and Returned adults in Hokkaido
- (3) Four scenarios of variability on salmon capture and strategies for avoiding climate change effects on Japanese salmon fisheries
- (4) Importance of combination strategies for regional industries
- (5) Conclusion

(1) Background

- Salmon are important fishery resources with global commercial value.
- Climate change has a marked influence on salmon inhabiting subarctic waters.
- The stability and catch of cold-water fishery resources will decrease due to climate change (or global warming).
- Climate change will cause prices to rise and price salmon out of global markets.

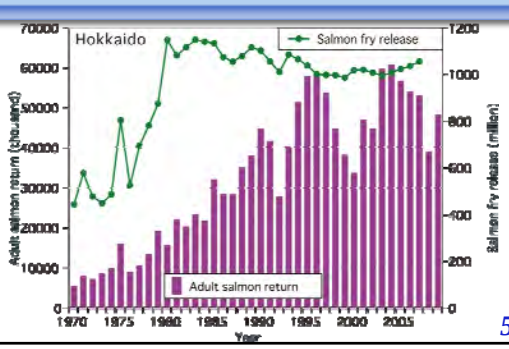
Objective

- Salmon fisheries are one of the most important industry in northern Japan.
- The basis for building economic strategies was suggested the stability of resources and prices.
- We thought that a combination of local, regional and global economic strategies could cushion salmon fisheries against the effects of climate change.
- What kind of strategies do we need?

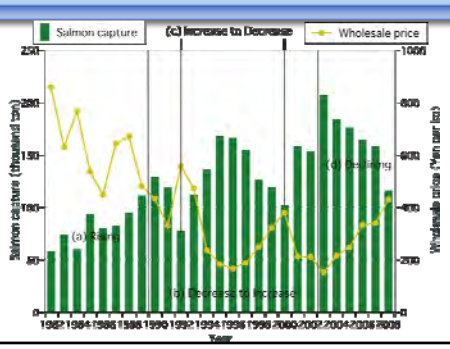
(2) Climate change and fishery

- Atlantic croaker juveniles spend their first winter in the estuarine nursery habitats. Temperature during winter period is very important to juvenile survival. The recruitment is determined by winter temperature (FISHupdate.com).
- Salmon juveniles spend their first autumn season in the Okhotsk Sea and their first winter season in the northwest Pacific Ocean.
- Some fish populations will increase and others decrease as a result of climate change (NEFSC). Climate change affects variability of fish populations.

Adult return and fry release of chum salmon in Hokkaido



Variability of salmon capture and wholesale price in Hokkaido



6

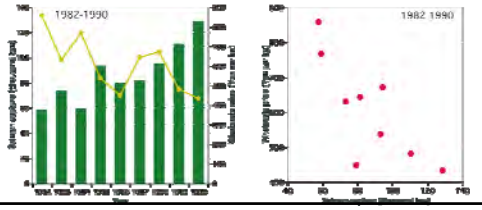
(3) Four scenarios of salmon capture and local strategies

- Hatchery salmon (*O. keta*) in Hokkaido
- Classified variation types from historical data
  - Rising (a) 1982-1990
  - Varying
    - Decrease to increase (b) 1990-2003
    - Increase to decrease (c) 1992-2000
  - Declining (d) 2003-2008

7

(a) Rising type (1982-1990)

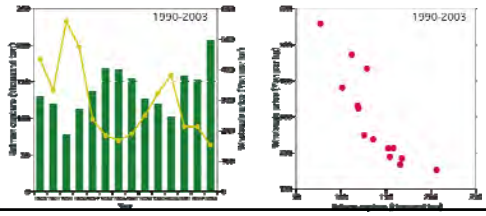
- Capture is rising. Wholesale price is declining.
- Raw material price is declining, too.
- Processing low price products and expanding domestic/foreign demand.



8

(b) Varying type (1990-2003) From decrease to increase

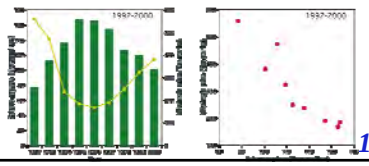
- Capture changed rapidly from decrease to increase. Wholesale price is up and down quickly.
- Saving fishing profits in rich years and using them as funds for lean years.



9

(c) Varying type (1992-2000) From increase to decrease

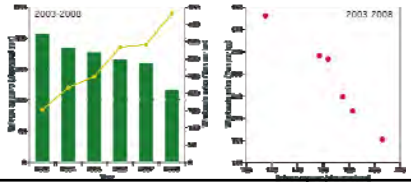
- Capture changed rapidly from increase to decrease. Wholesale price is down and up quickly.
- Maintaining prices of local resources by cooperation between salmon hatcheries, set-net fisheries and seafood processing industries.



10

(d) Declining type (2003-2008)

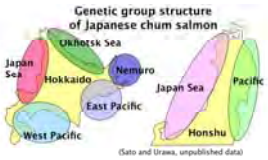
- Capture is declining. Wholesale price is rising.
- Raw material price is rising. Processing cost is increasing.
- Developing local resources to complement regional core resources by farming and ranching.



11

Regional strategy to stabilize salmon resources

- Planning the coexistence of hatchery salmon and wild salmon, and letting both resources stabilize.
- Examining methods of raising the return rate of salmon based on joint Japanese and Russian observation of the Okhotsk Sea.



12

Global strategy to stabilize salmon prices

- Planning differentiation by eco-labeling to evaluate hatchery salmon in the global market.
- Regarding East Asia countries as an extension of the Japanese market.

Japanese salmon at a department store In Shanghai

13

(4) Comparison of personal and cooperation styles of fishery management

- Case study of hatchery salmon industry in east Hokkaido, Japan
- Research on the relation between Catching-Processing-Circulation
- Comparison Kushiro region with Tokachi region in east Hokkaido
- Development of management structure
  - 1. Group of personal management; Kushiro region
  - 2. Cooperation management; Tokachi region
  - 3. Corporation management

14

Data of salmon fishery management

- Cost analysis of each salmon set-net fisheries at Kushiro and Tokachi regions.

Average cost per net (2003–2007)	Kushiro region	Tokachi region
Fisherman per net	11	11
No. of set-net	13	5
No. of company	13	7
Management style	Personal group	Cooperation
Capture (ton)	259	580
Price (Yen per kg)	273	285
Value (thousand yen)	64,450	159,170
Valuable cost (thousand yen)	26,100	73,380
Valuable ratio (%)	40.5	46.1
Fixed cost (thousand yen)	20,300	11,650
Net profit (thousand yen)	18,050	74,130
Marginal profit (thousand yen)	38,350	85,790
Marginal profit ratio (%)	59.5	53.9
Break even point (thousand yen) *	34,110	21,580
Integration of processing factory	76	2 (self-employed 1)

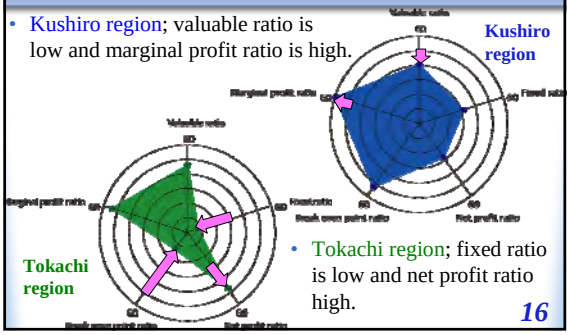
* Break even point=Fixed cost/Marginal profit ratio

- Valuable cost is affected by the variety of capture.

15

Comparison ratios of Kushiro region with Tokachi region

- Kushiro region; valuable ratio is low and marginal profit ratio is high.



- Tokachi region; fixed ratio is low and net profit ratio high.

16

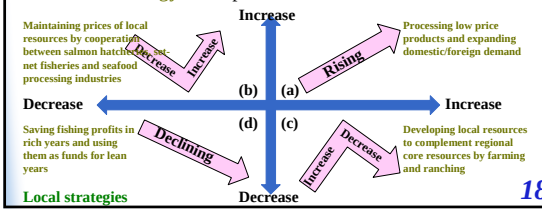
Combination strategies for stability of salmon fishery management

- Although Tokachi region showed high value of salmon fisheries, the valuable ratio is also high. Captured salmon are processed by a self employed factory.
- The value of Kushiro region was lower than that of Tokachi region. However, Kushiro region showed high ratio of marginal profit.
- Many processing factories are integrated in the suburbs of Kushiro fisheries.
- The combination between fishing and processing was suggested the formation of personal management.

17

(5) Conclusion

- Recommendation: Strategies for salmon fisheries
  - Local strategy for variability of price
  - Regional strategy for stability of resource
  - Global strategy for expansion of demand



(5) Conclusion

- A combination of strategies is important to stabilize fisheries management.
- These strategies are likely to help to improve the basis of fisheries management and to cushion against the effects of climate change.