Social-ecological study towards the integrated management of local fisheries in North Eastern Hokkaido, Japan

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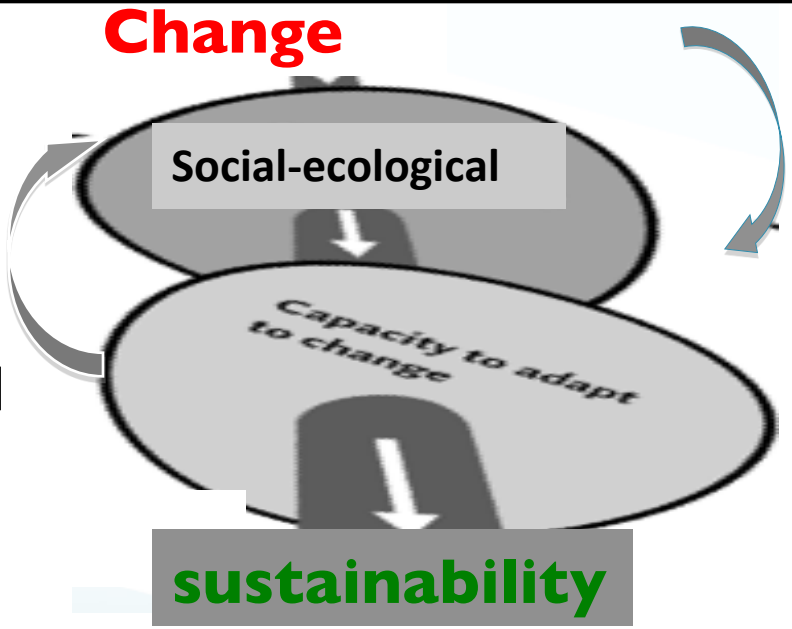
Introduction

Ecosystem

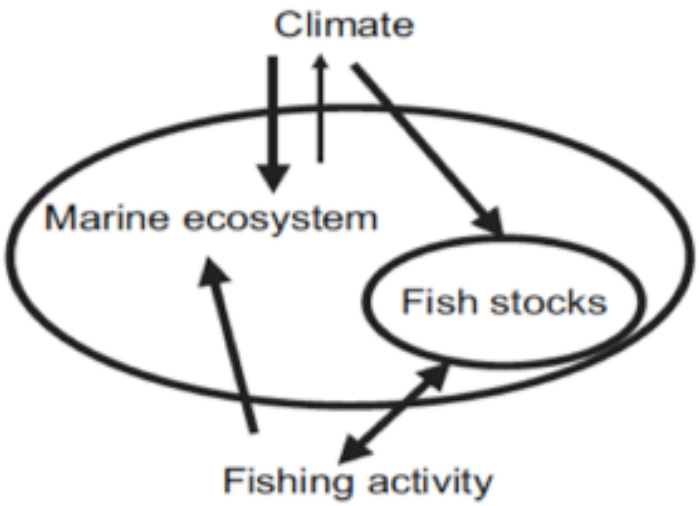
- Migration
- distribution
- food web dynamics and structure



Social

- intensification of fisheries
- diversification outside fisheries
- **management strategies**

Adaptive capability for sustainability (Berkes et al. 2001)



Fishing and climate change are strongly interrelated pressures on fish production

Importance of societal studies to fisheries

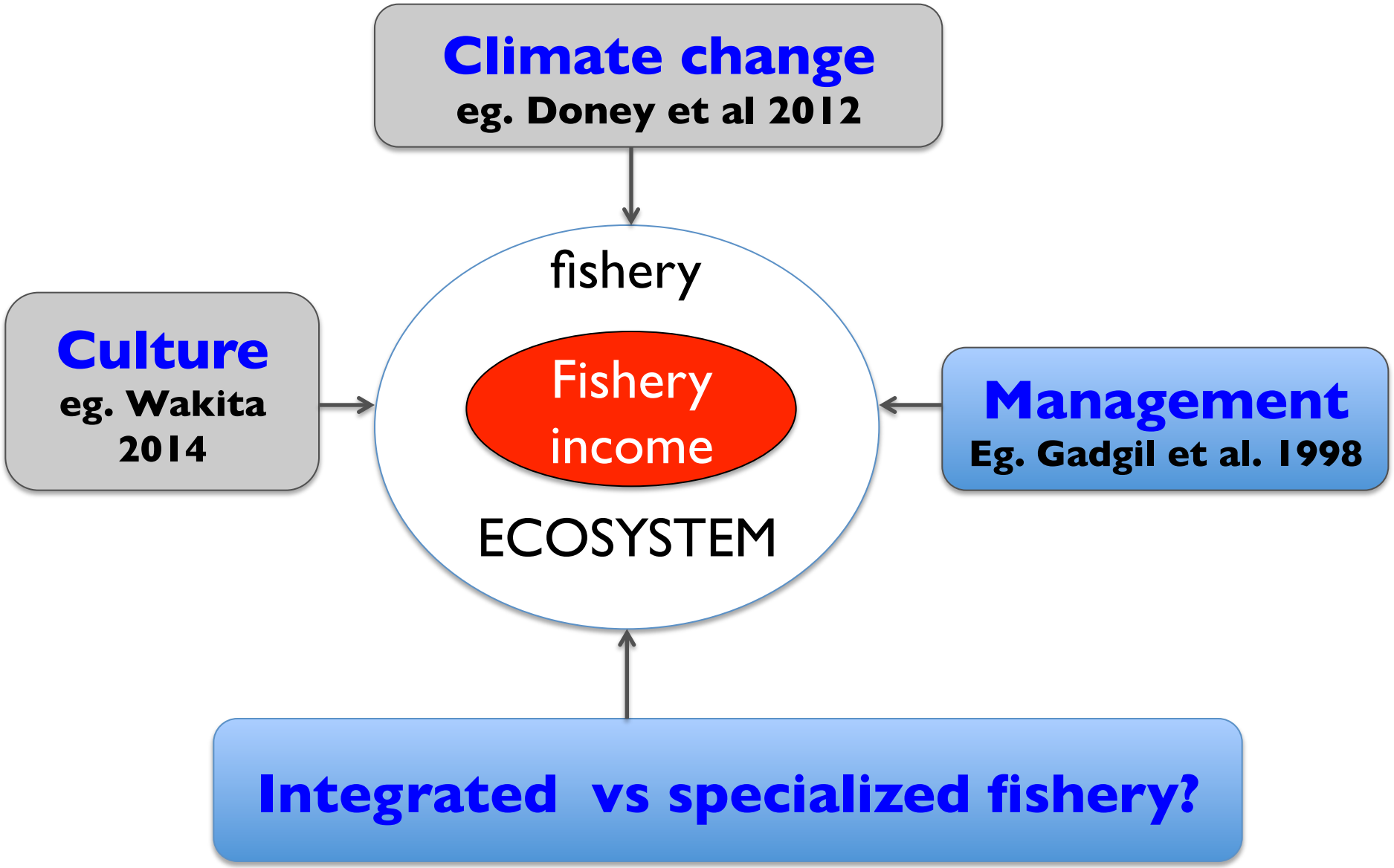
Matching social with science:

—human motivation in making reliable predictions about human responses.

—local needs based management policies

Perry and Ommer (2003)

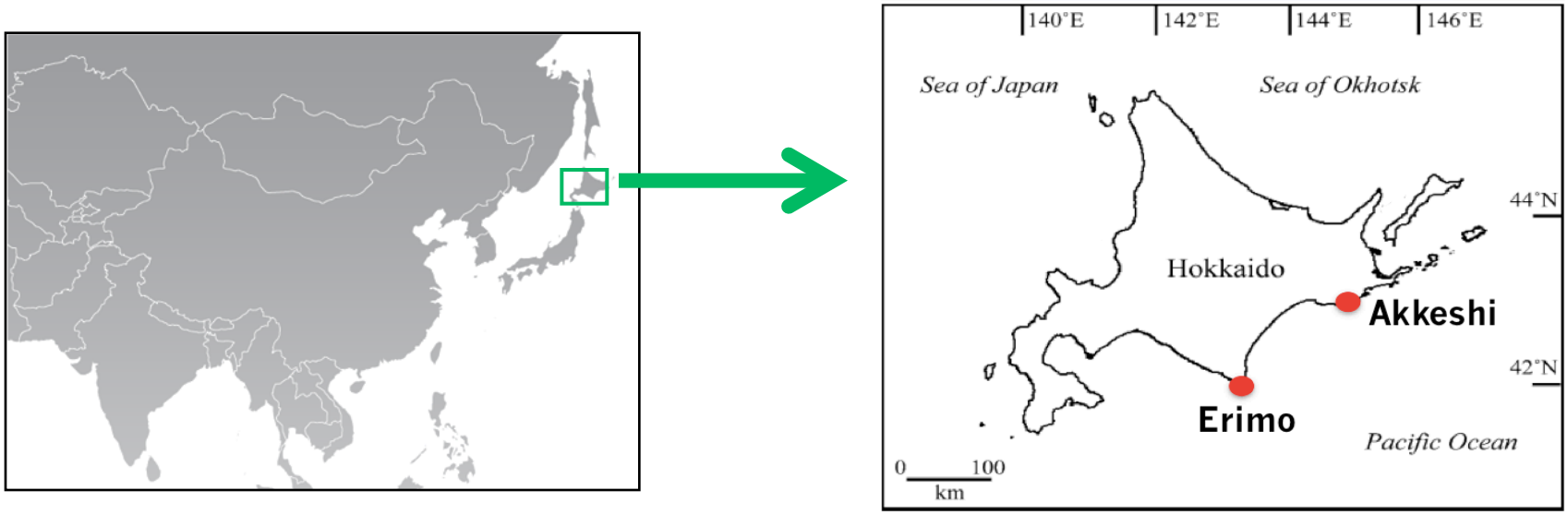
Factors affecting fishery income



Objective of the study

To compare integrated versus specialized fishery under social-ecological perspectives.

MATERIALS AND METHODS



	Akkeshi	Erimo
Fishery type	Integrated	Specialized-capture fisheries
Main species	Oyster- farming	Seaweed *(Laminaria angustata)* Salmon *(Oncorhynchus keta)*
Processing industry	Established	Not established

Data collection

To characterize integrated and specialized fisheries the following data were used:

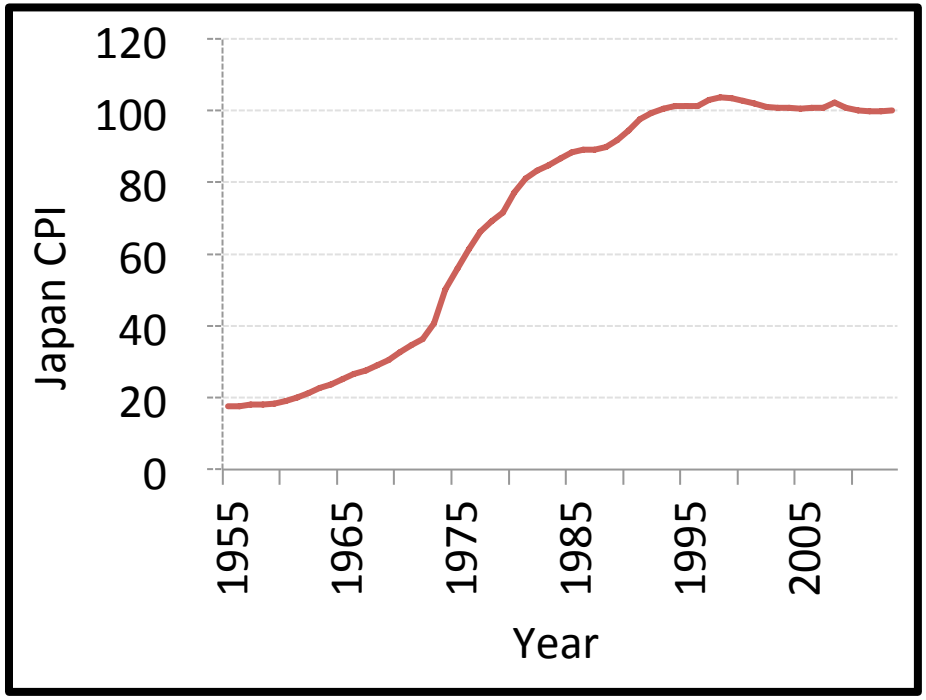
Data	Source
Catch Income Fishers demography Fishing vessels	Fisheries Cooperative Associations (FCAs) and Fisheries Department
SST	Research Research Institute/Station
Questionnaires and interview surveys	Onsite (on going)

Income standardization

- Consumer price index (CPI) was used to adjust the effect of inflation of income as:

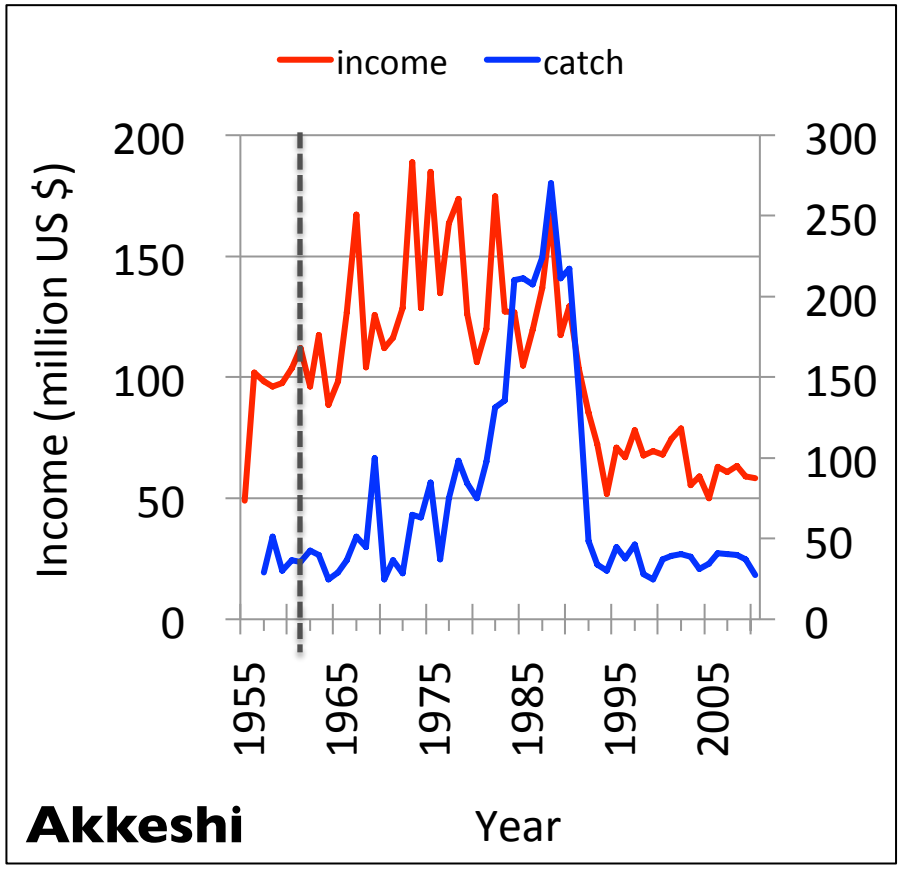
$$Updated\ income_i = \frac{Income_i * Base\ CPI}{CPI_i}$$

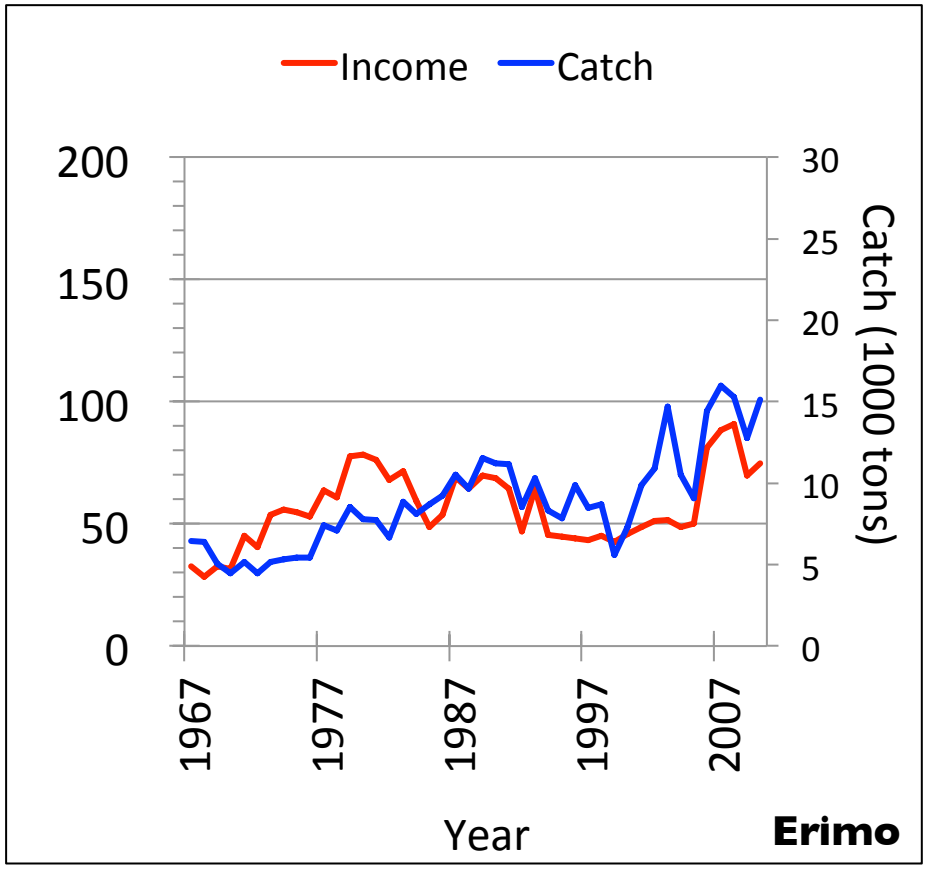
CPI is a measure of changes in the price level of a market basket of consumer goods and services.



Source: OECD-FAO 2014

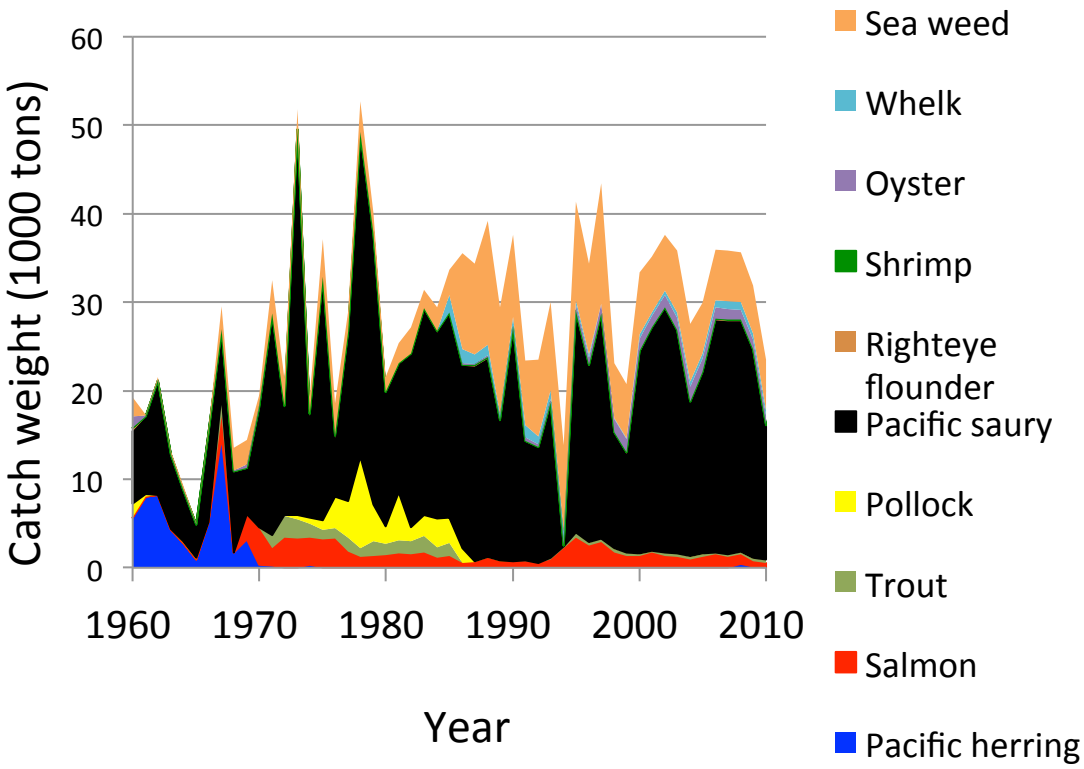
RESULTS AND DISCUSSION

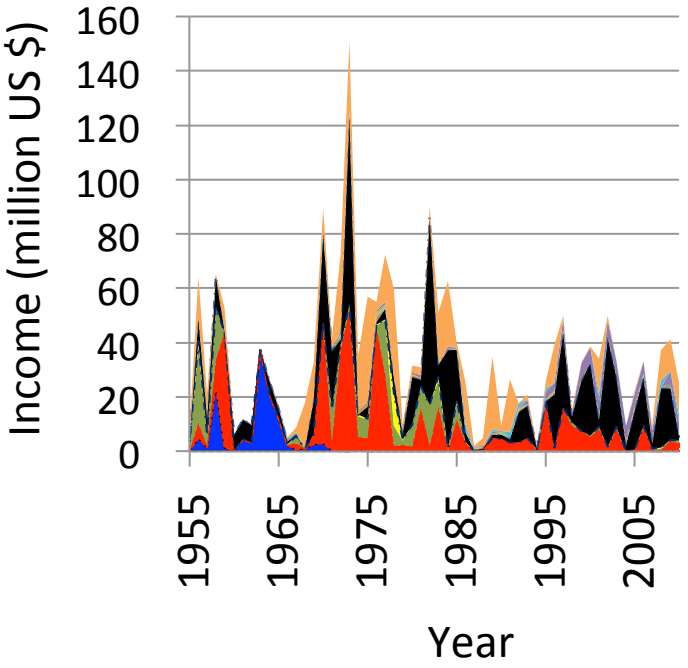




Total fisheries catch and income in Akkeshi and Erimo, Hokkaido Japan

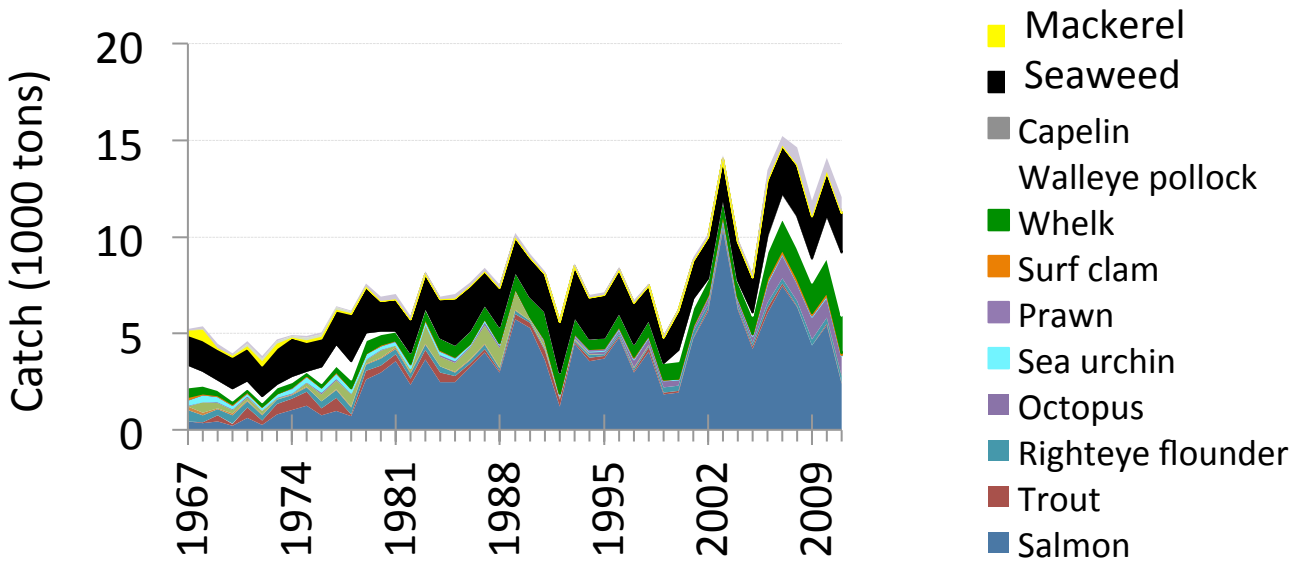
Catch and income in Akkeshi

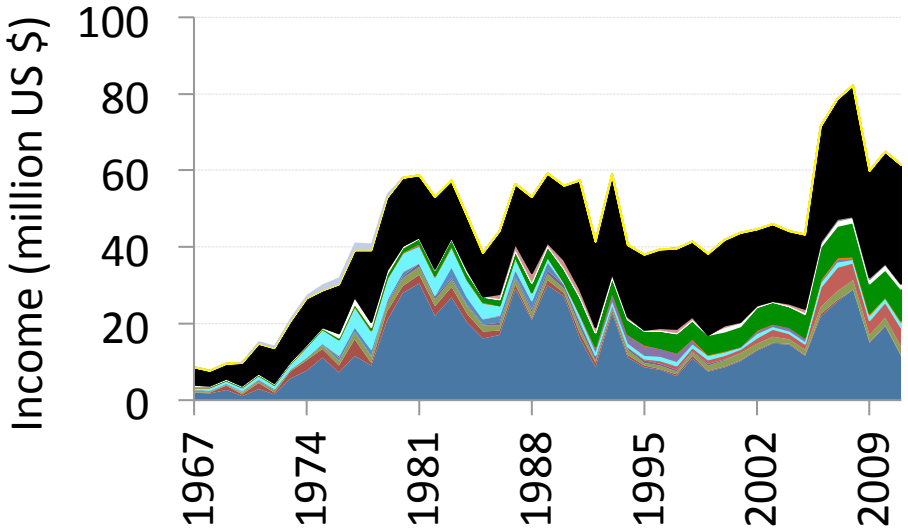




- There has been inter-decade variations in catch species composition
- Decline of contributions of some species (e.g herring & pollock) to total catch and income while some species are recovering.

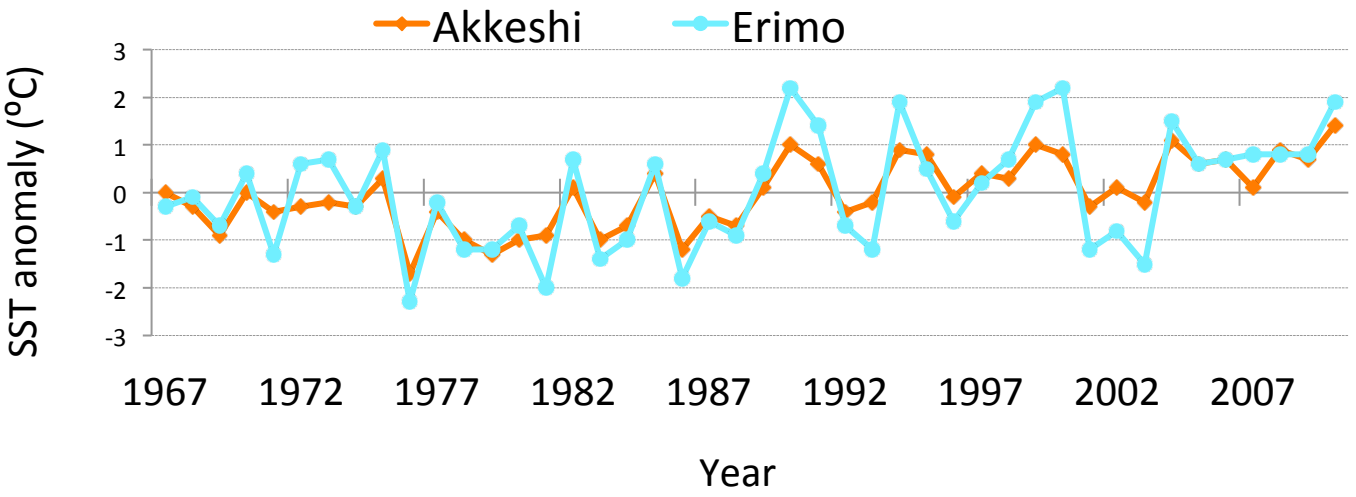
Erimo catch and income

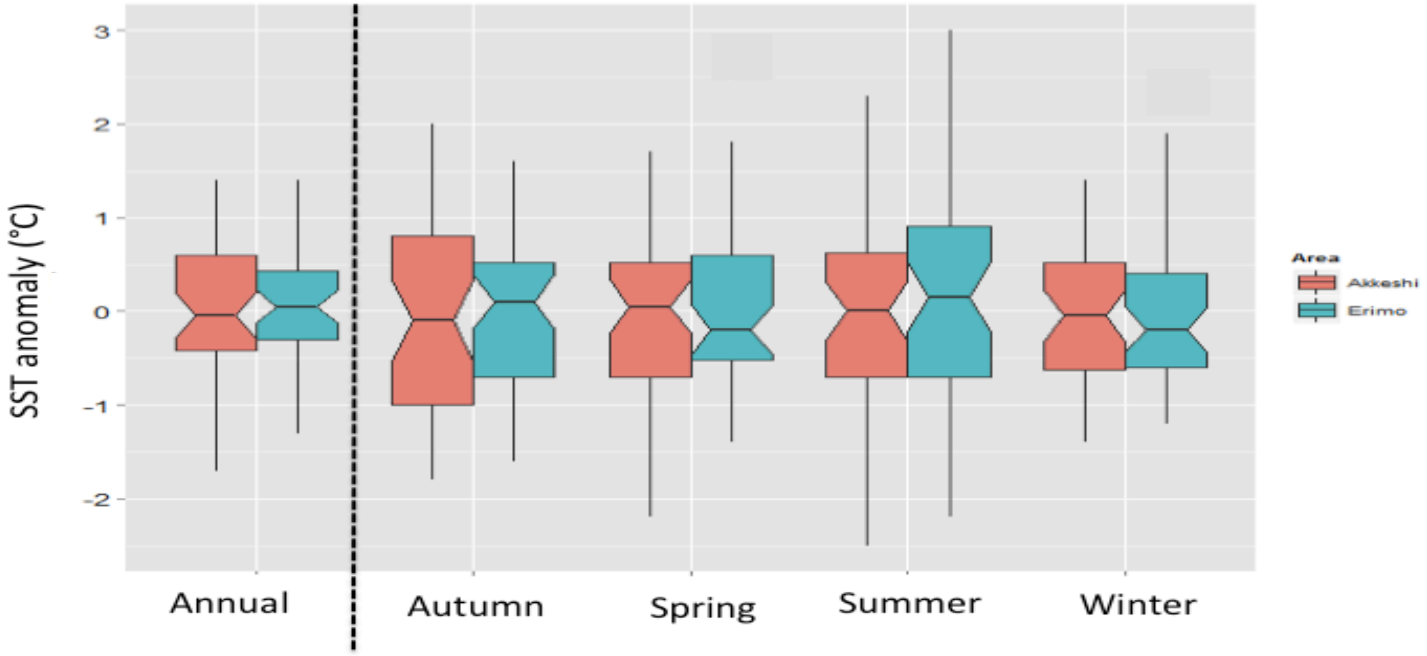




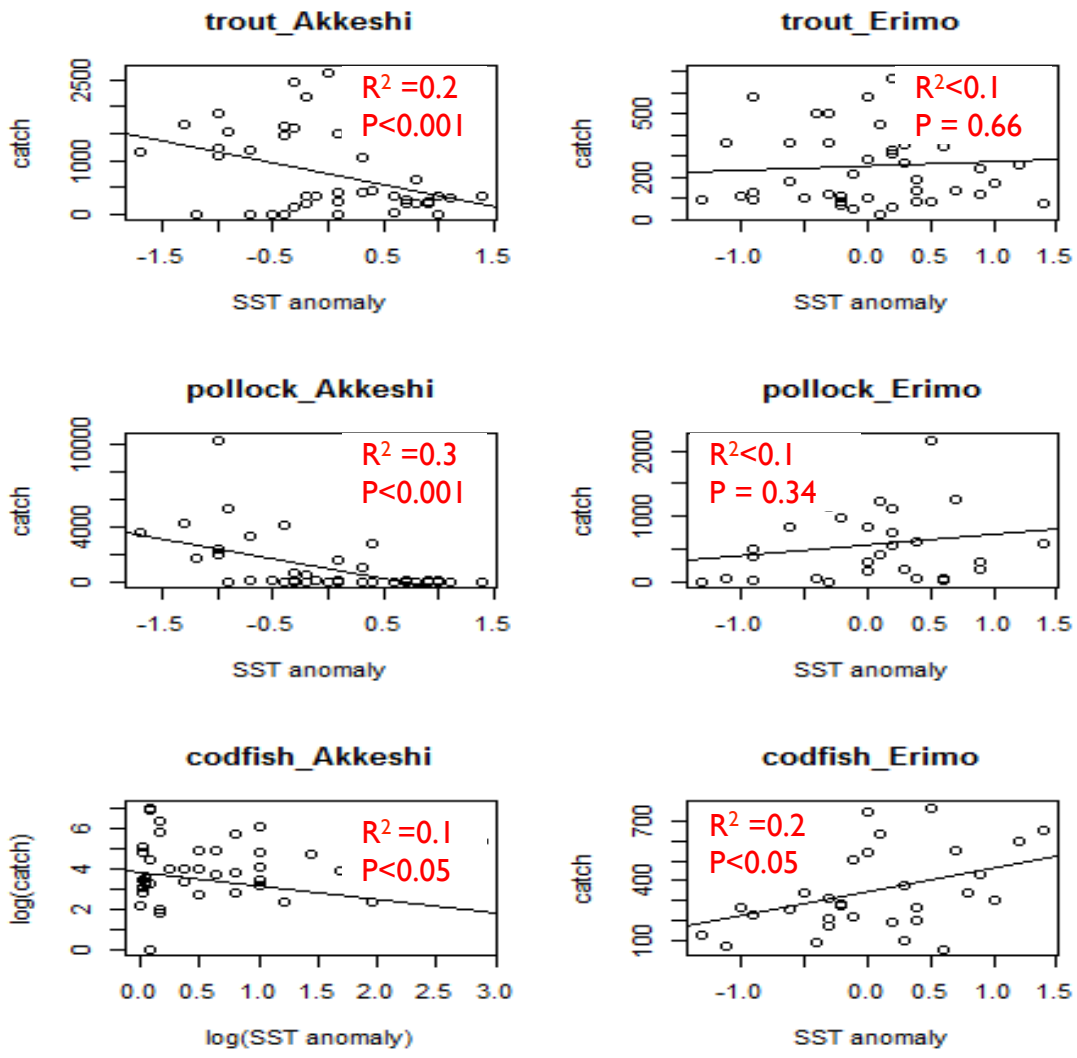
Income increase is contributed by consistent capture of valued species

Annual SST anomaly variation in Akkeshi and Erimo



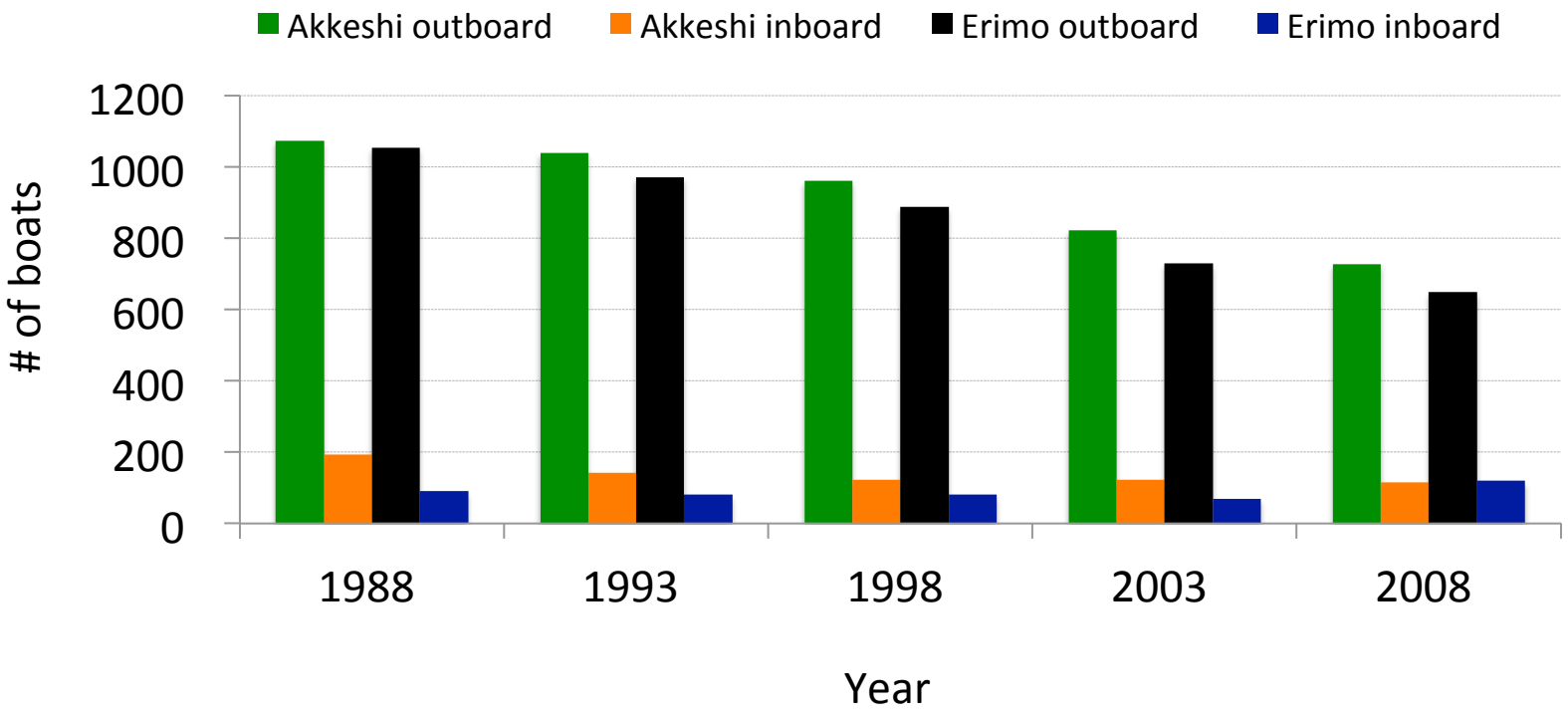


Catch and SST anomalies



- SST was likely to influence catch of few species (e.g. trout, walleye pollock, codfish)
- These species have minimal contribution to total catch in the area

Fishing boats census

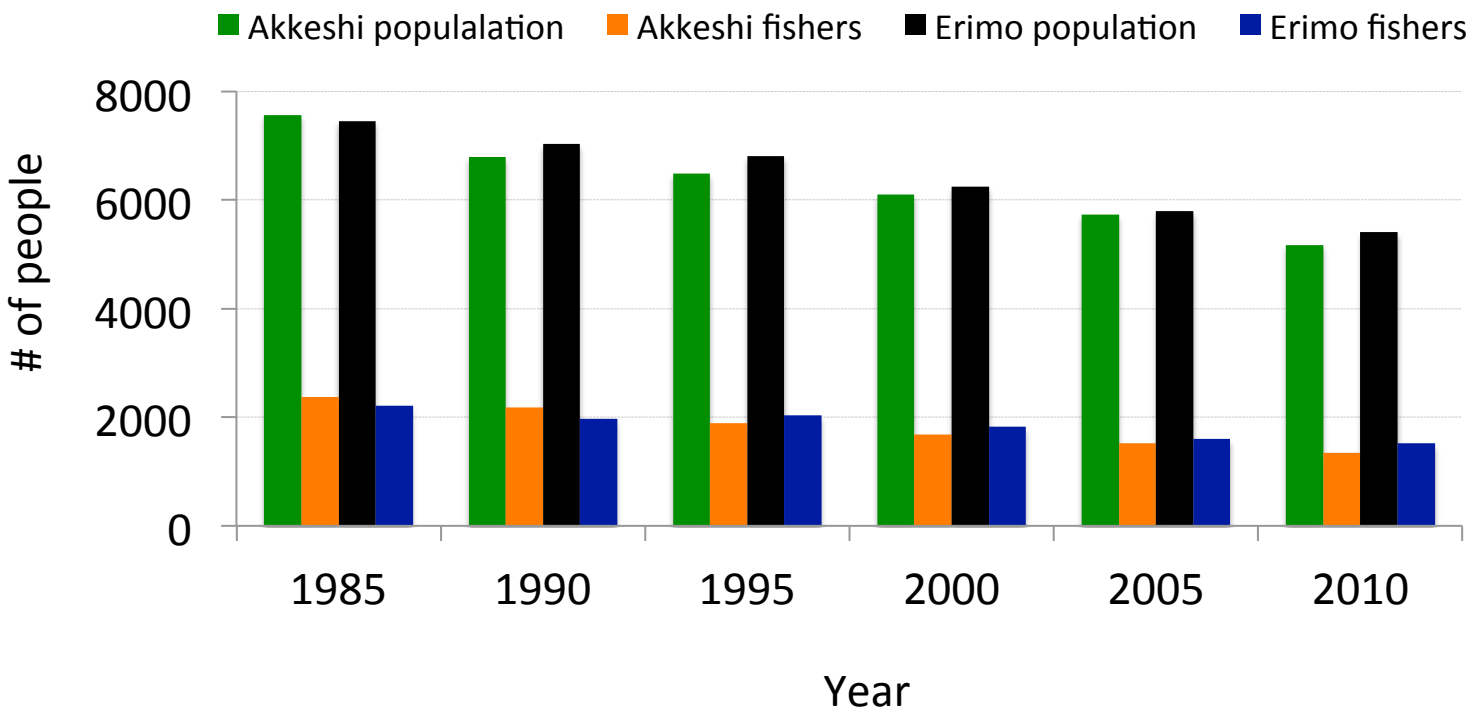


Fishing vessels shift: big to small sized

- reduce operational cost

- operational cost was correlated to fishery type (Cramer's V = 0.6, $P<0.001$)

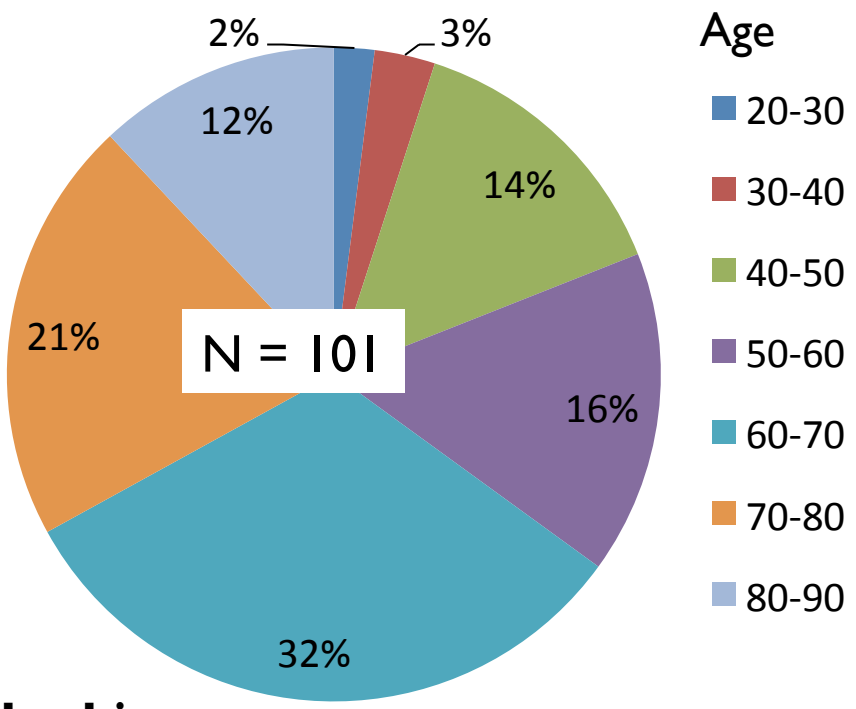
Demography census



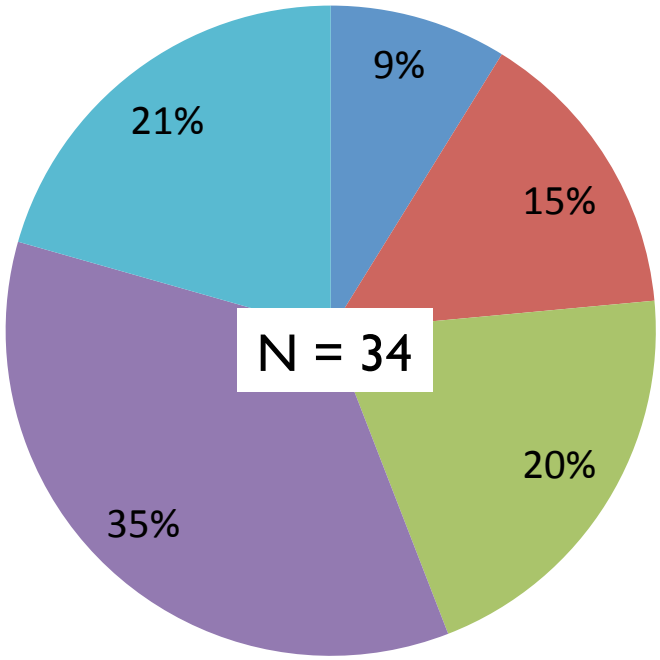
Shrinkage of the fishing man power due to:

- aging
- few new fishers recruitment.

Age distribution of questionnaire respondents

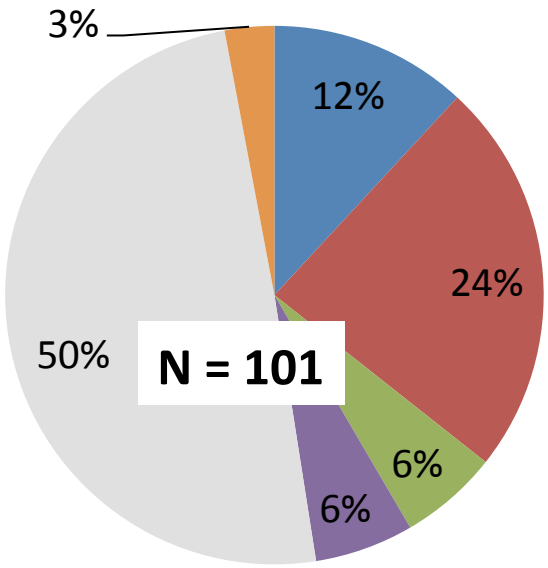


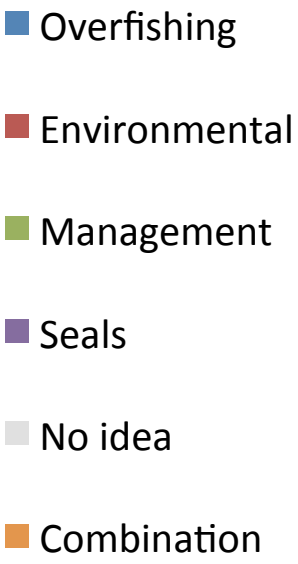
Akkeshi

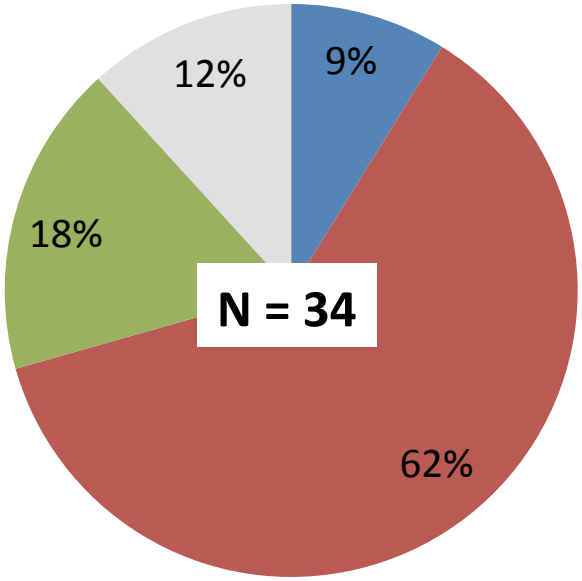


Erimo

Catch decline: Local people perspectives





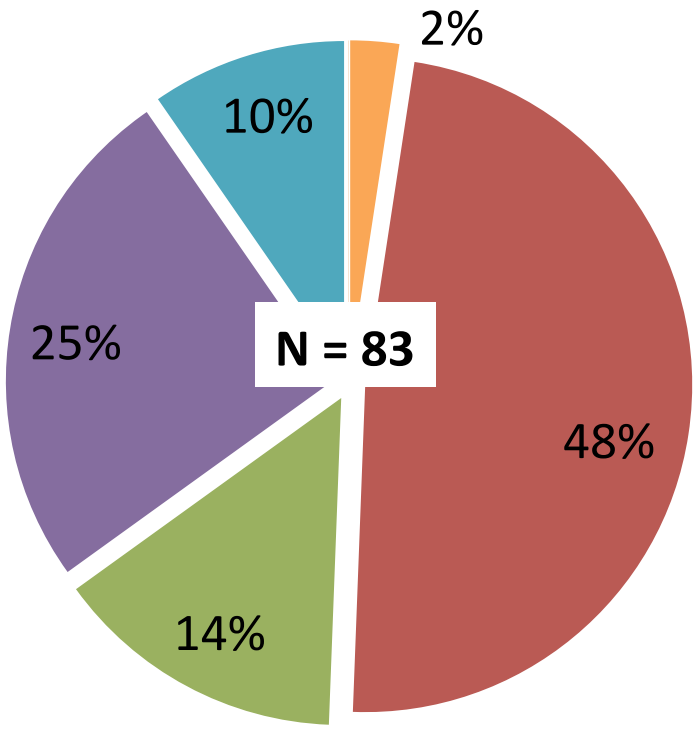


Akkeshi

Erimo

Problems facing fisheries were significantly related to main fishery (Phi = 0.8, $P<0.01$).

Fishers' level of satisfaction with fishery



Akkeshi

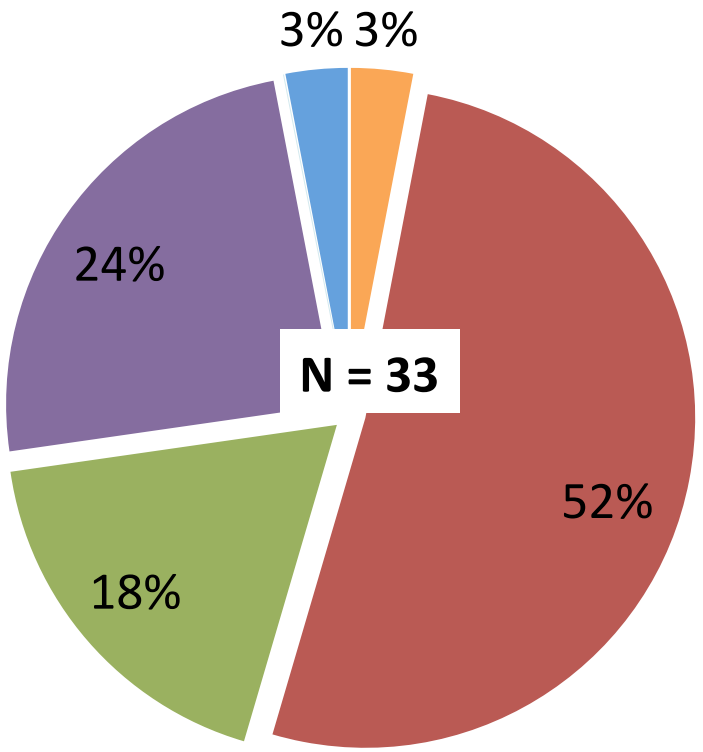
Extremly sat.

Moderately sat.

Neither sat/dis.

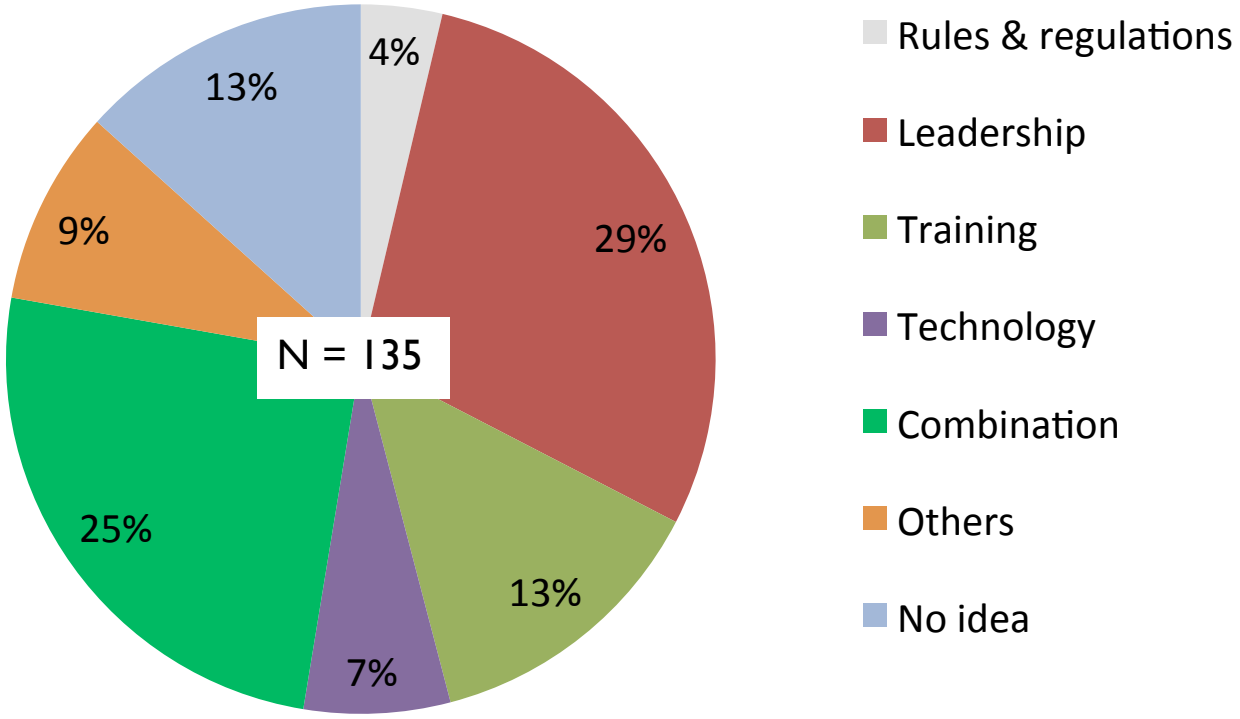
Moderately dis.

Extremely dis.



Erimo

Sustainable management strategies: Local people perspectives



Leadership at FCAs is required for timely fisheries management initiatives e.g. decreasing fishing effort, increase mesh size etc.

CONCLUSIONS

- Periodic variation in fish catch amount, composition and income of a number of species.

- Sea warming seemed to influence catch of few species. Further studies on impacts of biophysical factors to fish abundance would be necessary.

- Fishing manpower decline is one the major problems facing fisheries in the area.

- Integrated fisheries might play an important role in the improvement of ecosystem and outputs.

- Fishers argued that good leadership at FCAs is crucial for successful resource management.

- Future tasks:
  - Fishery stock co-evolutionary analysis model
  - Best alternative economic activities to fisheries
  - More questionnaire surveys with other groups of stakeholders.

Thank you for your attention