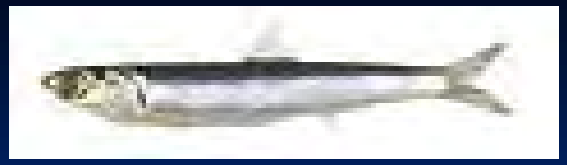
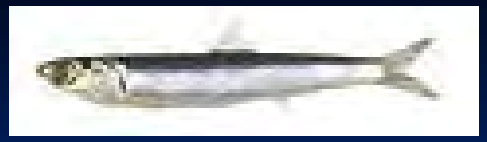

Predicting recruitment of anchovy based on oceanographic and reproductive conditions in the southern waters of Korea

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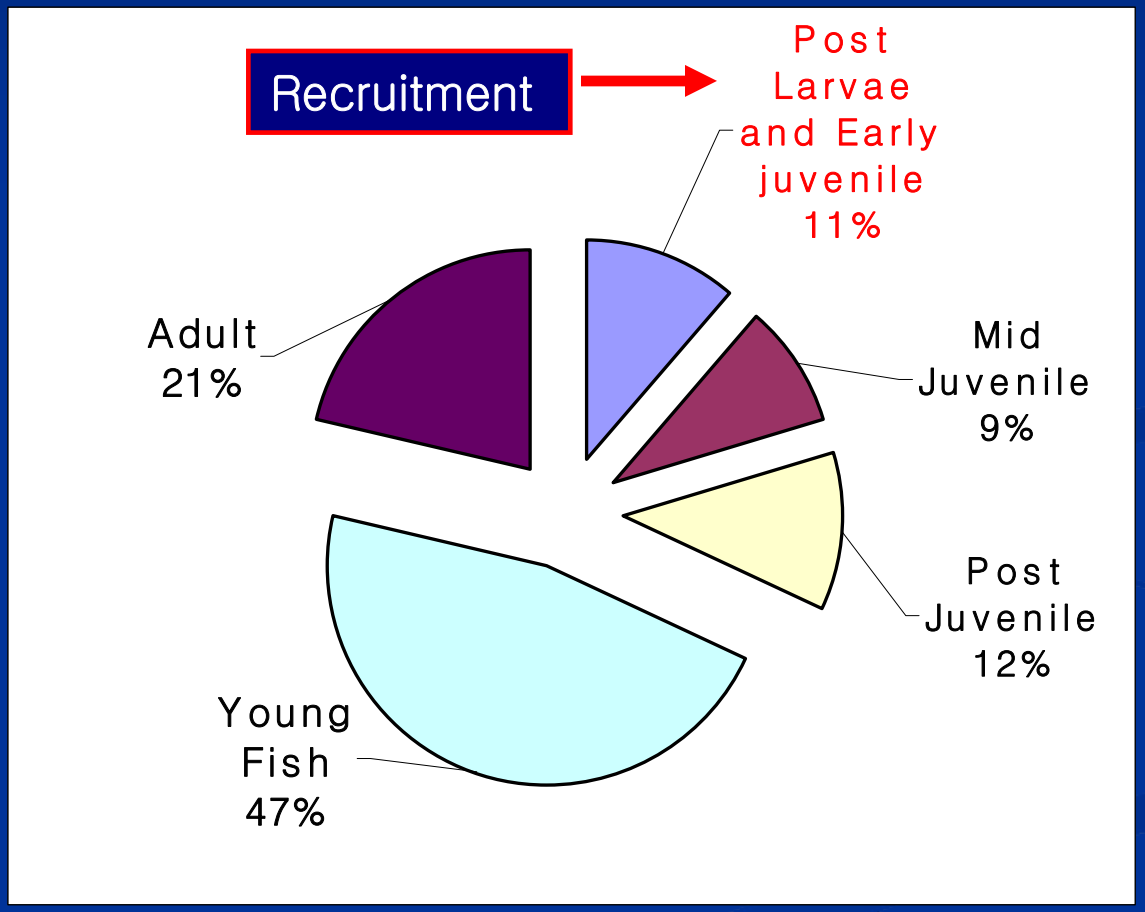
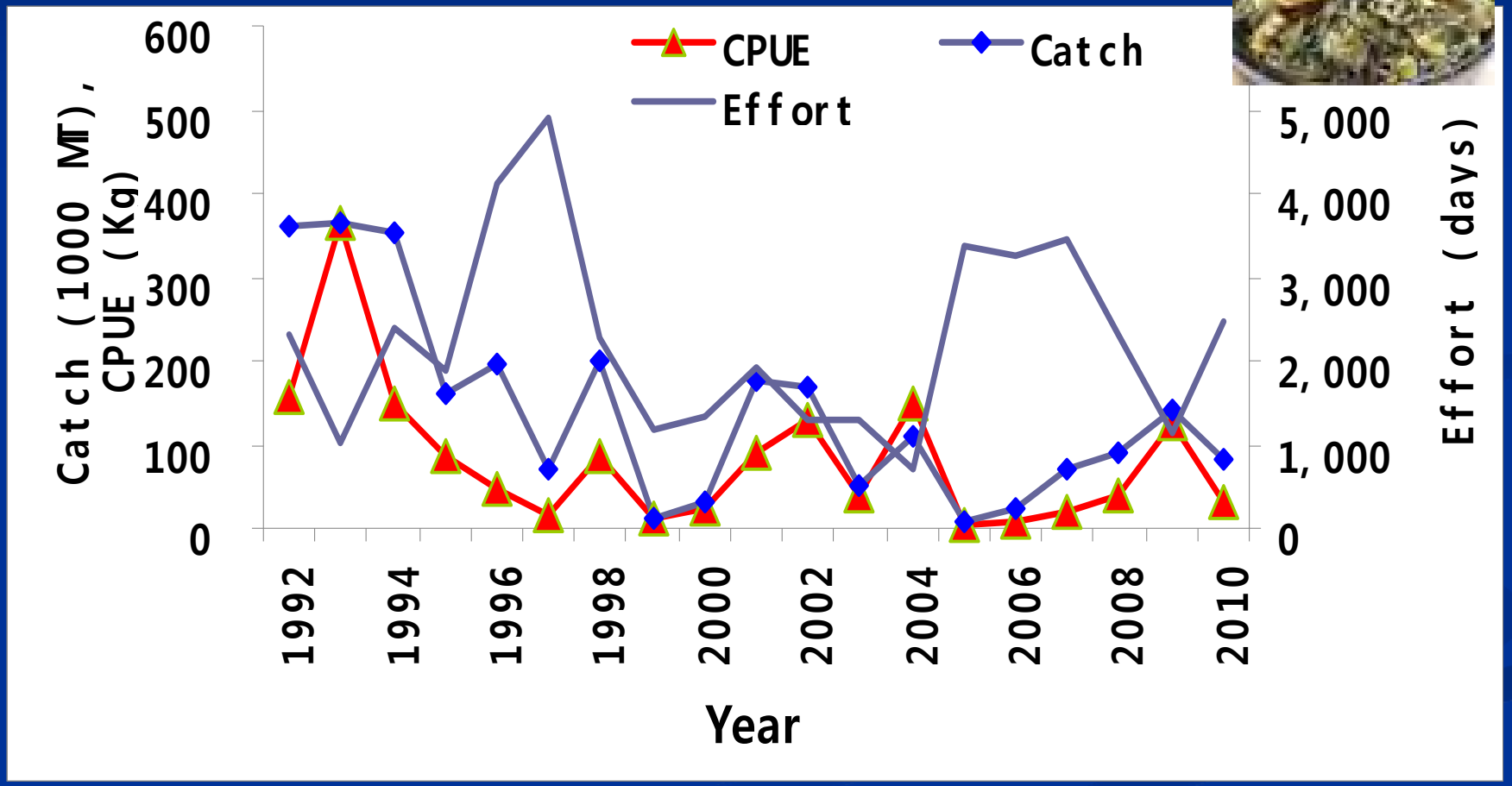
Composition of size group in the anchovy drag net fishery



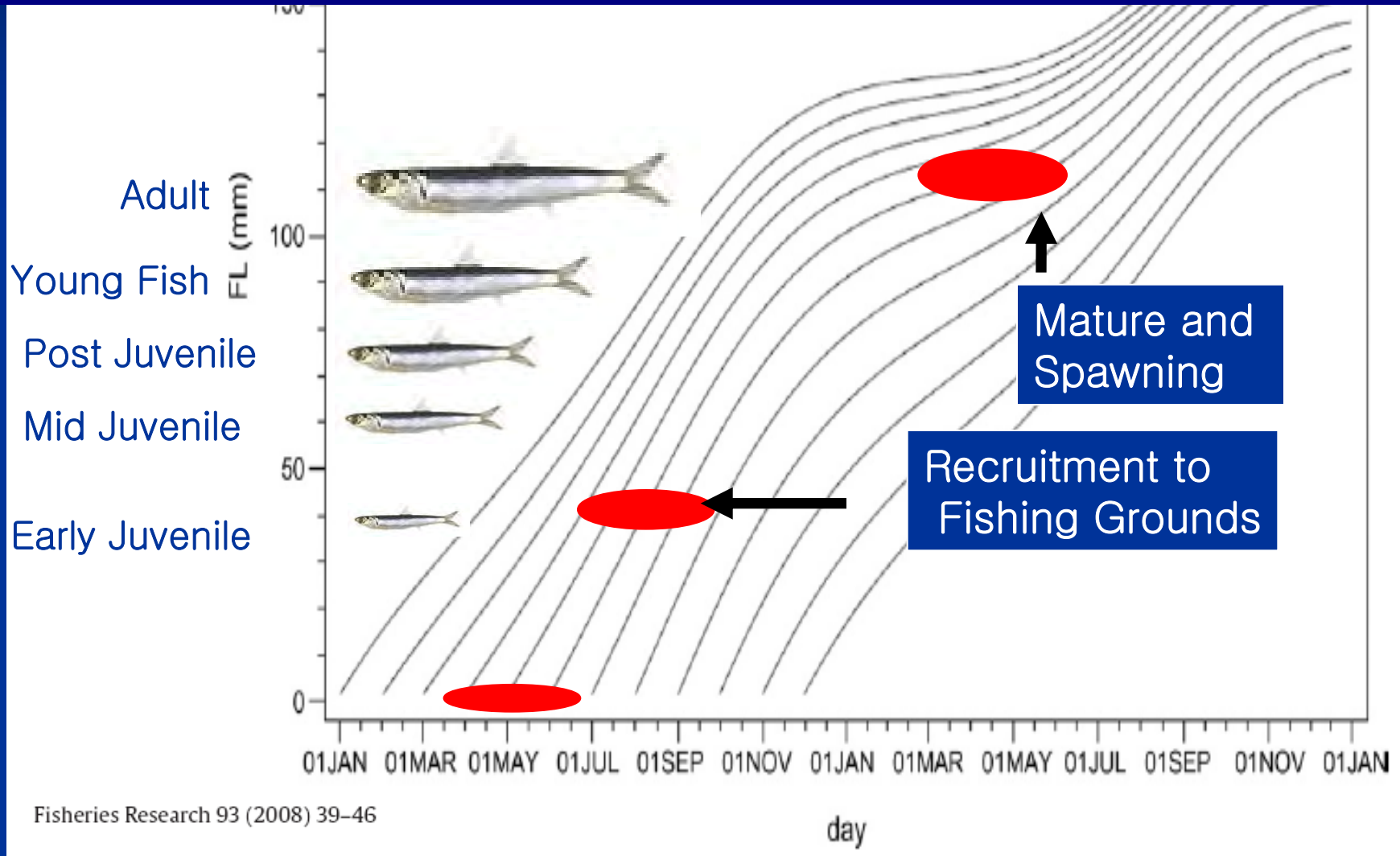
Yearly variation of CPUE for the early juvenile (below 4 cm total length) caught by anchovy drag net fishery during July in Korean southern waters,



Outline

- Fluctuation of oceanographic data and anchovy feeding condition in spring related to the climate change were compared to the anchovy recruitment in summer.
- Recruitment in summer was applied to multivariate analyses with times-series data of water temperature, salinity and copepod density during spawning season from 1992 to 2009.
- Climate change : Siberian wind, Heavy rain and snow, long winter season

Anchovy spawning season and recruitment time to the fishing grounds in southern waters of Korea



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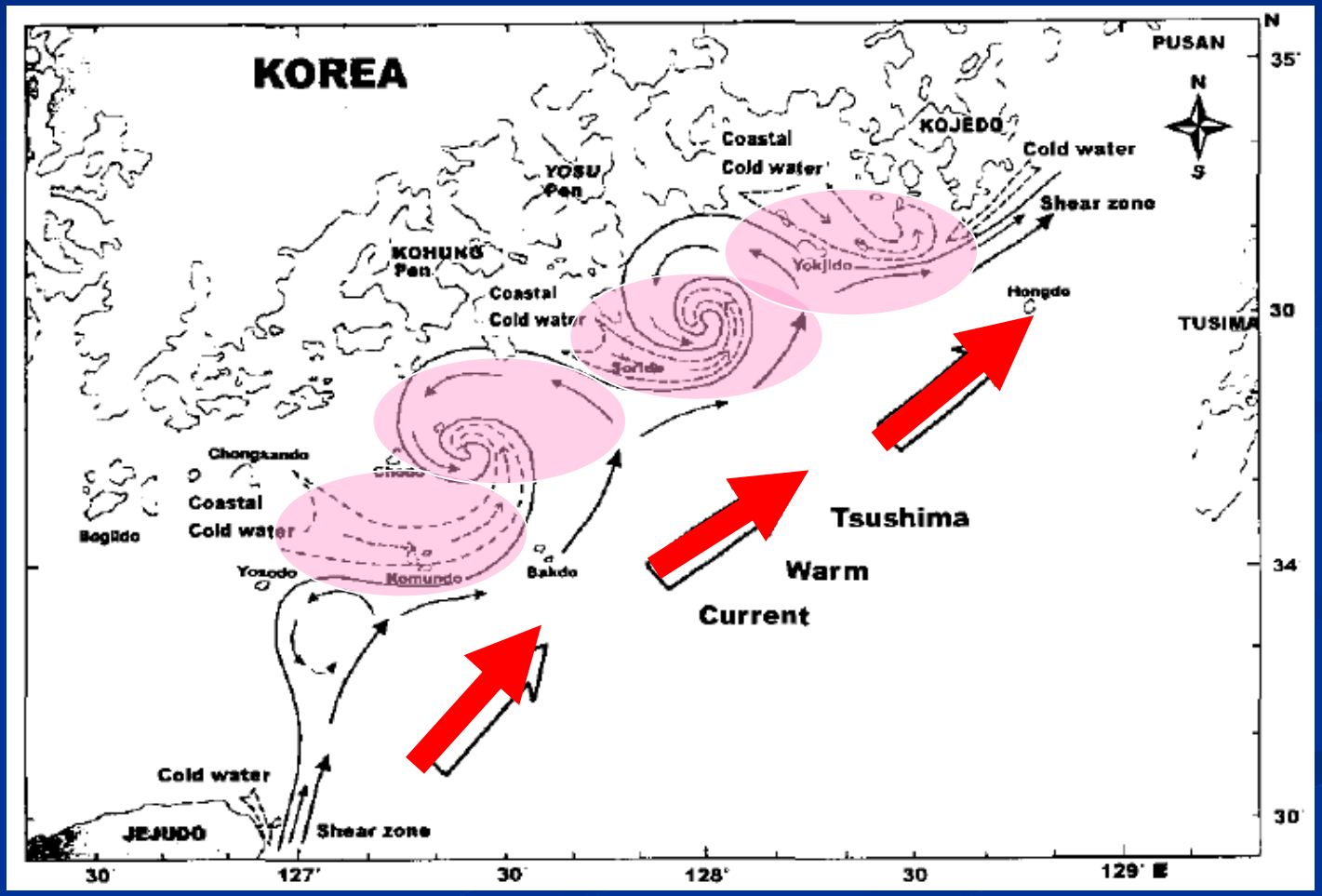
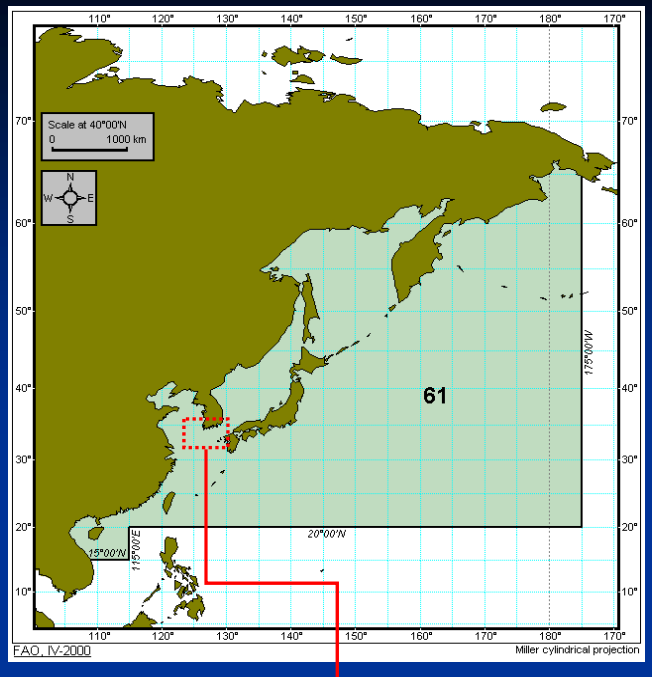
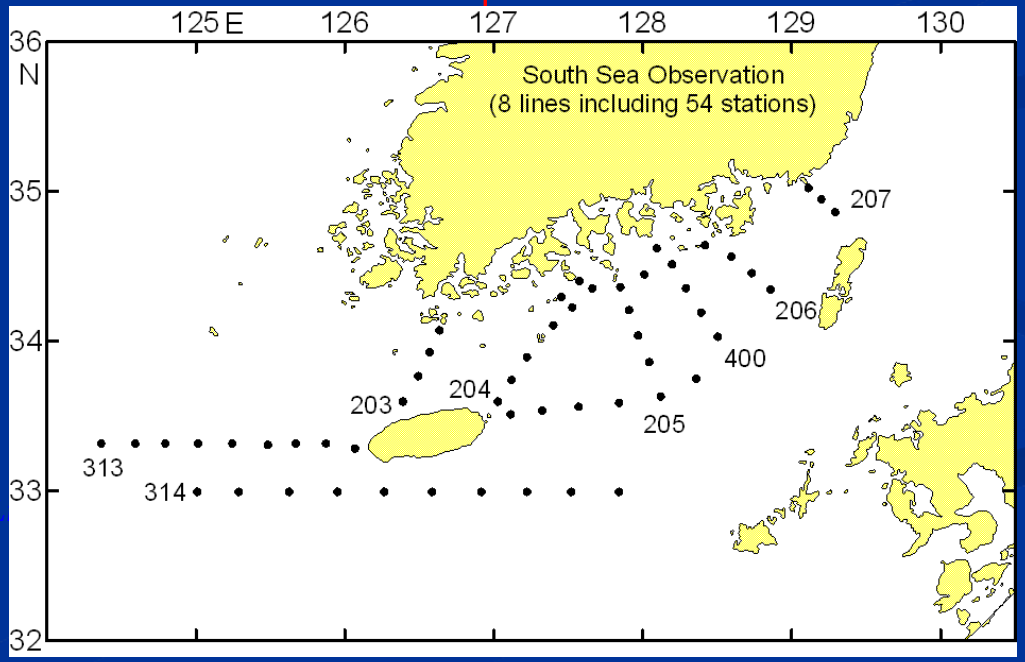
Current system affecting to the recruitment of larval anchovy (Choo, 2002)

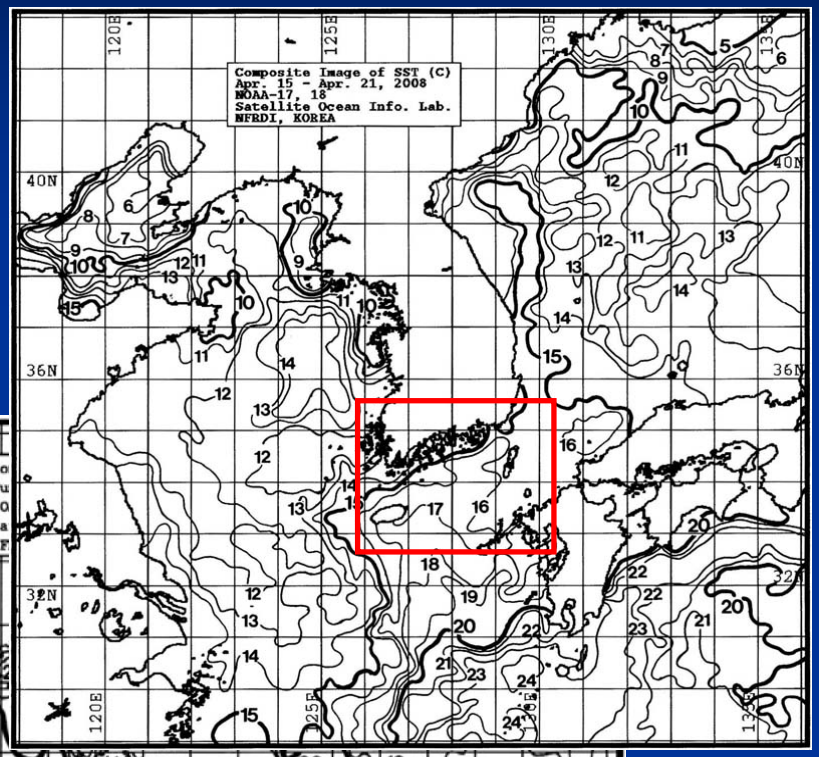


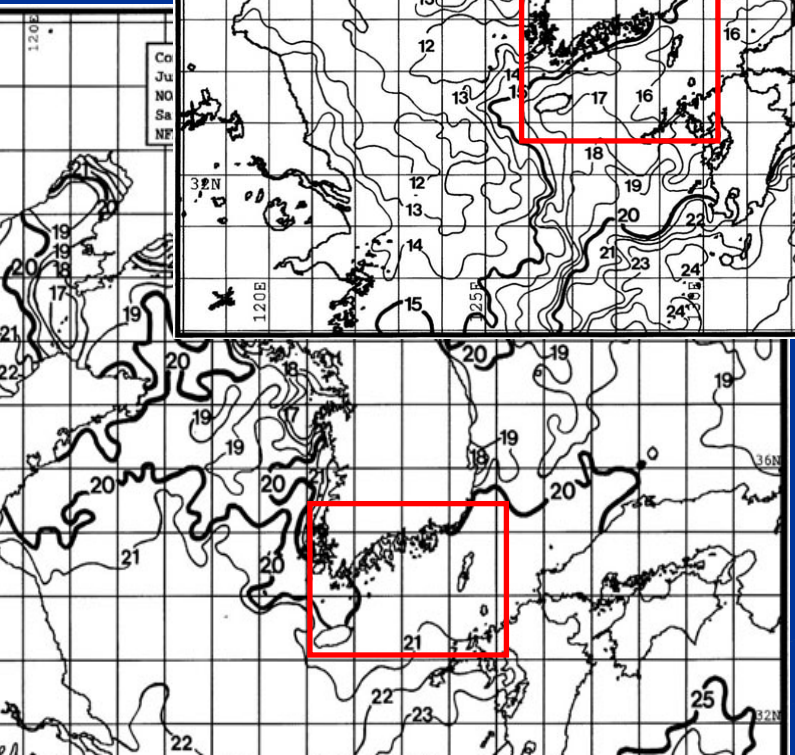
Map showing study area and typical stations of oceanography observation

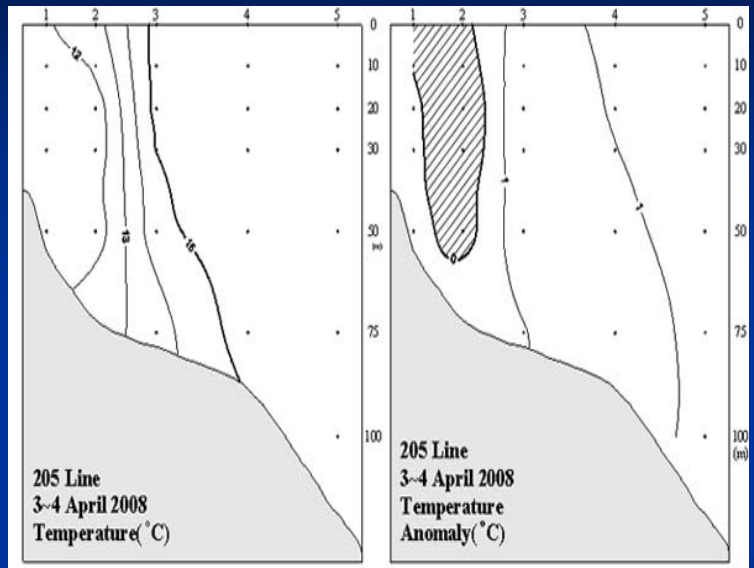


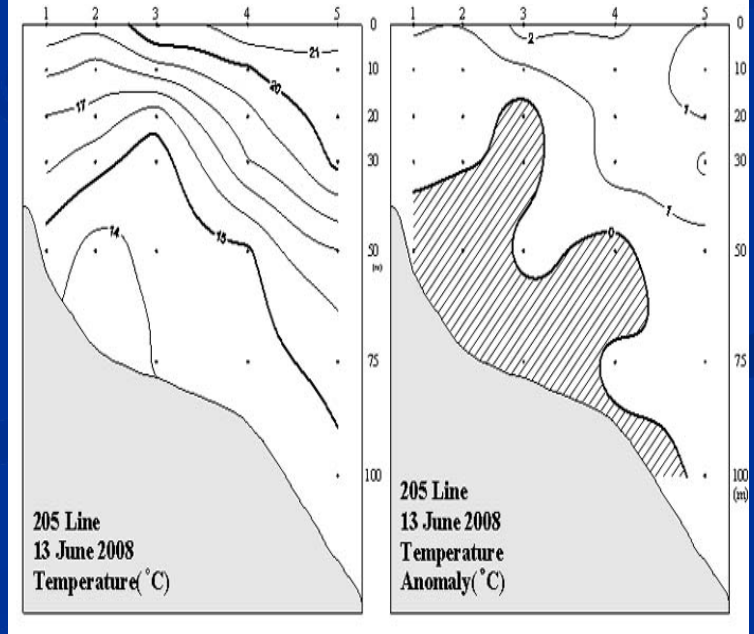


Spatial and vertical temperature distribution during April and June, 2008

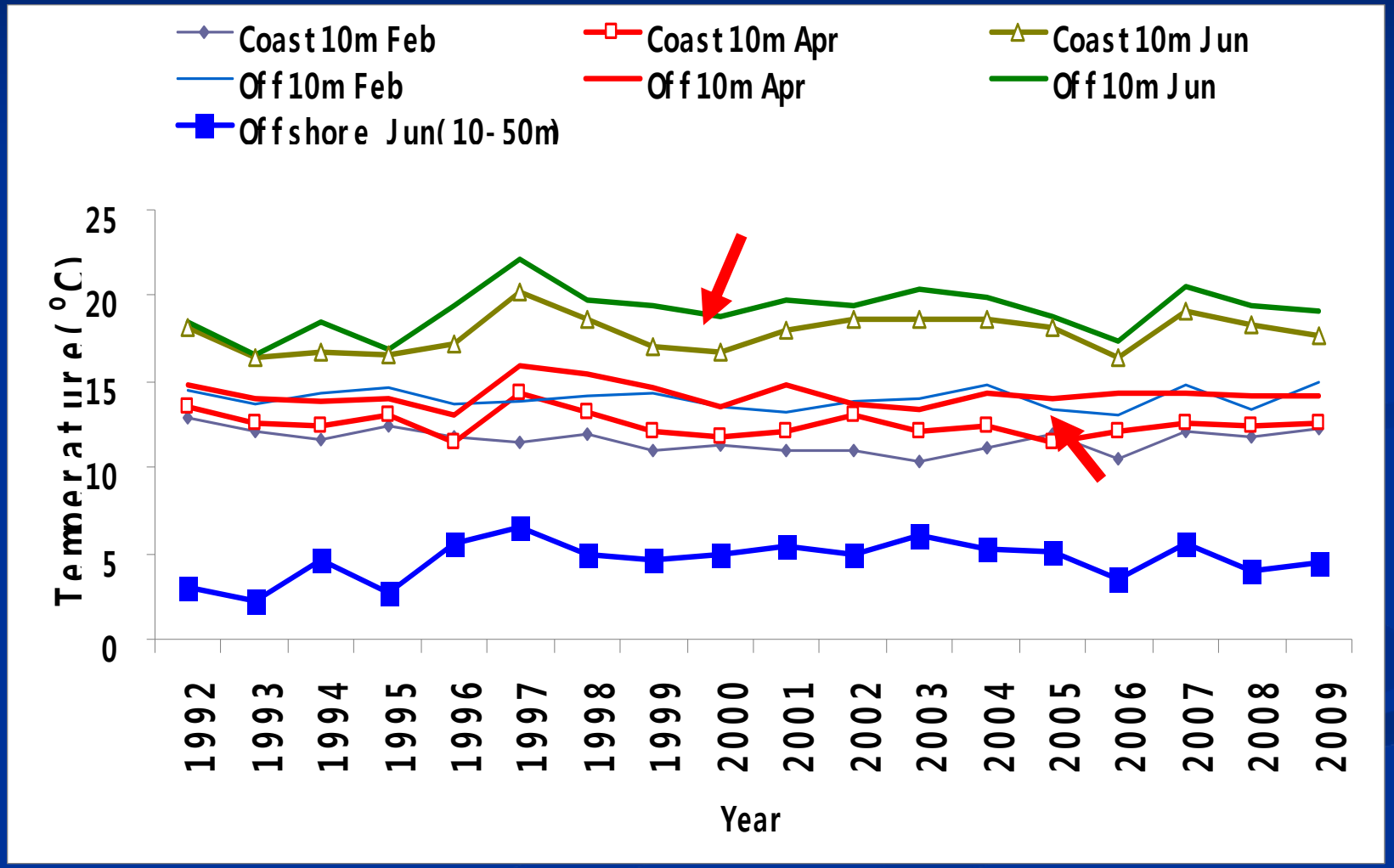




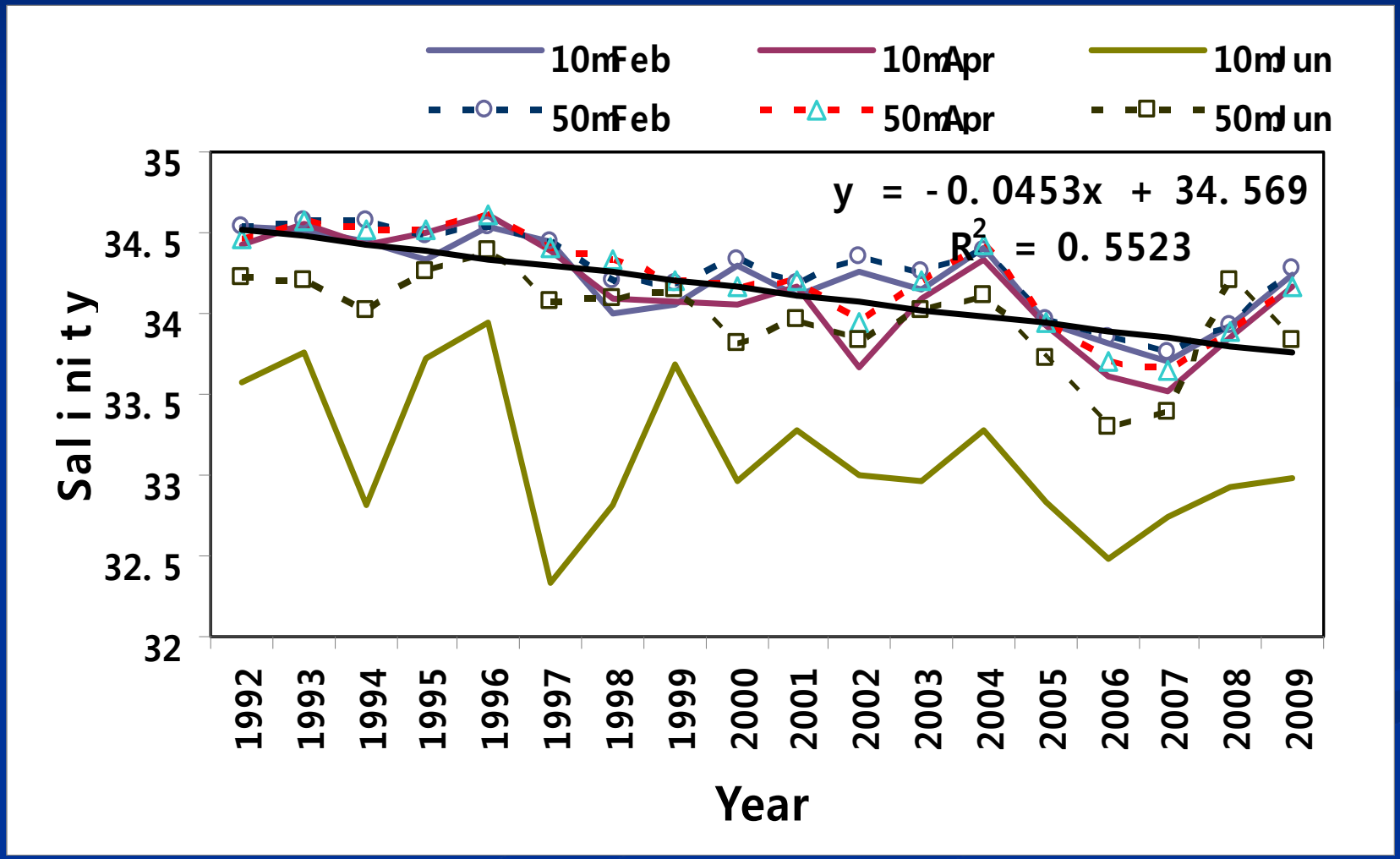




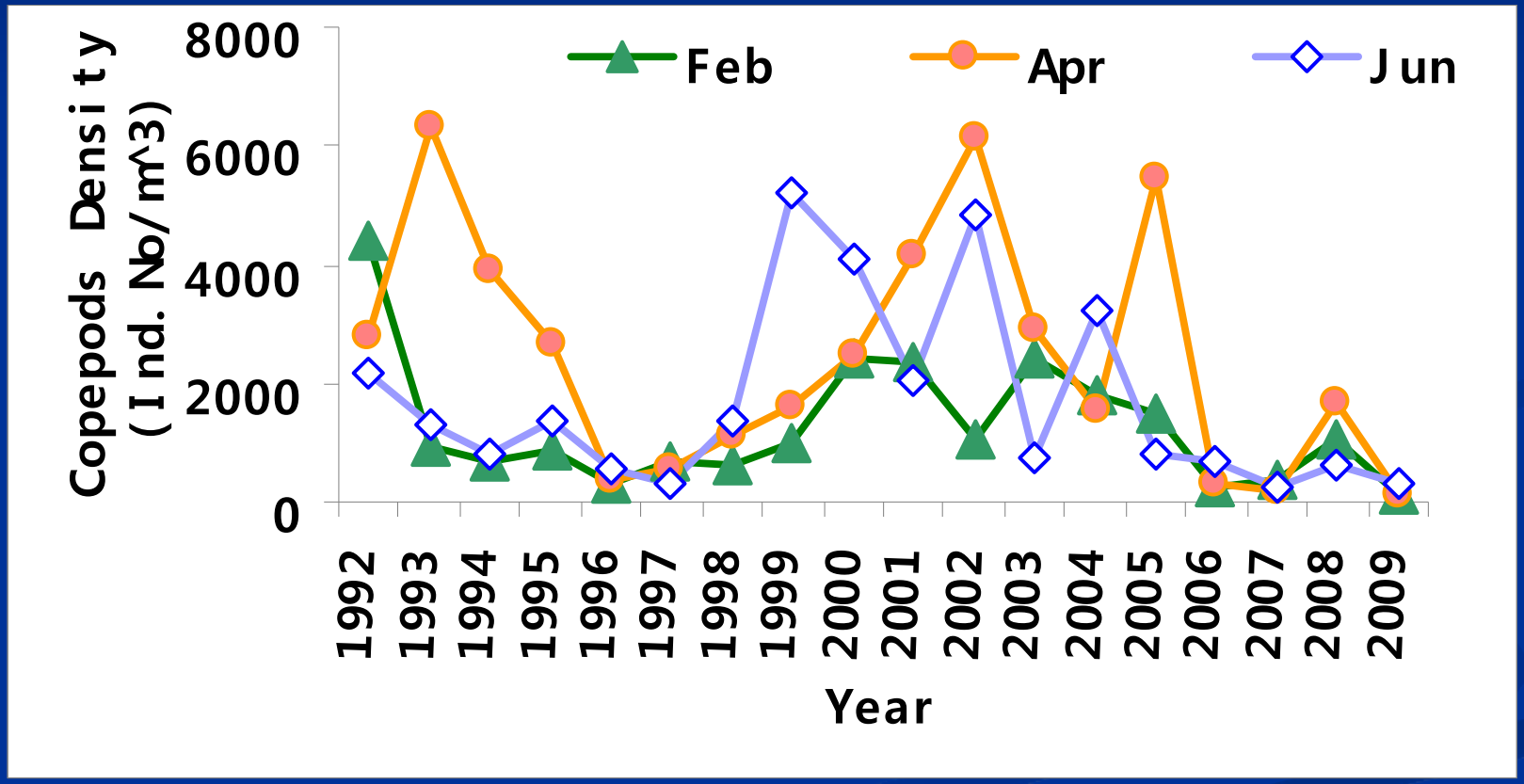
Monthly mean temperature in sea surface and 50 m depth layer in the southern waters of Korea



Yearly variation of mean salinity in the southern waters of Korea during February, April, June of 1992-2009



Monthly mean copepods density in the southern waters of Korea



Coefficient of correlation between anchovy recruitment and environmental factors in the southern waters of Korea

			Coefficient of correlation (Pearson)	Sig. (paired)
Salinity	10m	April	0.477	0.045
		June	0.435	0.071
	50m	April	0.518	0.028
		June	0.360	0.143
Temperature	10m	April	0.112	0.658
		June	-0.397	0.103
	50m	April	0.086	0.733
		June	-0.018	0.943
Temperature front		April	-0.402	0.098
		June	-0.504	0.033
Thermocline		June	-0.551	0.018
Copepods Density		April	0.561	0.016
		June	0.034	0.893

Model summary (Coefficients) of Linear regression with significant factor scores

Model		Unstandardized Coefficient		Standardized Coefficient	t	Sig.
		B	Std.Error	B		
1	A constant	85.6567	17.1012		5.0088	0.0001
	REGR factor score 3	-52.5954	17.5970	-0.5986	-2.9889	0.0087
2	A constant	85.6567	14.7766		5.7968	0.0000
	REGR factor score 3	-52.5954	15.2050	-0.5986	-3.4591	0.0035
	REGR factor score 1	38.5563	15.2050	0.4388	2.5358	0.0228

dependent variable : CPUE of larval anchovy

3. Temperature (June), Front (June), Thermocline (June)

1 . Salinity (April10m and 50m depth / June 10m and 50m depth)

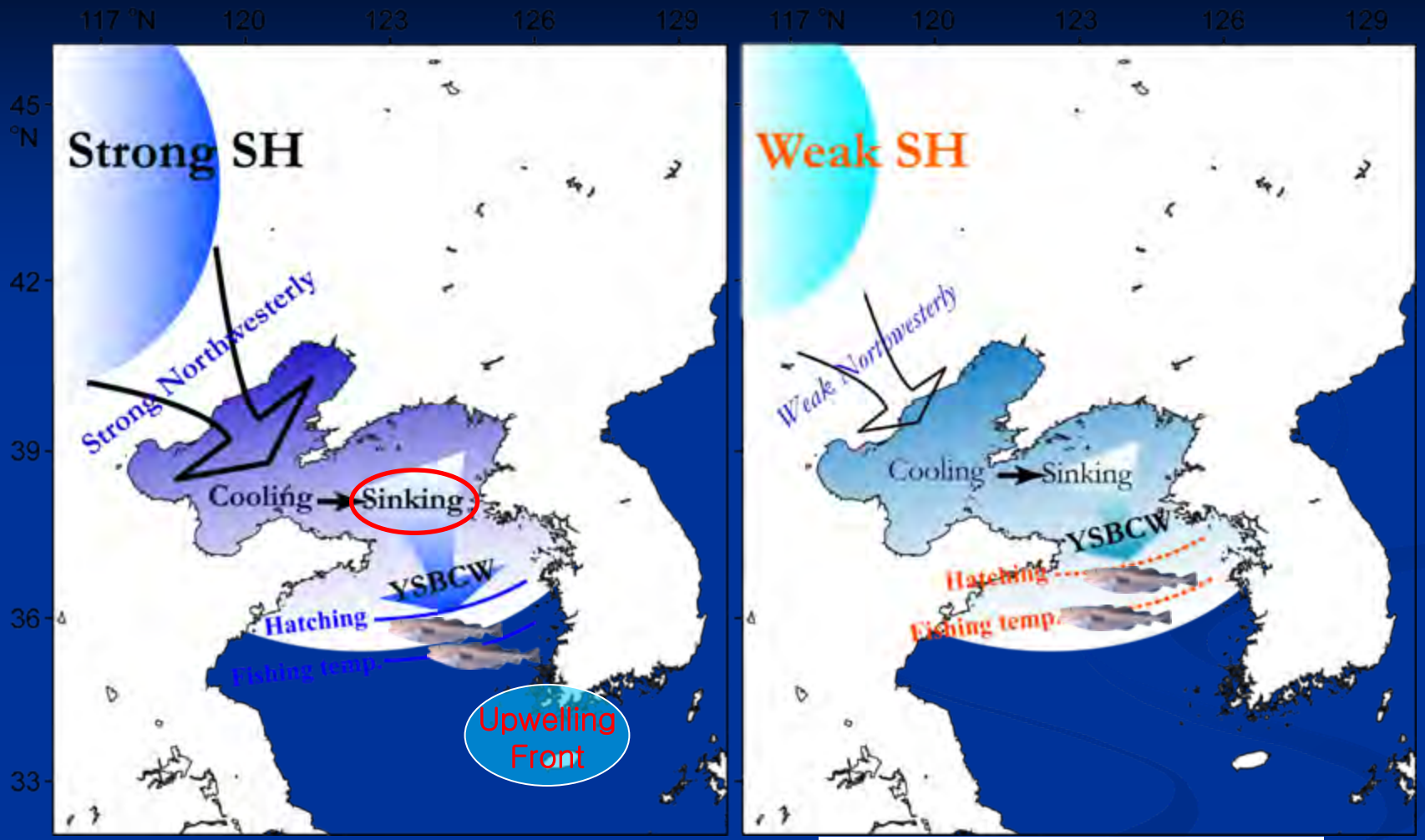
Model summary (ANOVA and coefficients) of Linear regression with significant factor scores

Model		Sum of Square	df	Mean Square	F	Sig.
1	linear regression	47026.61	1	47026.61	8.9334	0.0087
	residuals	84226.08	16	5264.13		
	Total	131252.69	17			
2	linear regression	72298.63	2	36149.32	9.1977	0.0025
	residuals	58954.06	15	3930.27		
	Total	131252.69	17			

1 Prediction: (a Constant), REGR factor score for analysis 3 ,
2 Prediction: (a Constant), REGR factor score for analysis 3 and analysis 1
dependent variable : CPUE of larval anchovy

3. Temperature (June), Front (June), Thermocline (June)

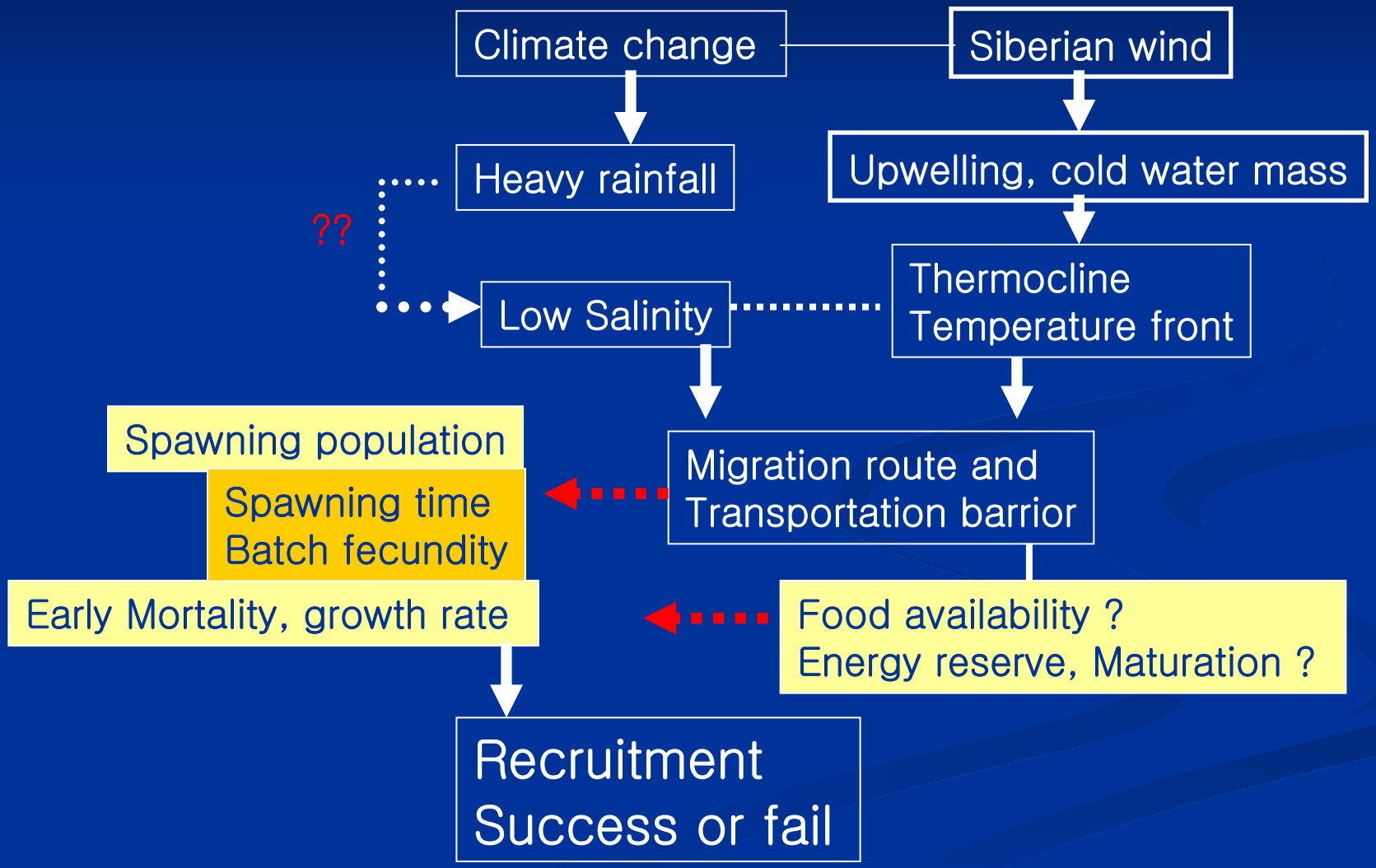
1 . Salinity (April10m and 50m depth / June 10m and 50m depth)



Cod : Increasing
Anchovy : ??

Cod : Decreasing
Anchovy : ??

Effect of climate change and oceanographic factors to the recruitment of anchovy



Conclusion

- **Model summary (ANOVA and coefficients) of Linear regression with significant factor scores suggested higher salinity and lower thermocline and front in the southern area of Korea could lead to higher recruitment.**

- **Condition factor and gonad somatic index of anchovy collected in the spawning grounds was positively correlated with monthly-averaged copepod density, suggesting bottom-up controls.**

- **Climate-driven fluctuations in river-water discharge and oceanographic conditions on primary and secondary productivity were related anchovy recruitment in southern Korean waters.**

Thank you