

Physical factors and prey availability affect diet and chick growth of Rhinoceros Auklets at Teuri Island in the Sea of Japan/East Sea

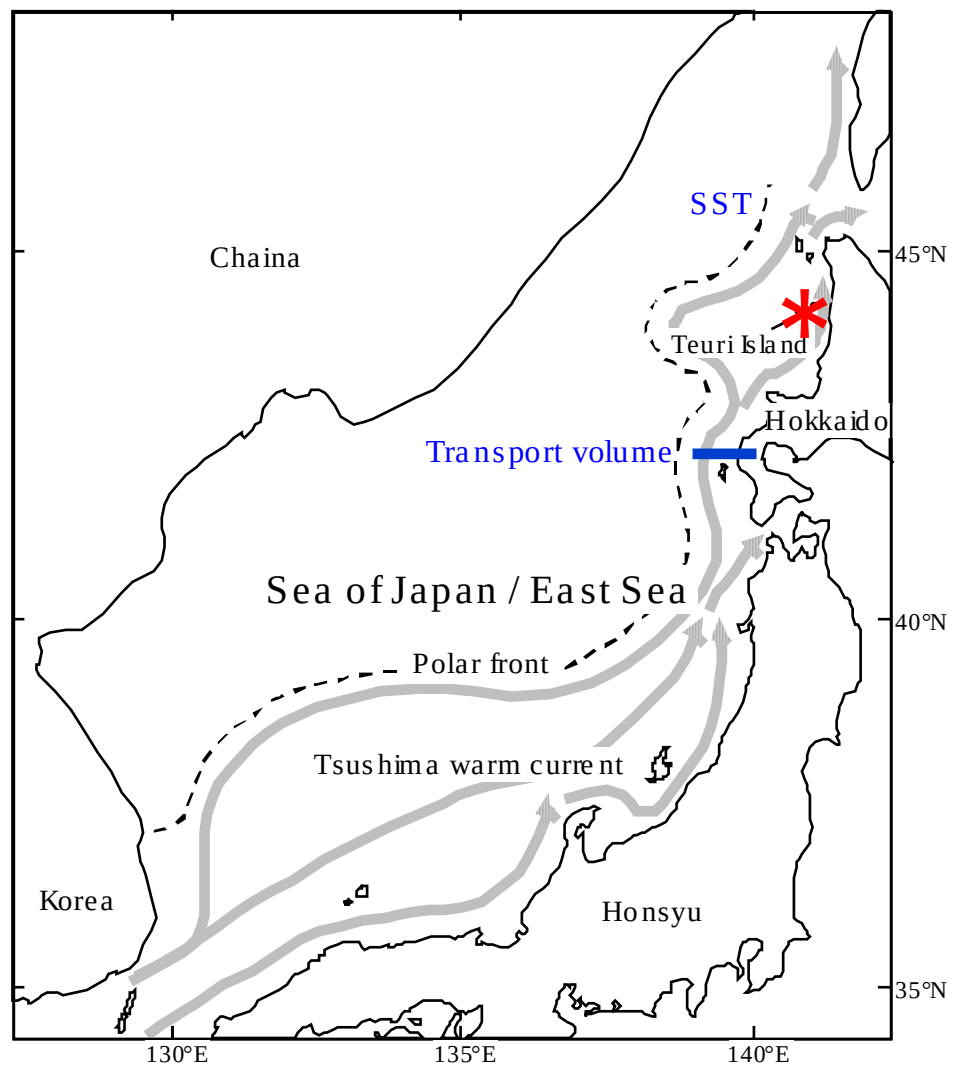
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Hypotheses based on Watanuki (1987) and Takahashi et al (2001)

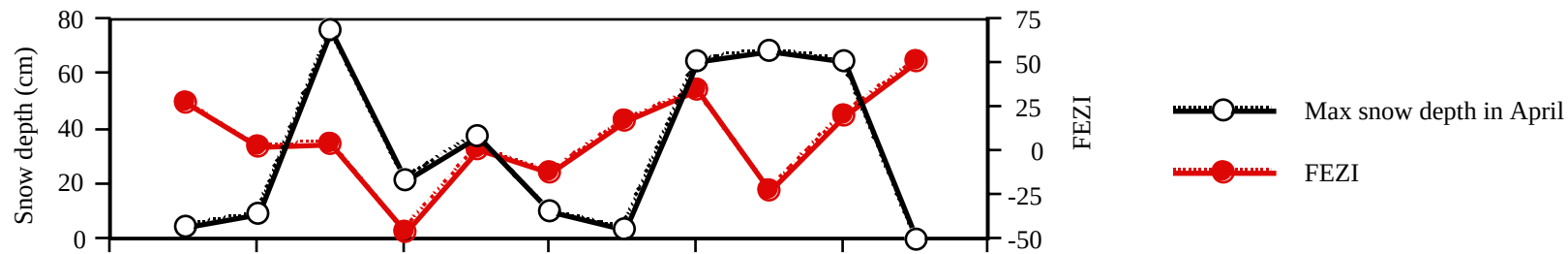
Factors affecting seabird diet and breeding

Dependent variable	Independent variable
Hatch date	Snow depth (Apr.), Air temperature (Apr.)
Time birds switch to anchovy	SST (Feb., Apr., Jun., Aug.)
%Mass anchovy in diet	Hatch date, Time birds switch to anchovy
Chick growth rate	%Mass anchovy in diet
SST(Jun.)	Current volume (Feb., Apr. Jun.), FEZI(Departure index of the atmospheric pressure balance)

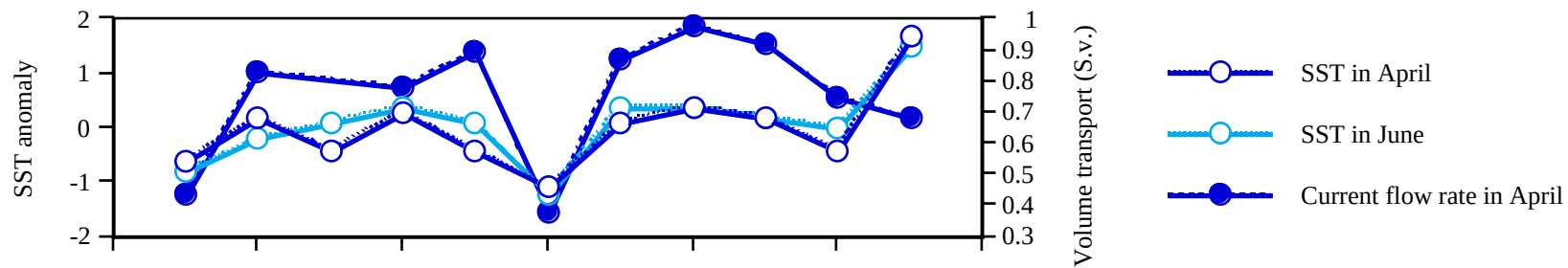


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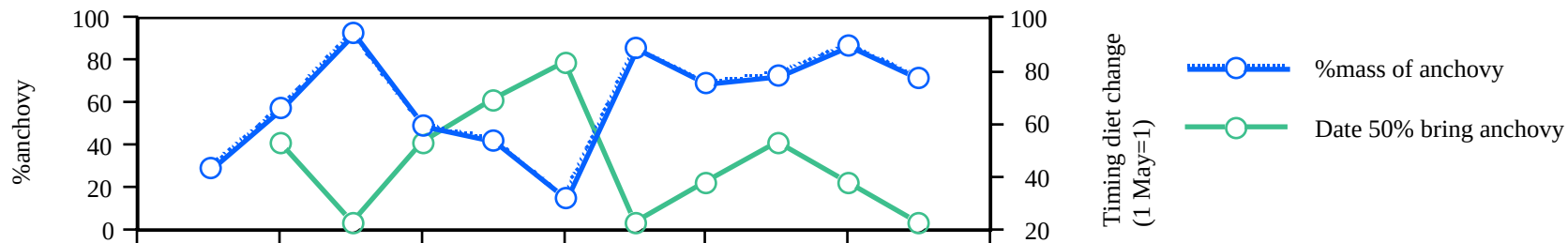
Climate



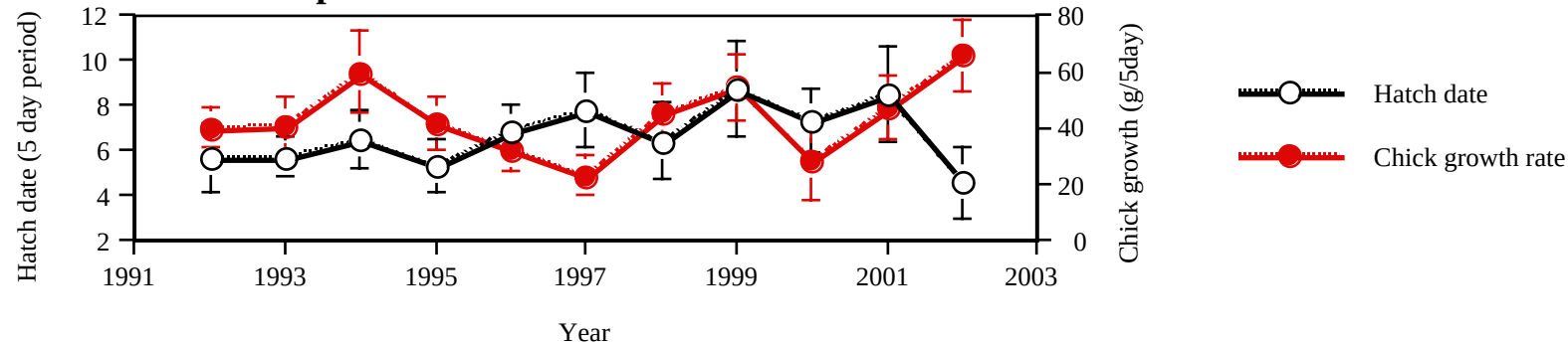
Marine environment



Seabird diet



Seabird reproduction



Results

Factors affecting seabird diet and breeding

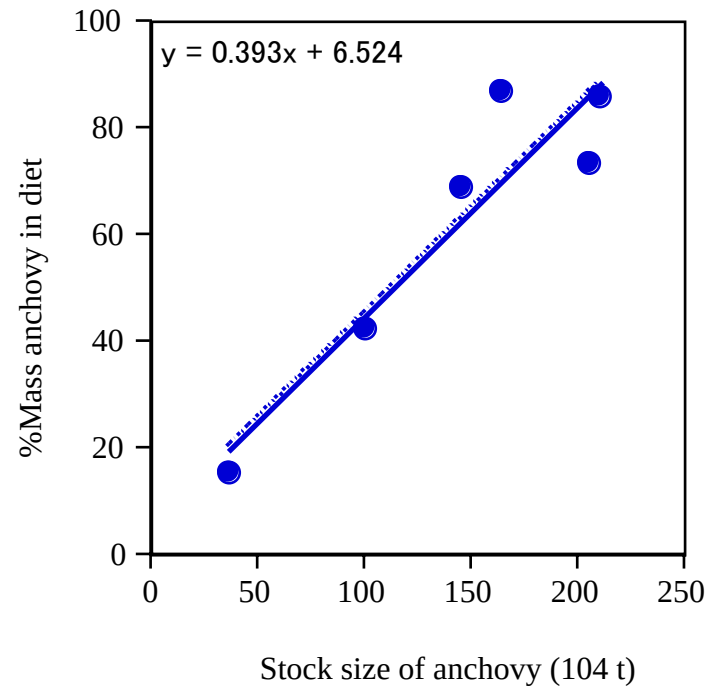
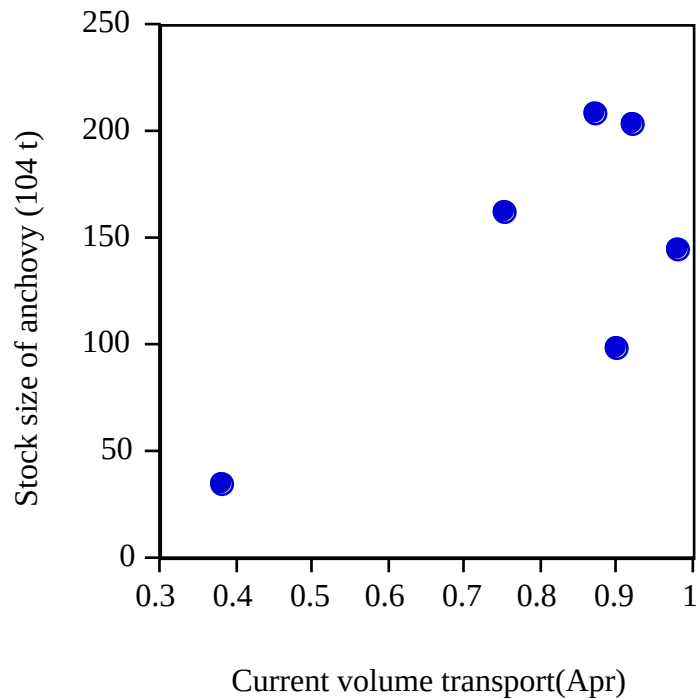
N=11 or 9 years

Dependent variable	Independent variable
Hatch date	Snow depth (Apr.) ($\beta = 0.642$, $P < 0.05$), Air temperature (Apr.)
Time birds switch to anchovy	SST (Feb., Apr., Jun.) ($\beta = 0.607$, $P < 0.05$), Aug.)
%Mass anchovy in diet	Hatch date, Time birds switch to anchovy ($\beta = -8.98$, $P < 0.01$)
Chick growth rate	%Mass anchovy in diet ($r = 0.653$, $P < 0.05$)
SST(Jun.)	Current volume (Feb., Apr. Jun.) ($\beta = 0.918$, $P < 0.01$), FEZI (Departure index of the atmospheric pressure balance)

Why did SST and current volume transport affect %anchovy in diet?

SST or current volume transport affect anchovy abundance ?

Bird seemed to feed on more anchovy in a year with high anchovy abundance



Why did chick grow faster in a year when birds fed more anchovy to chicks ?

Takahashi et al. (2001)

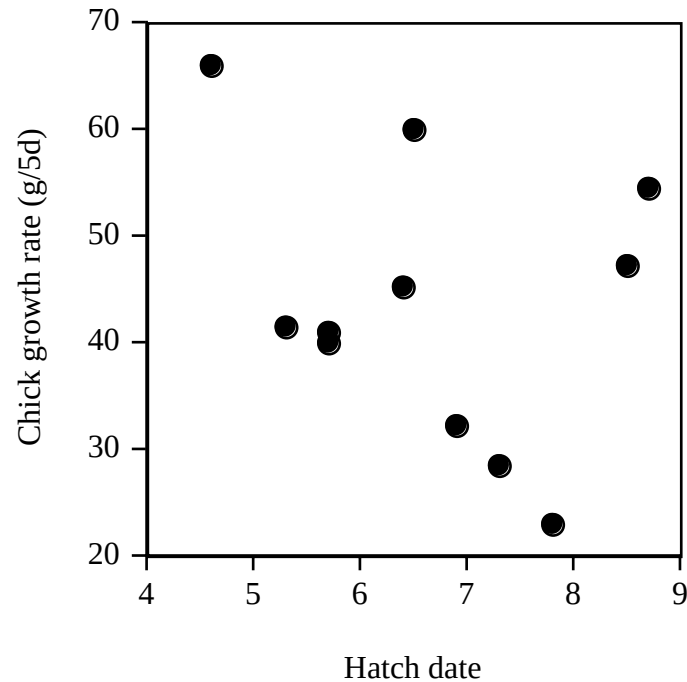
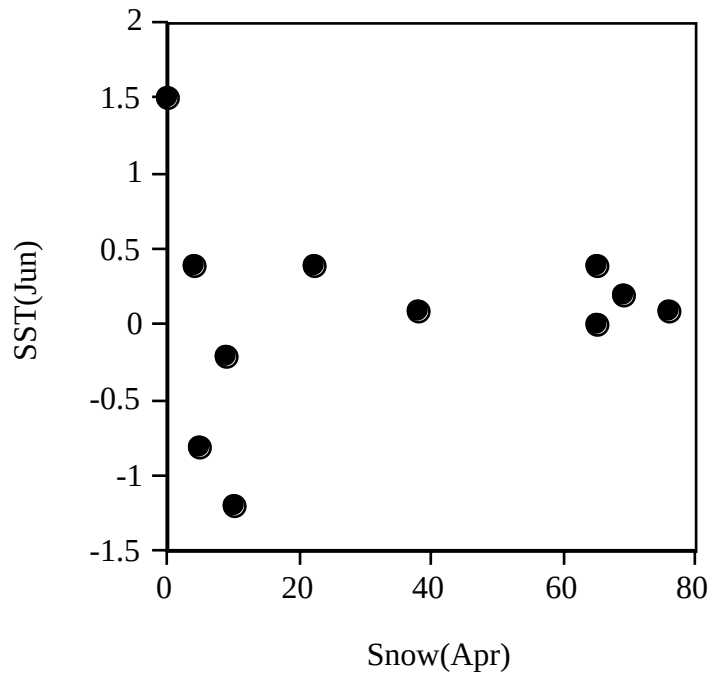
- 1) Heavier meal mass if birds fed chicks with anchovy (34g) than greenling (29g) and sandlance (23g)
- 2) Greater meal energy density if birds fed chicks with anchovy (5.3-7.3 KJ/g) than greenling (4.8 KJ/g) and sandlance (3.8-5.5 KJ/g)

Why hatch date did not affect %mass anchovy in diet ?

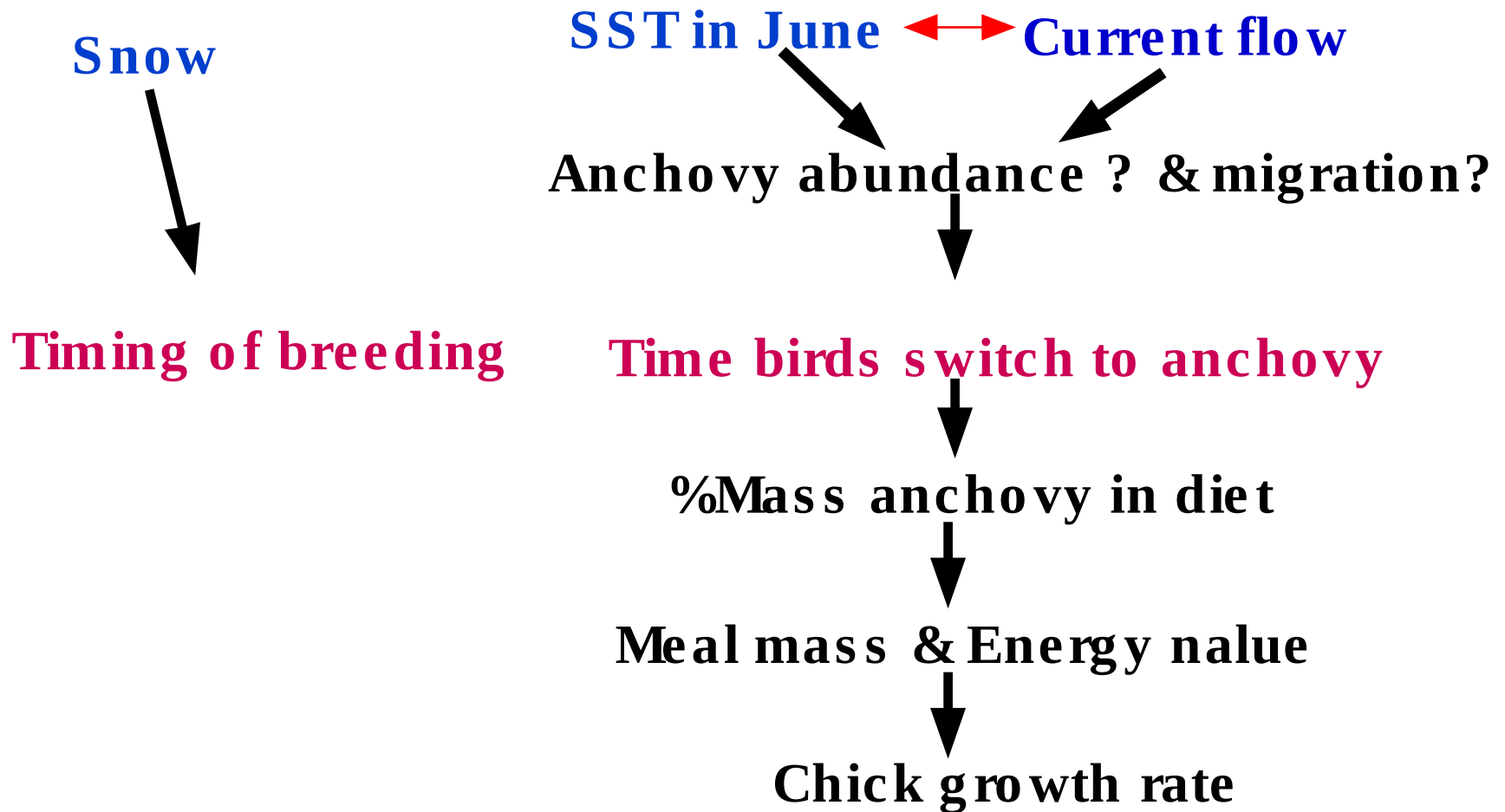
Snow depth (Apr.) and SST(Jun.) were independent.

Hence, no correlatio between

- 1) Hatch date and seasonality of anchovy availability
- 2) Hatch date and chick growth



Summary of factors affecting seabird diet and breeding



Conclusion

- 1) Snow coverage limited the timing to start breeding
- 2) SST or current flow seemed to affect the abundance or northward migration of anchovy, hence availability of profitable prey
- 3) As SST/current flow and snow coverage seemed to be independent, there were large between-year variation in chick growth