Seasonal forecasting of Pacific hake distribution in the California Current

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Variability in summer spatial distribution
Variability in summer spatial distribution
1. Test hypotheses regarding the drivers of hake summer spatial distribution

2. Develop 1–6 month lead-time forecasts of Pacific hake summer distribution
Hypothesized drivers

1. Temperature hypothesis

2. Shelf break hypothesis

3. Hake age hypothesis
Acoustic survey

Temperature at 100 m
Acoustic survey

Temperature at 100 m

Shelf distance

200 m
GAM present/absent model

\[ Pr(B) = \text{Year} + f_1(\text{Temp 100 m}) + f_2(\text{Shelf distance}) + f_3(\text{Lon,Lat}) \]

\[ g(E(Y)) = A + f_1(x_1) + f_2(x_2) + f_3(x_3, x_4) \]

Logit function
Year intercepts
Covariates

Probability some hake
Thin plate splines
GAM present/absent model

\[ \Pr(B) = \text{Year} + f_1(\text{Temp 100 m}) + f_2(\text{Shelf distance}) + f_3(\text{Lon,Lat}) \]

Deviance explained = 35%      AUC = 0.87
GAM present/absent model

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Deviance explained = 35%  \hspace{1cm} \text{AUC} = 0.87
Seasonal forecasting

Decision lead time

1—10 days  
weeks—months  
decades—centuries

Weather forecasting  
Seasonal forecasting  
Climate projections

Forecast skill  
Decision lead time

Hobday et al. (2016) Fisheries Oceanography
J-SCOPE ocean forecasting system

Siedlecki et al. (2016) Scientific Reports
Summary

Strength of evidence & relative importance of hypotheses

Seasonal forecasts of spatial distribution

Decision lead time

weeks—months

Seasonal forecasting

MSE