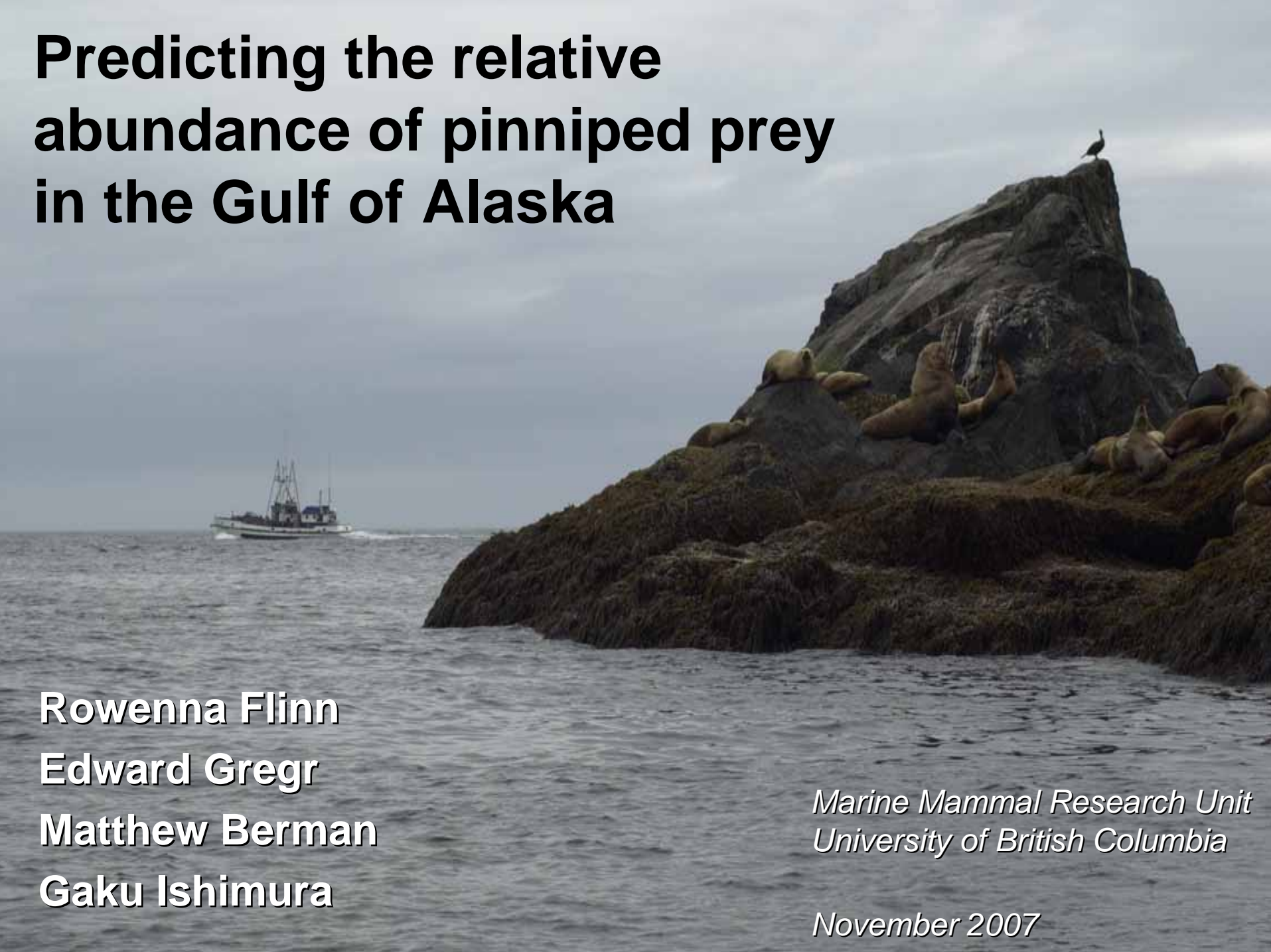


Predicting the relative abundance of pinniped prey in the Gulf of Alaska

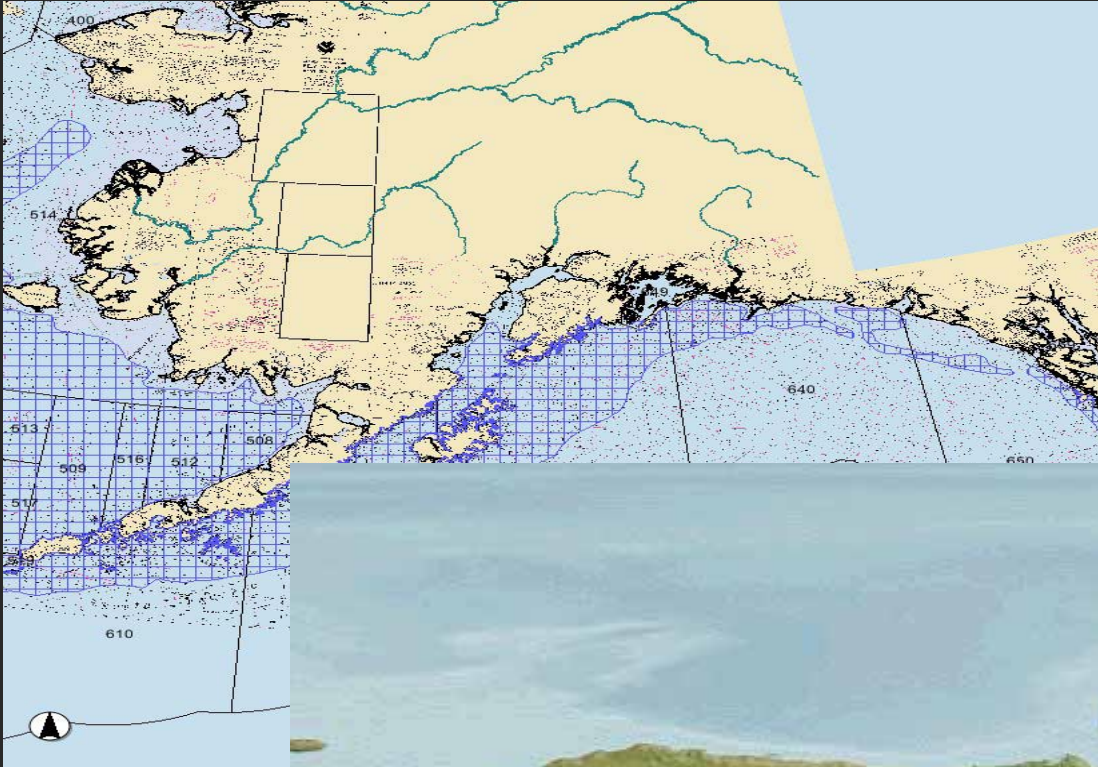
Rowenna Flinn
Edward Gregr
Matthew Berman
Gaku Ishimura

*Marine Mammal Research Unit
University of British Columbia*

November 2007

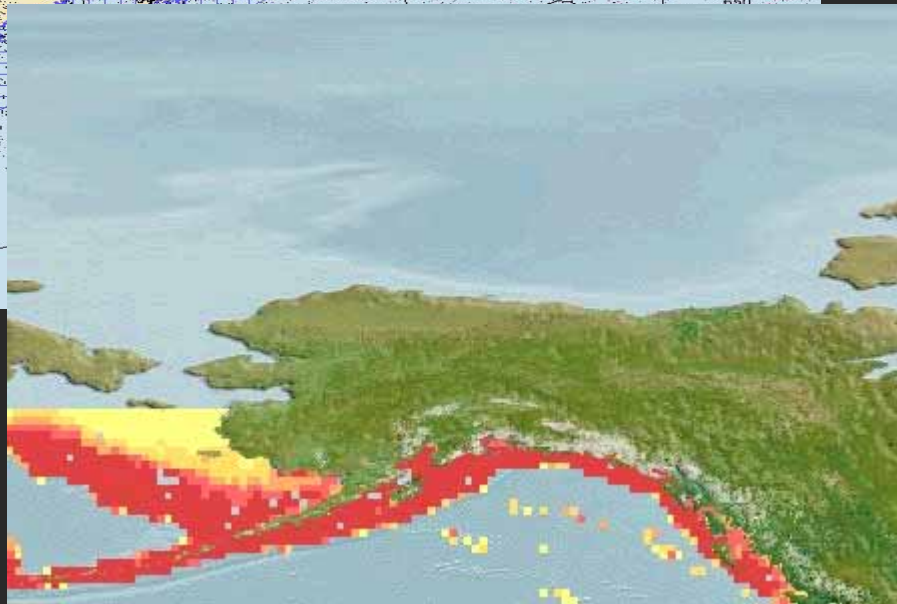


Prey distributions



EFH Map

Late juvenile and
adult Pacific cod



FishBase

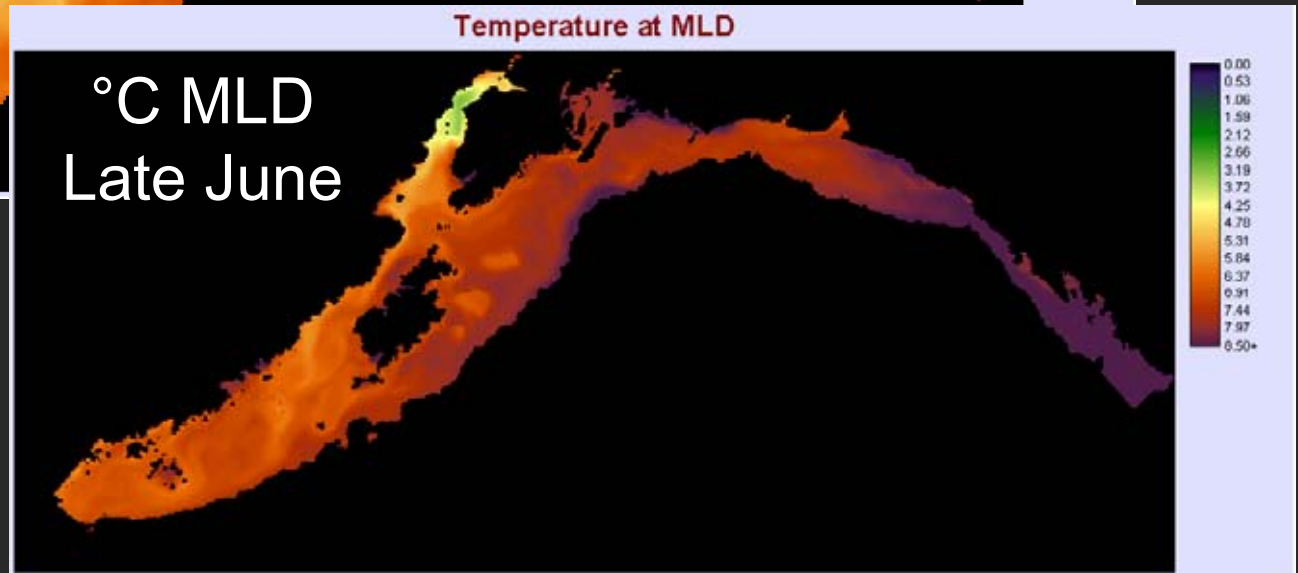
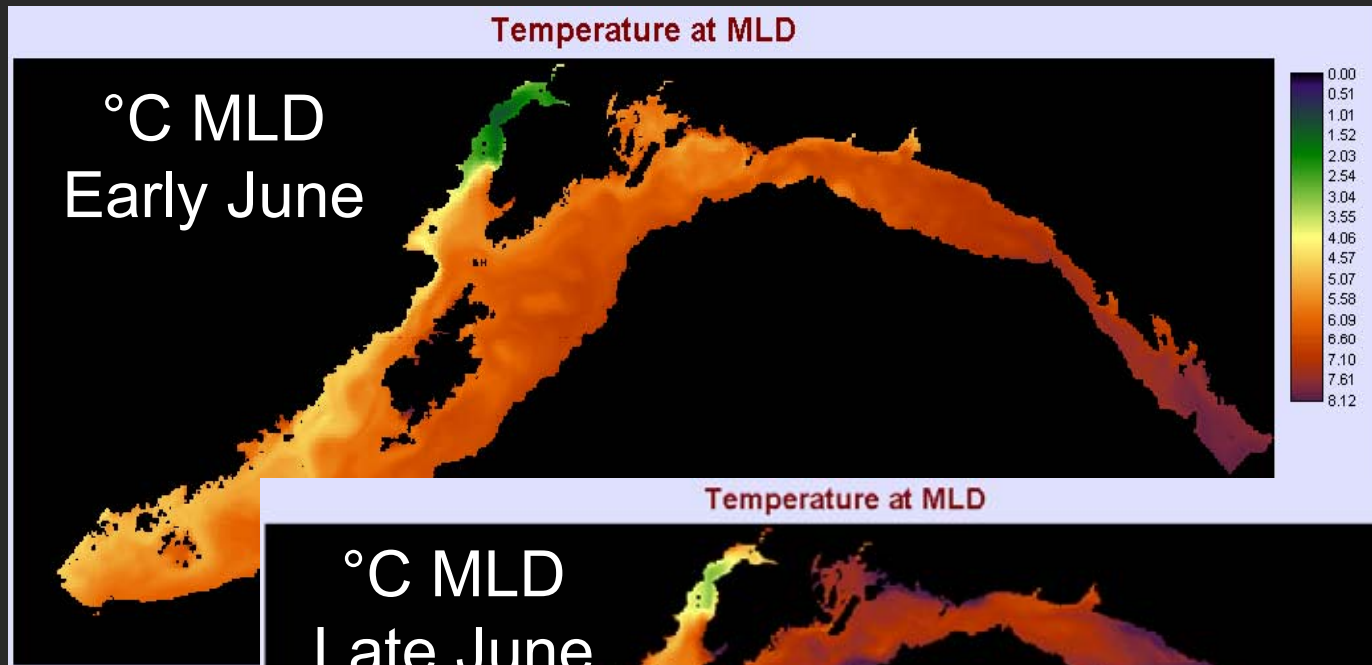
Regression approach

- Remotely sensed data
 - SSH
 - SST
 - Chl a
- Bathymetry

Vertical structure?

Temporal scale?

Regional Oceanographic Models (ROMs)



Creating the models

- Remotely sensed data
- Bathymetry
- ROMs output
- 2001 NMFS trawl survey data (n=403)

Rockfish

Flatfish

Walleye pollock

Pacific cod

2 week

Monthly

Seasonal

Model results

Pacific cod CPUE

(Monthly time scale)

- Time period
- Surface salinity
- Salinity MLD, Salinity MLD²
- Salinity gradient (MLD-surf)
- Bottom temperature
- Bottom salinity, Bottom salinity²
- MLD, MLD²
- Bottom depth, Bottom depth²
- Slope, Slope²
- Sea Surface Temperature (RS)
- Chlorophyll a (RS)

Models with/without ROMs?

Adjusted R^2 for models including ROMs

Adjusted R^2 for models not including ROMs

	2 week	Monthly	Seasonal
Pollock	0.366	0.283	0.248
	0.149	0.141	0.134

Model Results

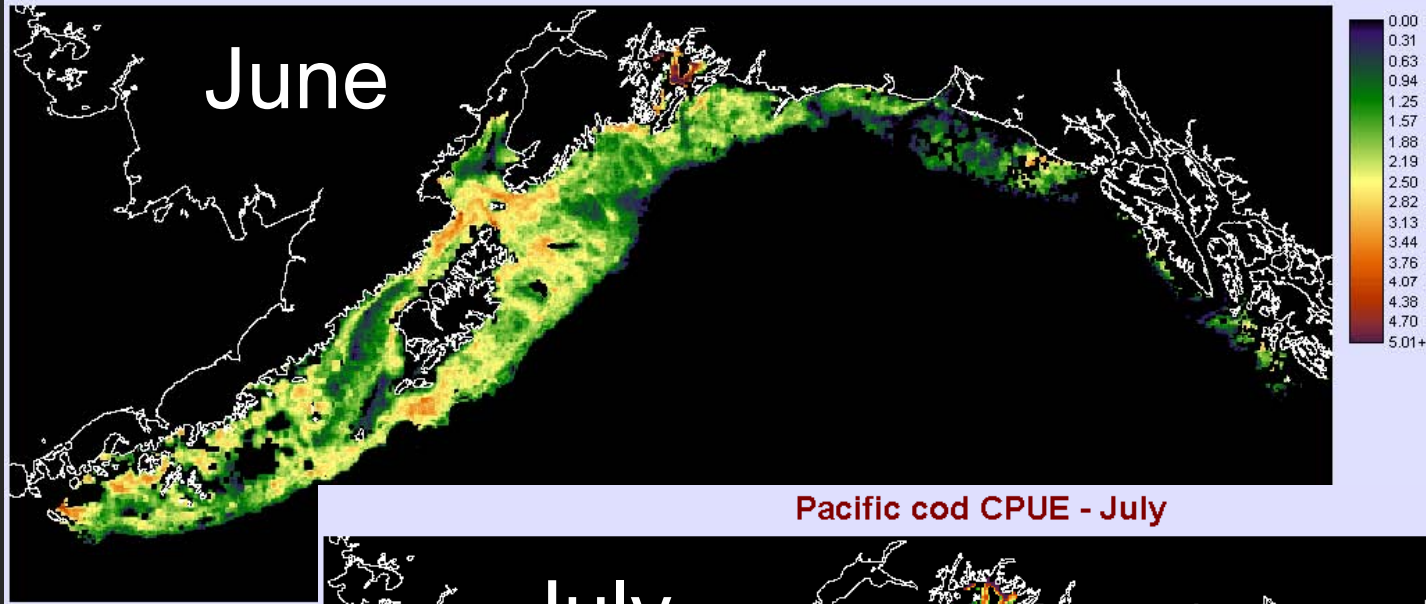
	2 week	Monthly	Seasonal
Pollock	0.366	0.283	0.248

Model Results

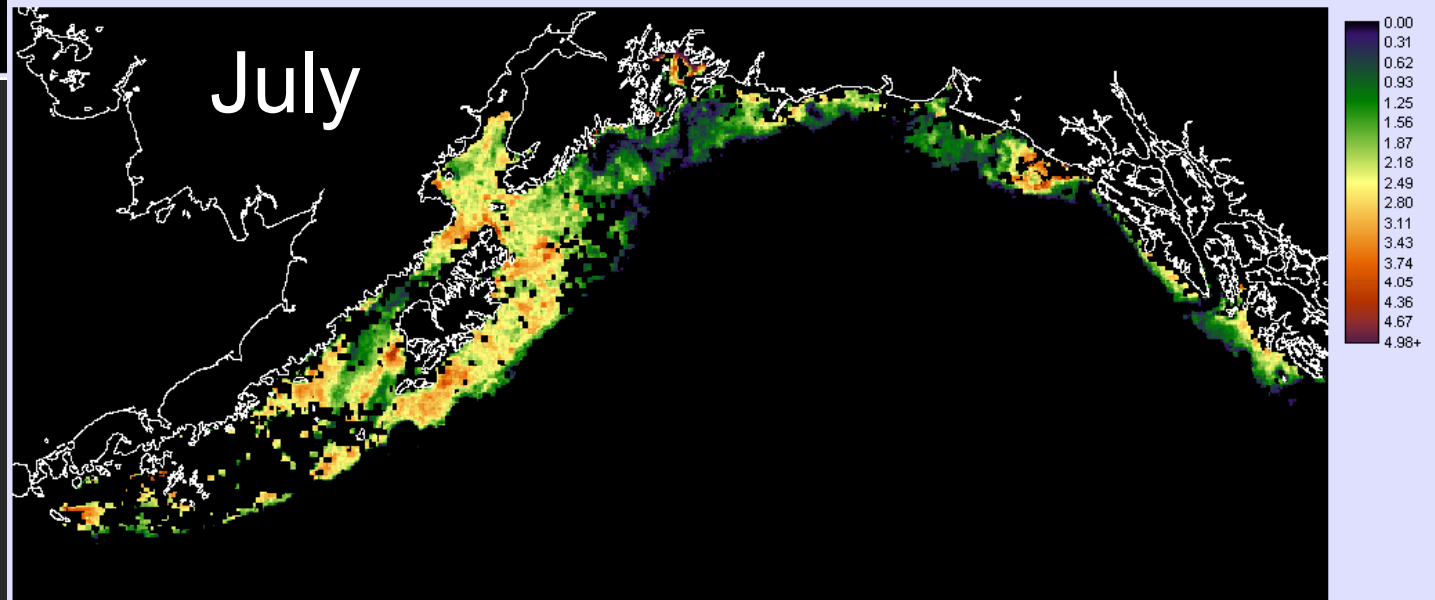
	2 week	Monthly	Seasonal
Pollock	0.366		
Pacific Cod		0.171	
Rockfish			0.370
Flatfish	0.344		

Pacific cod

Pacific cod CPUE - June

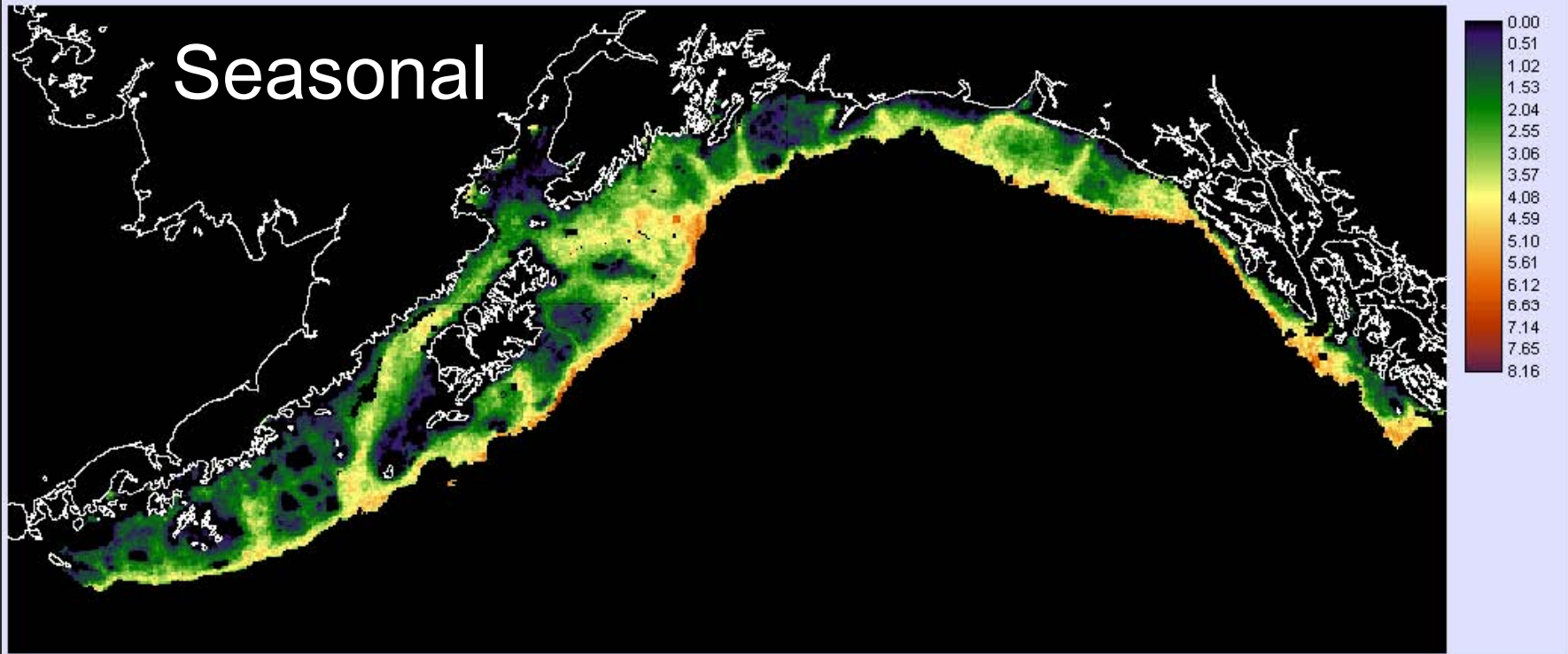


Pacific cod CPUE - July



Rockfish

Rockfish CPUE - Seasonal



Model validation

	2 week	Monthly	Seasonal
Pollock	0.0817	0.5636	0.0408
	0.0493		
	0.0072	0.2099	
	0.0207		
Rockfish	0.7389	0.231	0.3149
	0.0004		
	0.1362	0.0009	
	0.2122		

Non-significant p-value

Significant p-value

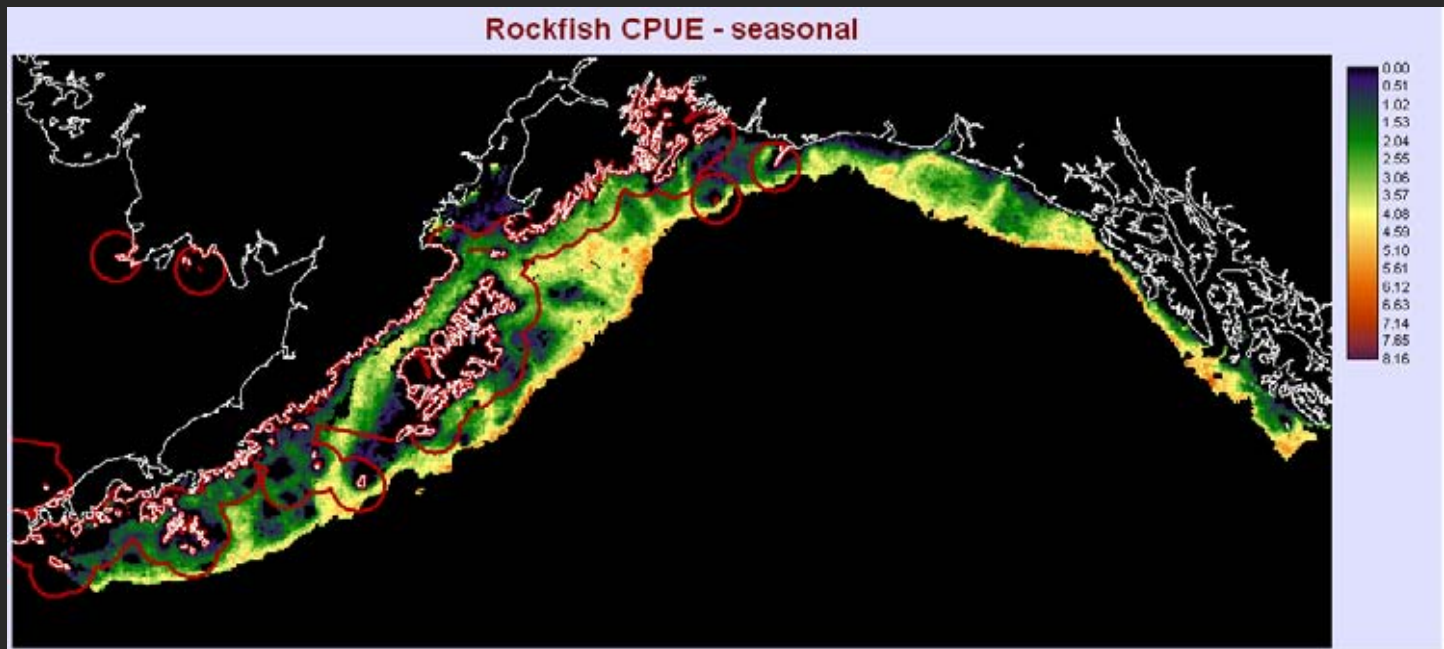
- Pacific cod seasonal models predictions is not significantly different from the 2003 trawl survey data
- Flatfish predictions not significantly different from the 2003 survey data in 3 of 4 of the 2-week periods and 1 monthly period

Conclusions

- Inclusion of vertical structure explained considerably more variance than remote sensing and bathymetry alone
- Appropriate temporal scale differs for individual species
- Temporal scale for predicting out-of-sample can be determined

Applications

- Quantitative seasonal predictions
- Cost of closures
- Marine protected areas
 - SSL Critical habitat



Thanks very much ...

Dr. A.J. Hermann & Dylan Righi (PMEL, NOAA, Seattle)
Ryan Coatta (MMRU, UBC)



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Poll (2 week) = Timeperiod+TSURF+LMTEM+LTBOT+SBOT+WSURF+WSURF²+WBMLD+HVBOT+MSTEM+LMLD+LMLDBOT+BOT+BOT²+SST+LCHLA+LCHLA2

PCod (Month) = Timeperiod+SSURF+SMLD+SMLD²+LTBOT+SBOT+SBOT²+LMSSAL+LMLD+LMLD²+BOT+BOT²+LSLOPE+LSLOPE²+SST+LCHLA

Rock (Season) = LMSAL+LMSAL²+SBOT+HVSURF+WSURF+HVAMLDBOT+BMSTEM+LBMSAL+LMLD+LMLDBOT+LDEPTH+LDEPTH²+LSLOPE+LSLOPE²+CHLA1

Flat (2 week) = Timeperiod+TMLD+TBOT+TBOT²+HVBOT+LBMSAL+MLD+MLD²+LDEPTH+LDEPTH²+LSLOPE+LSLOPE²+SSH+LCHLA1