

Biological Sampling and Foraging Ecology of North Pacific Albacore



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Motivation for Albacore Research



- Demand for albacore supports recreational and commercial fisheries along the entire U.S. West Coast
- Little is known about their foraging ecology, migration, and stock structure
- Are there two separate U.S. West Coast stocks?

Objectives



- Create an extensive archive of biological samples from albacore caught in the Eastern Pacific Ocean (EPO)
- Explore regional and annual variation in albacore diets, age and growth rates, migration patterns and stock structure throughout the EPO in support of management

Methods

- Commercial passenger fishing vessels-
CA Southern California Bight (SCB)
- 2007 -2011
- Commercial albacore fleet- OR/ WA
-2009-2011



Processing

Fish processed at the Southwest Fisheries Science Center in La Jolla, CA

- Samples collected for current and future projects



2011 AAFA Biological Sampling Program

Samples Collected

- 50 albacore
- July 20th-October 16th
- 6:30am-9pm
- 50.6-85 cm fork length



2012- please focus on size range

Fish Sample Number	Date (MM/DD/YYYY)	Time of Day	GPS Location (DD°MM' DDD°MM')	Fork Length (CM)	Gear Type (bait or Trawl)
191	09/29/2010	1200	45.34 127.49	52	Bait
192	09/29/2010	1200	45.34 127.49	54	Bait
193	09/29/2010	1800	45.08 128.08	56	Bait
194	09/29/2010	1800	45.08 128.08	56	Bait
195	09/30/2010	1000	45.02 128.00	60	Bait
196	09/30/2010	1000	45.02 128.02	61	Bait
197	09/30/2010	1000	45.02 128.02	60	Bait
198	10/01/2010	1350	45.11 125.05	66	Bait
199	10/01/2010	1350	45.11 125.05	62	Bait
200	10/01/2010	1350	45.11 125.05	60	Bait

Boat Name: Steel Fin II

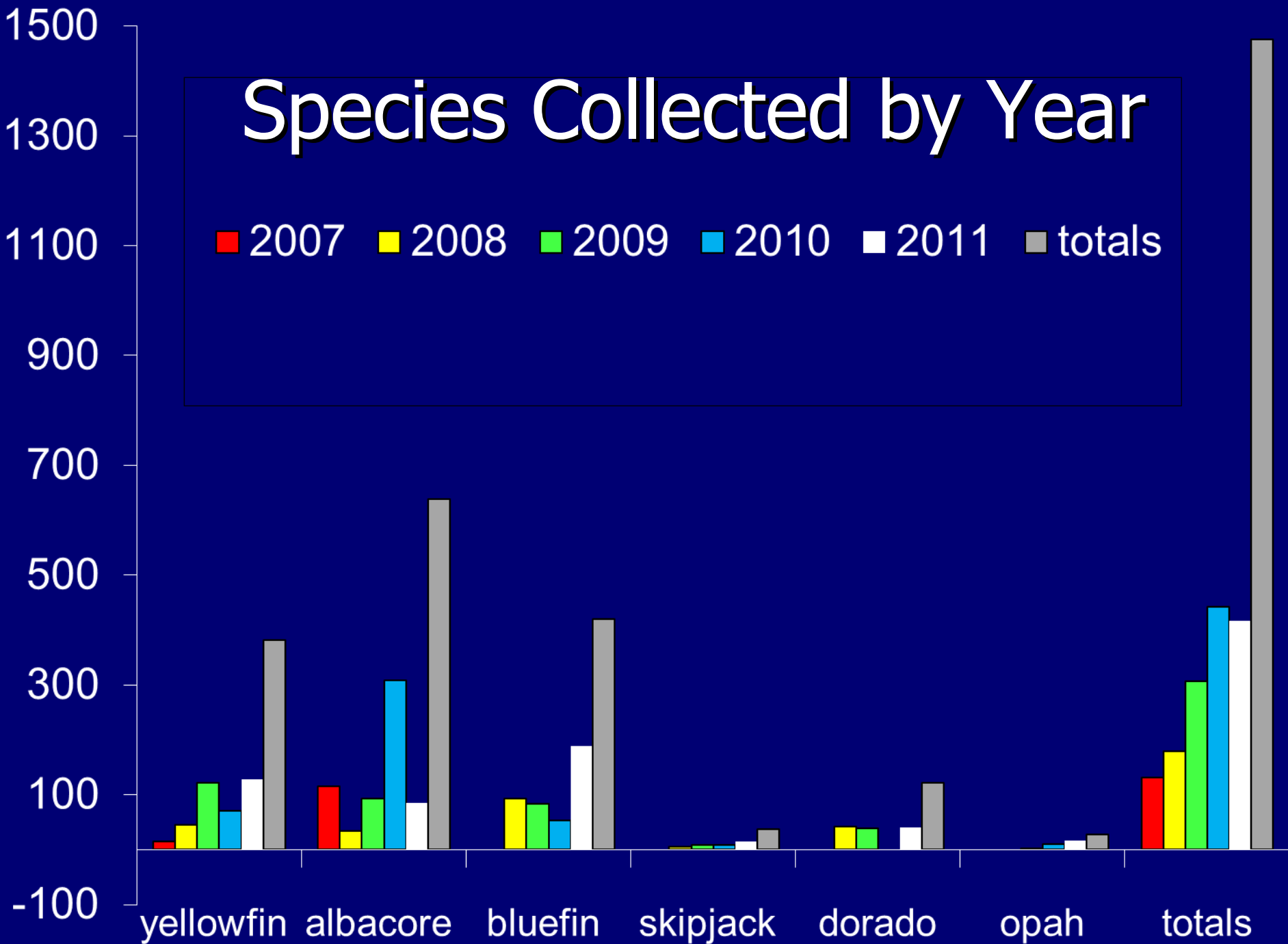
Fish Ticket #:

Total fish weight in pounds:



Species Collected by Year

2007 2008 2009 2010 2011 totals



Samples

- Age and growth: otoliths, dorsal spines, scales, vertebrae
- Foraging ecology: stomach content identification/ liver & muscle tissue isotope analysis
- Reproductive state: gonads
- Stock structure and migration patterns : DNA, otoliths, tissues

Nothing is Wasted!



Fisherman's Processing in Point Loma processed and donated the fillets to a San Diego non-profit that feeds people in need:

Fish. Food. Feel Good.

(www.fishermansprocessing.com) & (www.F3G.org)

After being filleted and processed for biological samples all carcasses were given to local commercial lobster fishermen



M96-708964 [RM] © www.visualphotos.com

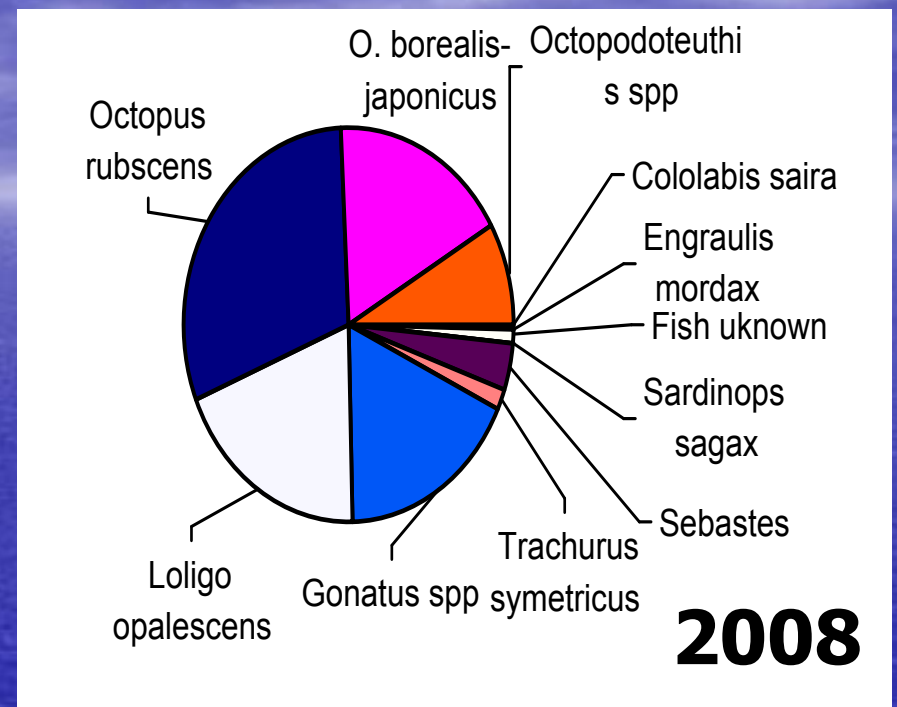
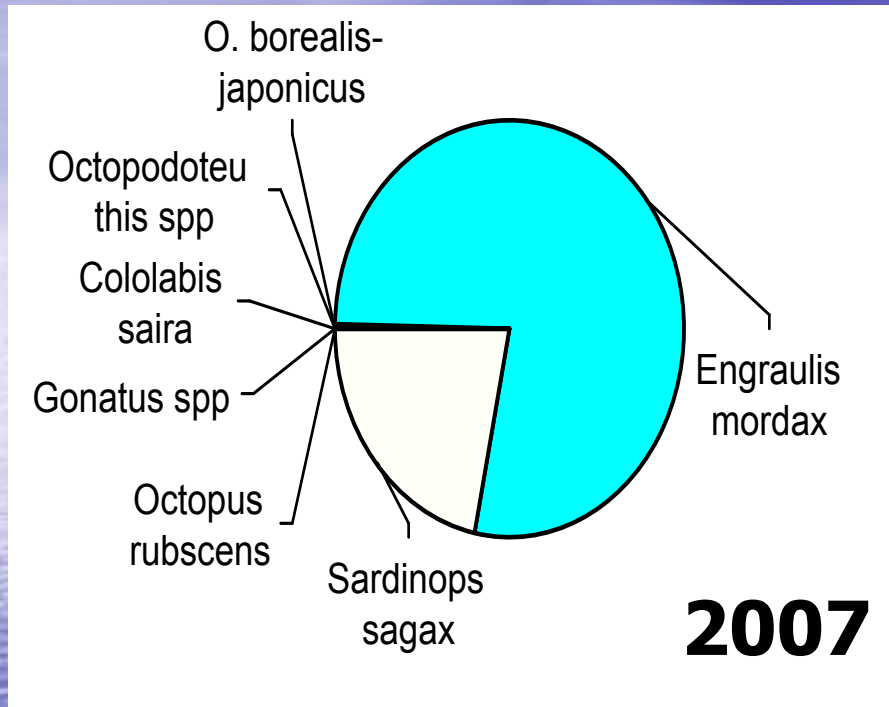


Initial Focus: Southern California Bight (SCB)

- Stomach content analysis
 - Snap shot of foraging
- Stable Isotope analysis
 - Foraging over time
- Age and Growth
- Migrations Patterns



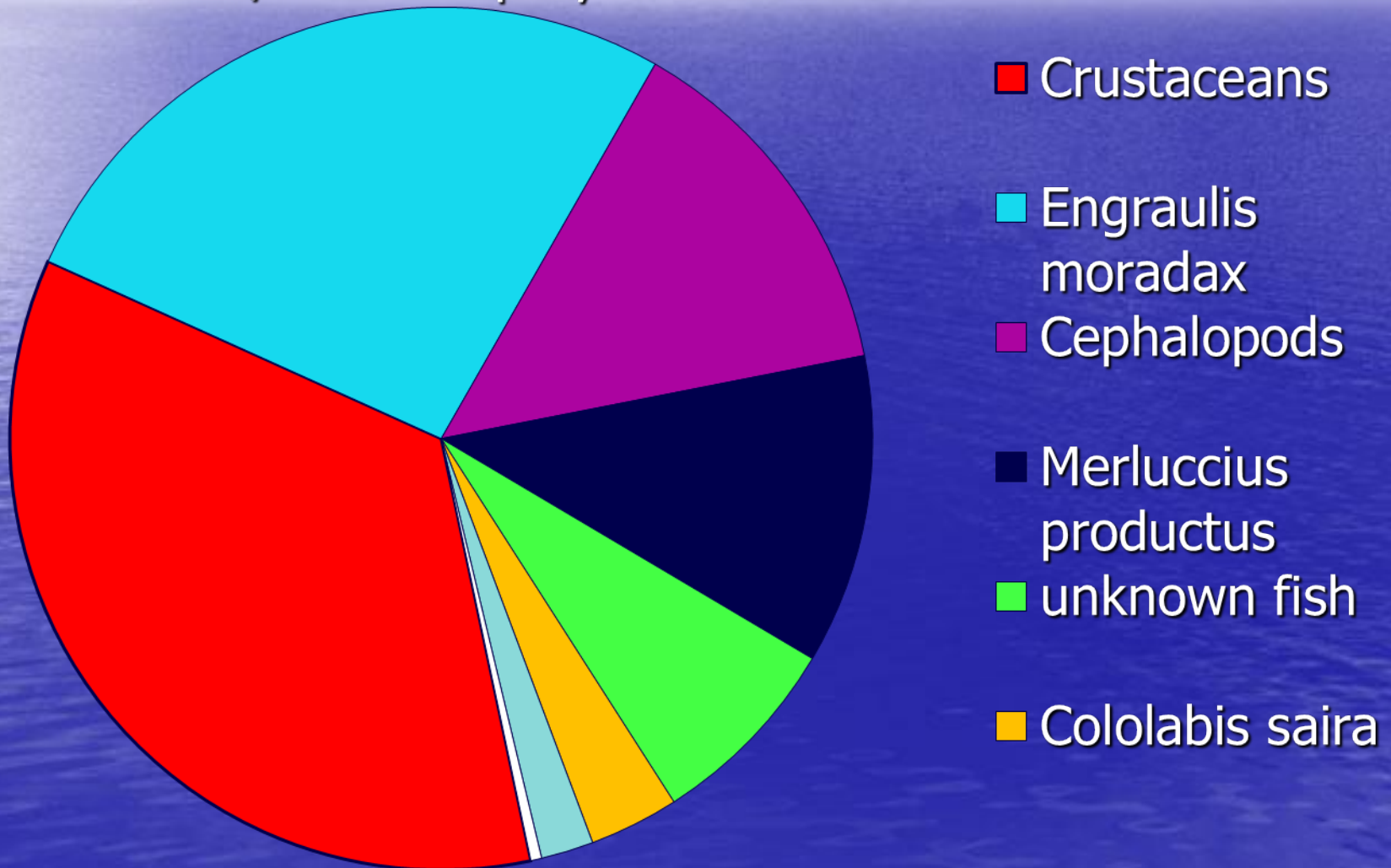
Southern California Bight



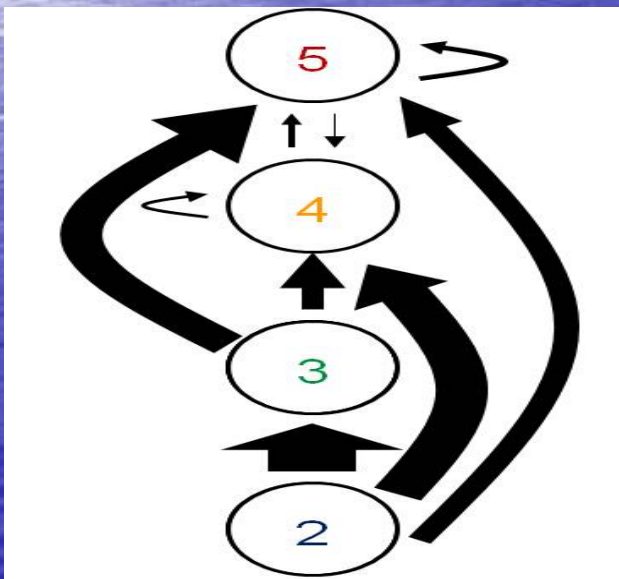
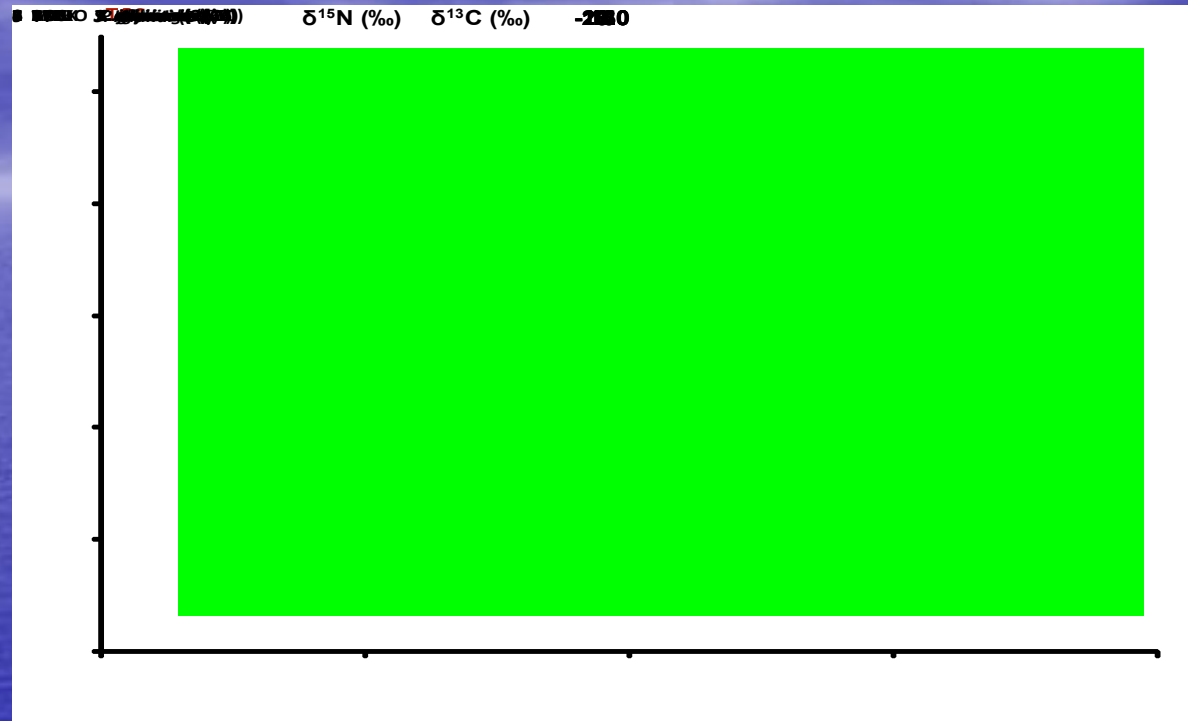
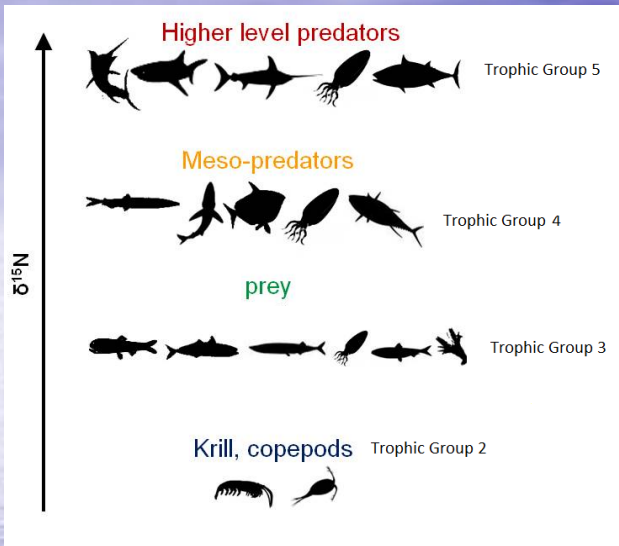
- 2009 and 2010 preliminary results are similar to 2008 with squid, small crustaceans, and fish commonly associated with the deep scattering layer composing the majority of prey found

Northern Oregon/ Washington

% N frequency = total N for prey items in all stomachs
/ N for all prey items in all stomachs



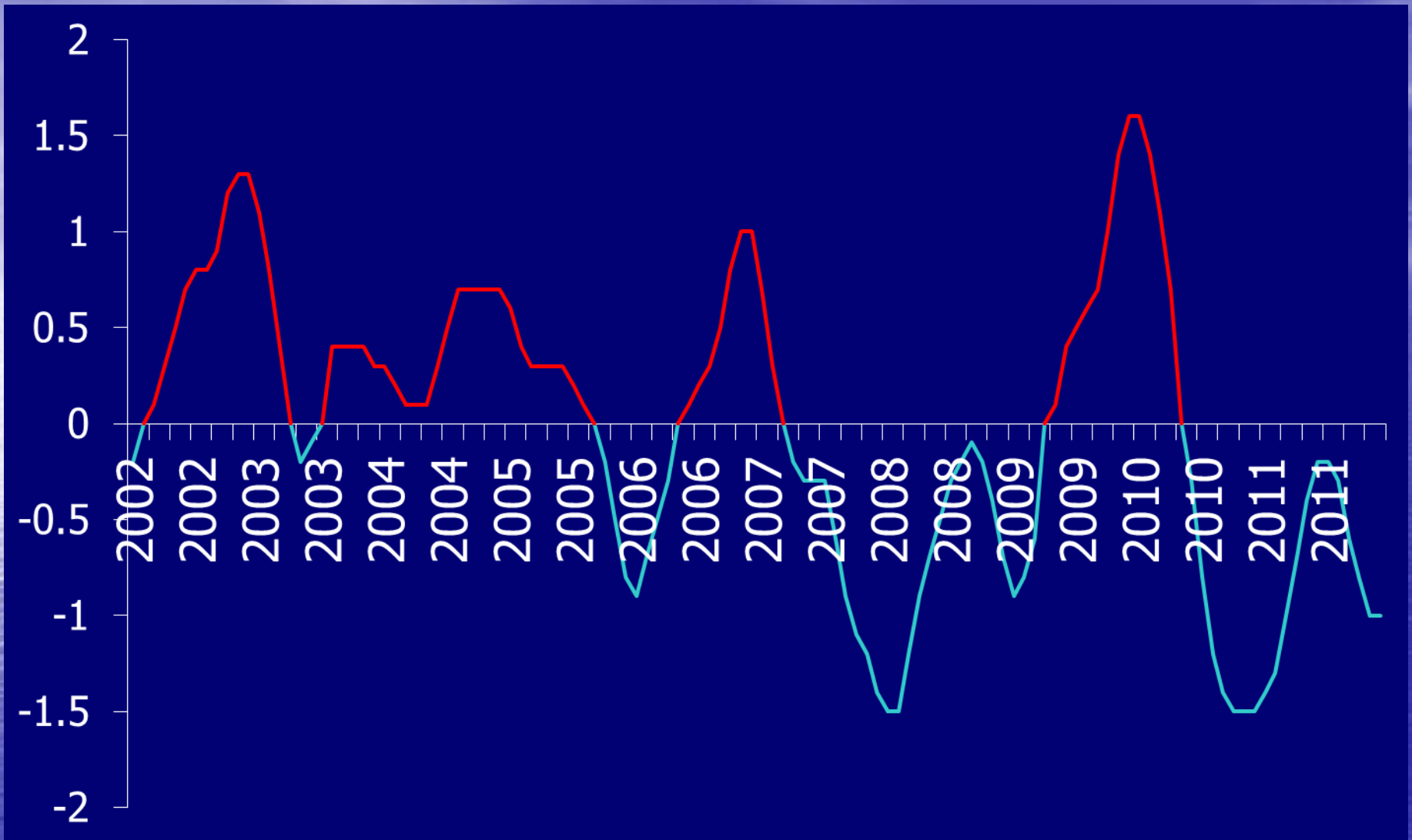
Stable Isotopes Analyses SCB



Species	code	Estimated proportional prey inputs							
		Trophic group 2		Trophic Group 3		Trophic group 4		Trophic group 5	
		Median	95% CI	Median	95% CI	Median	95% CI	Median	95% CI
<i>T. alalunga</i>	ALB	74.5	69.9 – 78.6	12.1	4.9 – 22.5	11.8	4.1 – 17.7	1	0.1 – 4.1
<i>T. orientalis</i>	PB	42.6	36.0 - 49.3	31.6	20.7 – 42.4	16.6	5.9 – 26.8	9.1	2.0 – 17.0
<i>T. albacares</i>	YFT	52.4	46.4 – 56.9	5.1	1.6 – 16.4	40.5	9.8 – 45.2	1.5	0.1 – 7.8

Other studies

- Glaser (2009): Malacostracans belonging to the orders Decapoda and Euphausiacea comprised a significant proportion of biomass consumed by albacore in the northern region of the CCS



Oceanic El Niño Index showing sea surface temperature anomalies at the equator over time: 2002 to 2007 colder than 2007 to 2011



How does variation in ENSO conditions effect water temperatures and prey on the US west coast?

Current & Future Projects

- Link oceanographic variations to availability of albacore locally
- Continue collections to better understand inter-annual variation in regards to changes in climate and oceanographic conditions

Summary and Conclusions

- Shifts in the forage regimen likely result from a combination of changes in productivity, predator abundance, and environmental variability, which in turn affects albacore fishing and fisheries
- Combining different methods allows us to validate results and develop a more concrete understanding of foraging ecology and age and growth
- Understanding the EPO food-web in relation to environmental fluctuations may help us understand trends in availability of albacore to fishermen and help differentiate between natural and human influences



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- San Diego Rescue Mission
- Sportfishing Association of California (SAC)

