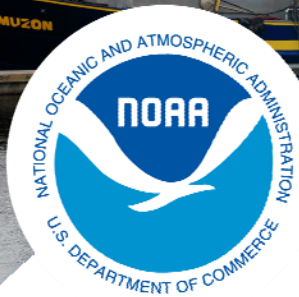


Agenda Item H.3.b
Supplemental SWFSC Presentation 1
September 2018

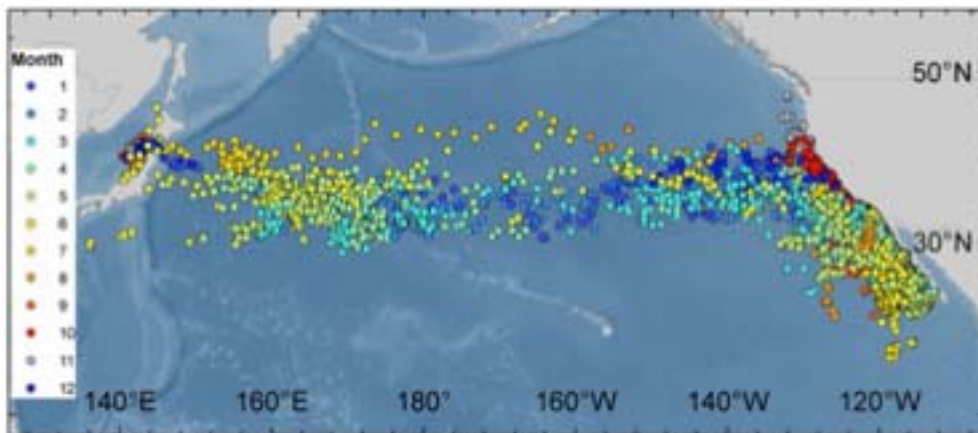


**NOAA
FISHERIES**

Southwest Fisheries
Science Center

NMFS Report SWFSC Activities Highly Migratory Species

Gerard DiNardo
Director, Fisheries Resources Division



NOAA FISHERIES

Presentation Outline

- HMS Biological Sampling
 - Foraging ecology
 - Reproductive biology
- Tagging
 - Genetic
 - Conventional
- Deep Scattering Layer
- Stock Assessments
- Conservation Information
- Workshops/Outreach



Bluefin Biological Sampling

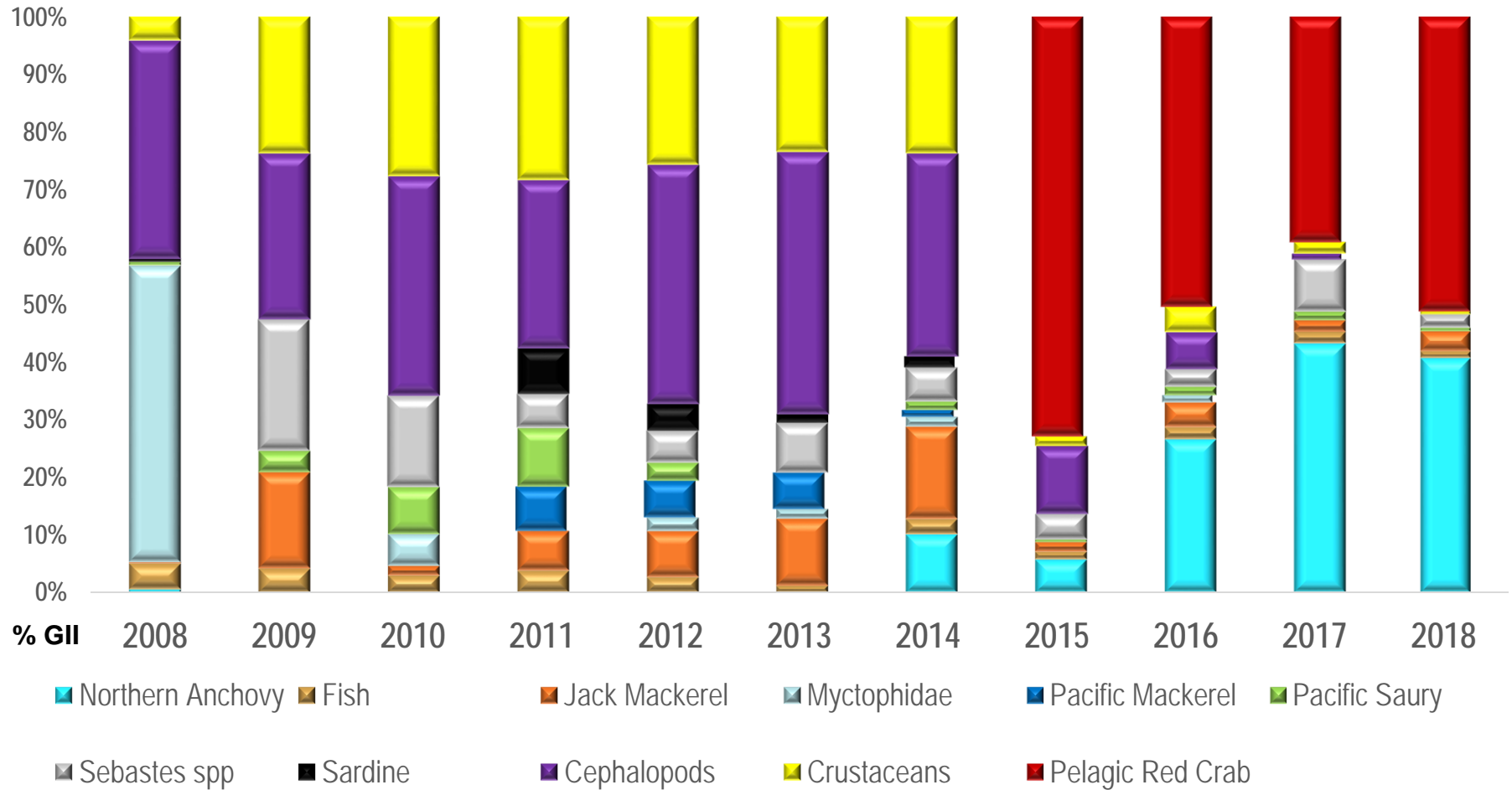
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
PBT	75	78	54	189	294	171	156	120	487	253	235

Provides data to support:

- Foraging Ecology
- Reproductive Biology



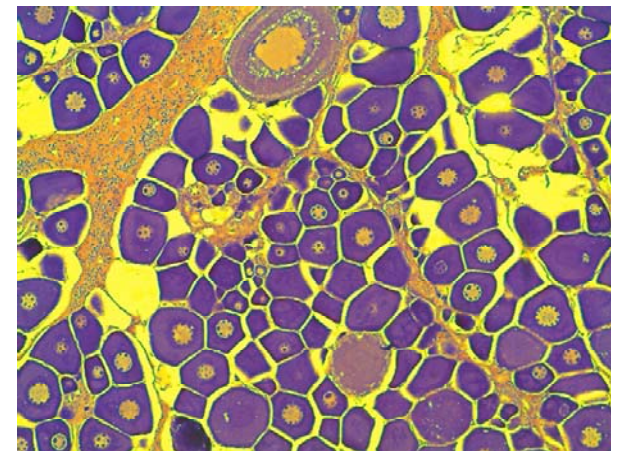
Pacific Bluefin Foraging Ecology



PBF Reproductive Biology:

Are larger fish in the EPO Spawning?

- Samples sent out for histology
 - Females: N=11
 - Males: N=3
 - Length range: 134 to ~180 cm FL (~4-7 years old)
 - Weight range: 120-243 pounds
- Results:
 - Males: mature but inactive
 - Females: immature



Opah Research

Results and ongoing work: 2017-2018

Life history

- Stomachs: Diverse diet in the CA current including epipelagic and mesopelagic forage species
- Gonads: all samples appear immature off CA
- Hard parts: Ageing method needs to be determined
- Data mining - size composition in different fisheries

Speciation

- How many species? – recent genetic research

Future activities 2018-2019: same as 2017-2018

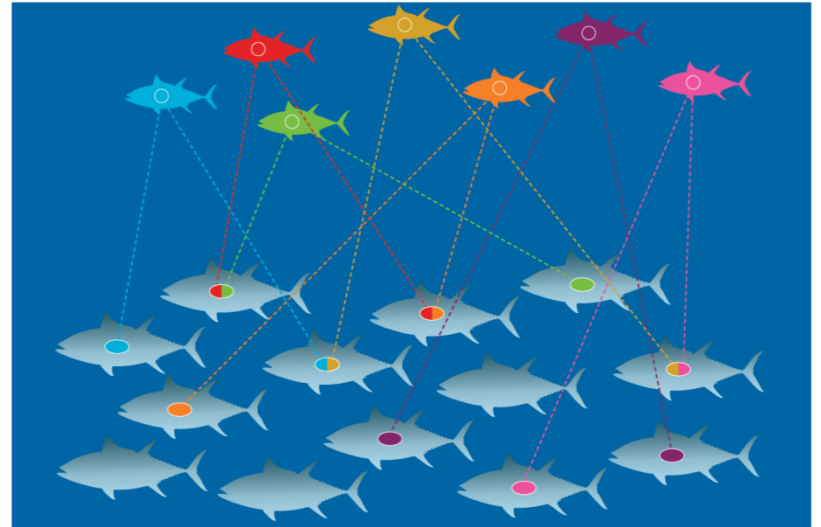


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Tagging

PBF Tagging - Close Kin Analysis (genetic tagging)

- Required tissue samples by country/fishery have been collected
- March 2019 - workshop to identify tissue processing protocols; Busan Korea



Tagging

Conventional Tagging

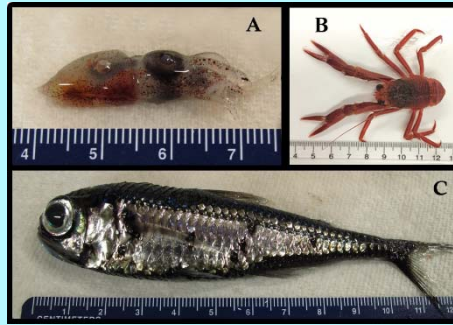
- North Pacific Albacore
 - 2001-2015 (4-150 annually)
 - Summer-fall 2018 (~70 tags)
- Pacific Bluefin Tuna
 - Golden opportunity in 2019
- Opah
 - PAT tagging: 13 tags deployed (2011-2014) and being analyzed



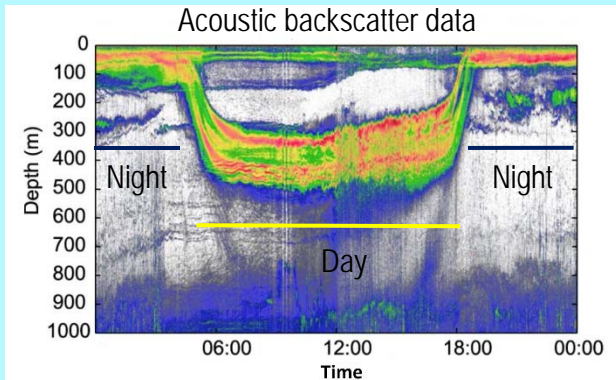
©Stanford University/Gaelin Rosenwald

The Deep Scattering Layer (DSL): Its what's for dinner!

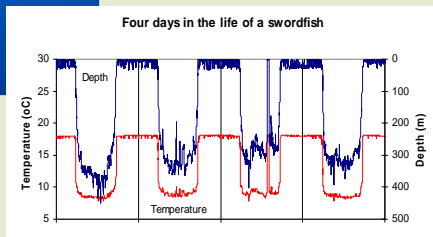
The DSL is composed organisms including fish, squid and crustaceans that typically migrate between surface waters at night and deep waters during the day.



Micronekton of the DSL



Depth (blue) and temperature data (red) for a swordfish.



The organisms in the DSL are an important food source for a broad range of predators which are both ecologically and commercially important including sharks, swordfish, albacore, bluefin tuna and marine mammals.

(Left: swordfish foraging in the DSL during the day)

- Despite its importance, we know relatively little about the DSL in the California Current (CC) and what conditions are required for foraging (i.e. density and composition).
- Using a combination of acoustic data, environmental data and information on predator distributions scientists at the SWFSC will examine:
 - 1) patterns in the relative abundance of fish, squid and crustaceans in the CC
 - 2) how these patterns are linked to 3-D environmental parameters
 - 3) how patterns are related the abundance and distribution of key predators

HMS Stock Assessments - ISC

2017-2018

- Pacific Bluefin Tuna – Update Assessment – no change in status ---- series of increased catch projections
- W-CPO Swordfish stock – Benchmark Assessment – not overfished; not experiencing overfishing
- Shortfin Mako Shark – Benchmark Assessment – not overfished; not experiencing overfishing

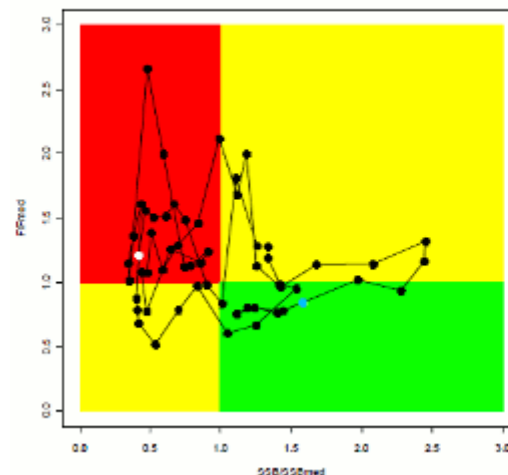
2018-2019

- North Pacific striped marlin

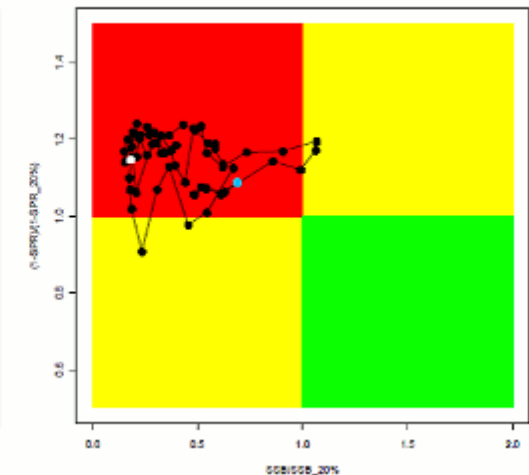
2019-2020

- Pacific bluefin tuna
- North Pacific albacore tuna
- Pacific blue marlin (?)

A.



B.



Conservation Information


- ISC Tasks:
 - NP Swordfish
 - More tagging & genetic data preferable but \$\$\$\$
 - U.S. West Coast share of catch unlikely to be a major factor in overall status of the EPO stock
 - Management Strategy Evaluations (MSE)
 - North Pacific albacore tuna MSE Workshop – March 5-7, 2019 – Yokohama Japan
 - Pacific Bluefin Tuna – Spring 2019 Workshop – USA or Japan (**preference please**)
 - PBF Catch Projections
 - Additional projections requested to determine if the catch of PBF in 2020 may be increased

Conservation Information

PBF Catch Projections for Testing (pending approval)

West Pacific		East Pacific
Small fish	Large fish	
0	600t	400t
5%	1300t	700t
10%	1300t	700t
5%	1000t	500t
0	1650t	660t
5%		5%
10%		10%
15%		15%

Workshops-Meetings

- North Pacific Marine Science Organization (PICES) 2018 Annual Meeting – Oct. 25 - Nov. 4, 2018, Yokohama Japan
 - Topic Session 12 - Applying ecosystem considerations in science advice for managing highly migratory species
- Center for the Advancement of Population Assessment Methodology (CAPAM) - 2018 Lasker Award 
 - Spatial Stock Assessment Models – Oct. 1-5, 2018, SWFSC
- Integrating CPS Research – NSF Project, COCOA, Univ. WA
 - Building a Climate Resilient CPS Fishery – Oct. 9, 2018, SWFSC

Outreach

- SWFSC 2017 Billfish Newsletter - *New and Improved*
(<https://swfsc.noaa.gov/BillfishTagging/>)
 - 1963-Present
 - Recent science & tagging results
 - Angler photos
- Tuna Species of the U.S. West Coast – An Identification Guide – *Hot Off the Press*
 - Pacific Ocean management overview
 - Species-specific biology and ecology

Thank You

Questions?



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