Central Stock Northern Anchovy

- **CSNA "actively managed" status**
  - Along with krill, CSNA is the most important forage in the ecosystem for salmon, groundfish, seabirds, marine mammals
  - "Monitored" status has not protected against "overfishing" as defined by MS Act
- **CSNA not data-poor**
  - Biomass estimates & timeseries
  - Length frequency timeseries

Time series of spawning biomass

Method	Year	Region	Spawning biomass in mt (cv)
DEPM (SWFSC)	**1981**	**San Francisco – Baja**	**635,000 (0.22)**
DEPM (SWFSC)	1982	San Francisco, CA - Baja California, Mex	378,000 (0.26)
DEPM (SWFSC)	1983	Moro Bay, CA - Baja California, Mex	652,000 (0.21)
DEPM (SWFSC)	1984	San Fransico, CA - Baja California, Mex	306,000 (0.17)
CalCOFI-Eggs & Larvae (Fissel et al. 2011) **(no area weighting)**	2009	Avila Beach. CA - **San Diego, CA**	159,370 (-)
CalCOFI-Eggs & Larvae (tesselated) (McCall et al. 2016 **,17, 18**	**1951-2017**	**Pt Reyes, CA – Baja CA, Mex**	**2017: 1,169,000 (0.36)**
DEPM (SWFSC)	2017	San Francisco, CA - San Diego, CA	308,173 (0.36)
ATM (SWFSC)	**2015-2016**	**Bodega Bay, CA – San Diego, CA**	

Total biomass (recruitment + age 1+) but SSB can be separated using length frequency

CSNA spawning biomass timeseries

Long-term SSB ranges from <100 K to ~2M mt

CSNA length frequencies

Survey	Season	Year	Region
NMFS RREAS	spring	1998-2018	central CA
NMFS RREAS	spring	2004-2018	southern to central CA
Predator Diet	summer	1990-2018	central CA
Predator Diet	summer	1981-2018	southern CA
NMFS ATM	summer	2015-2016, 2018	southern to central CA
NMFS ATM	summer	2017	central CA

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- **CSNA not data-poor**
  - Biomass estimates & timeseries
  - Length frequency timeseries
  - Timeseries of estimated spawning area
  - Alternative Ricker model
  - CalCOFI-based anchovy stock-stock model suitable for data-limited stock assessment & management
  - Driving factors of anchovy population dynamics – bottom-up, top-down and guild-interactors (machine learning model – Dedman et al. *submitted*)