

DRAFT ---- NOAA HABHRCA (HAB and Hypoxia) Expenditures (in Millions) FY 2010 – FY 2019 ---- DRAFT

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018 Est+	FY2019 Pres Bud++
PPA: Coastal Science Assessment, Response, and Restoration										
Intramural Research and Assessment Activities*	4.60	5.00	4.40	3.40	4.00	4.04	3.92	3.35	3.80	3.80
Operational HAB Forecasting	0.57	0.57	0.40	0.30	0.40	0.40	0.40	0.40	0.40	0.40
NCCOS intramural total	5.17	5.57	4.80	3.70	4.40	4.44	4.32	3.75	4.20	4.20
PPA: Competitive Research										
Ecology and Oceanography of Harmful Algal Blooms (ECO HAB)	4.60	3.90	1.90	1.50	2.20	2.90	1.06	2.27	5.68	0.00
Monitoring and Event Response for Harmful Algal Blooms (MERHAB)	0.60	1.40	0.80	0.98	1.30	1.30	0.93	1.37	0.65	0.00
Prevention, Control and Mitigation of Harmful Algal Blooms (PCM HAB)	1.00	1.00	1.20	0.55	0.90	0.68	1.21	0.97	0.18	0.00
Event Response	0.02	0.06	0.02	0.04	0.03	0.03	0.02	0.03	0.03	0.00
Gulf of Mexico Ecosystems & Hypoxia Assessment (NGOMEX)	2.40	2.20	1.40	1.20	0.60	0.12	0.95	0.81	0.55	0.00
Coastal Hypoxia Research Program (CHRP)	1.30	1.00	0.57	0.70	0.70	0.00	0.91	0.44	1.56	0.00
Infrastructure (support for the HAB and hypoxia National Offices)	0.05	0.20	0.17	0.19	0.25	0.22	0.21	0.23	0.42	0.00
NCCOS extramural total	9.97	9.76	6.06	5.16	5.98	5.25	5.29	6.12	9.07	0.00
COASTAL SCIENCE & ASSESSMENT + COMPETITIVE RESEARCH (NCCOS) TOTAL	15.14	15.33	10.86	8.86	10.38	9.69	9.61	9.87	13.27	4.20
Other NOAA (external to Coastal Science & Assessment Sub-program)										
Other intramural**	3.70	1.60	0.70	1.40	3.60	1.59	1.45	1.76	2.24	2.24
Ship Costs (Office of Marine and Aviation Operations – OMAO)	1.30	1.60	0.50	0.57	0.40	0.10	0.02	0.00	0.00	0.00
Sea Grant (competitive)** \$						1.08	1.78	1.81	1.80	0.00
IOOS (competitive)**						2.30	1.73	0.57	0.68	0.34
OTHER NOAA TOTAL	5.00	3.20	1.20	1.97	4.00	5.07	4.97	4.13	4.72	2.58
NOAA Intramural Total						6.13	5.79	5.51	6.44	6.44
NOAA Competitive Total						8.63	8.79	8.49	11.55	0.34
NOAA TOTAL	20.14	18.53	12.06	10.83	14.38	14.76	14.58	14.00	17.99	6.78

+ FY18 enacted numbers are estimates. Competitive awards are pre-decisional.

++ Assumes intramural spending is the same as FY18. NCCOS and Sea Grant Competitive lines are zero, and IOOS drops 30%.

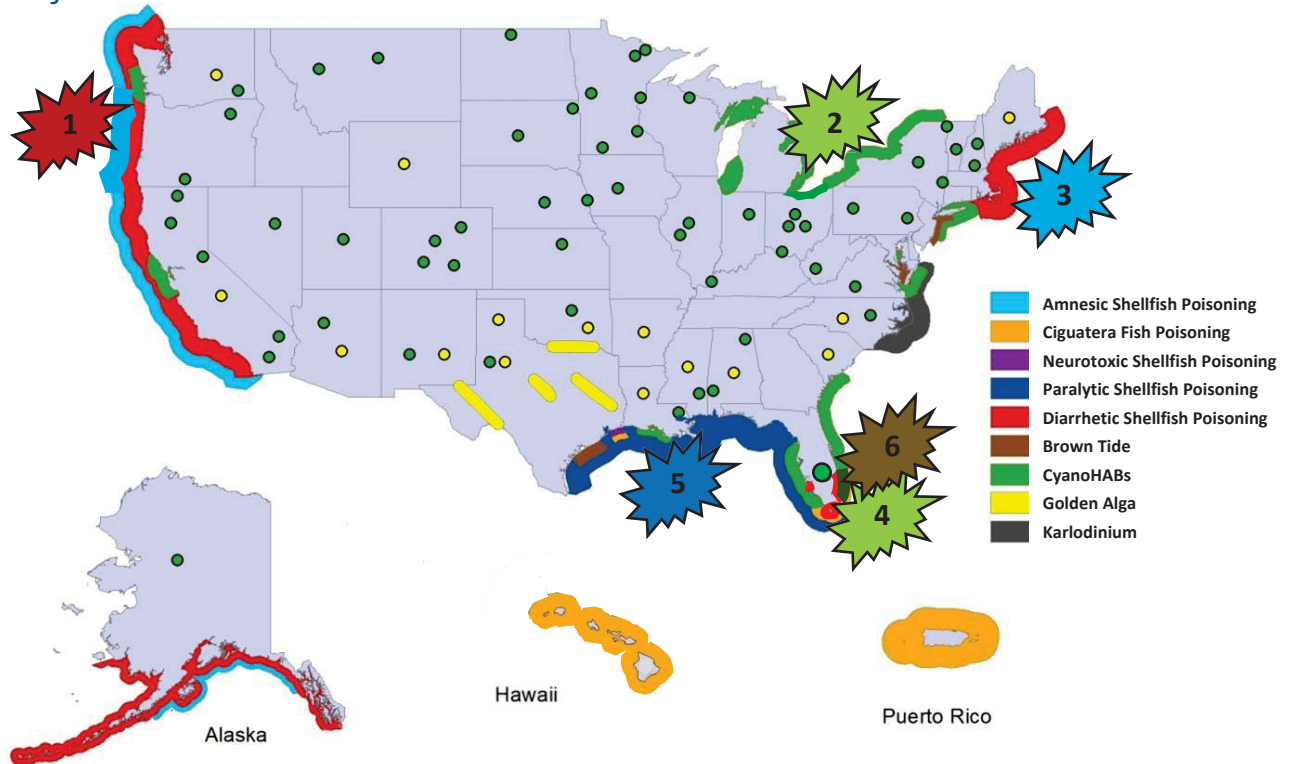
* Includes FTE labor and discretionary funds supporting HABHRCA. Does not include facilities (e.g. rent, utilities, safety etc.).

** Prior years reported 'other NOAA', as a single number that included intramural and competitive research funded outside the two NCCOS PPAs. In FY15 we broke out the intramural vs competitive funds in the 'other NOAA' category to increase transparency.

\$ Sea Grant requires matching funds from its programs. The matching funds are not included in this table.

Harmful Algal Blooms

Major U.S. HAB Events since 2014 HABHRCA Reauthorization



1. West Coast: The 2015 *Pseudo-nitzschia* bloom was the largest, most toxic, and longest lasting in the past 15 years. Record-setting concentrations of domoic acid (DA), the potent neurotoxin produced by the bloom, caused marine mammal deaths and shut down crab, bivalve, and other fisheries in California, Washington, and Oregon. Initial estimates of lost revenue approach \$75 M.

2. Great Lakes: The 2015 HAB in Western Lake Erie was the most severe this century. The severity index, which captures the amount of biomass in the bloom, was 10.5 for 2015, as compared to 10 for the 2011 bloom that shut down Toledo's drinking water. While 2016 was a mild year, 2017 was the third worst on record, with an unprecedented fall bloom appearing in the Maumee.

3. New England: In 2016, New England experienced the first-ever shellfish harvesting closures from Maine to Rhode Island due to blooms of the DA-producing diatom, similar to the 2015 West coast bloom. Because of the suddenness of the event, recalls of toxic shellfish from interstate commerce were required. In winter 2017/18, an unexpected late-season bloom in Maine coastal waters again required recalls of toxic shellfish.

4. Florida Lakes: Gov. Scott declared a State of Emergency in 2016 after a massive toxic cyanobacterial bloom on Lake Okeechobee was transported to coastal regions on the east coast of FL, impacting local recreation and tourism.

5. Gulf of Mexico: Red tide blooms (*Karenia brevis*) occur almost annually along southwest Florida. In 2016 the bloom spread across the entire US Gulf coast, resulting in intense respiratory irritation, fish kills, and shellfish harvesting closures. Blooms also occurred in 2017 and 2018.

6. Indian River Lagoon: In 2011 a super bloom of a green alga wiped out sea grasses and set the stage for a series of brown tides (2012, 2013, 2016) which have impacted fisheries and recreation. Early data indicate 2018 may be another severe brown tide bloom.