

**SUMMARY REPORT**  
**CeNCOOS Science Impact, Governing Council, and 20-Year Meeting – Winter 2024**  
**Fort Mason Firehouse**  
**10-11 December, 2024**

**Executive Summary**

The Central and Northern California Ocean Observing System (CeNCOOS) Science Impact, Governing Council, and 20-Year Meeting was hosted by CeNCOOS with support from Synchro. The event took place from December 10–11, 2024, at the Fort Mason Firehouse in San Francisco, California. The meeting aimed to commemorate the successes of the last five years and to collectively take stock of the remaining challenges and opportunities for advancement. Approximately 50 participants from the CeNCOOS community attended the meeting, including members from the Governing & Executive Council, observing system representatives, and a diverse array of community partners. Participants represented a blend of federal & state agencies, environmental non-profits, academic research institutions, and maritime industries (e.g. fisheries and shellfisheries). Taken together, this wide array of backgrounds and expertises resulted in rich and expansive dialogue about past successes, current challenges, and strategic directions for the program.

The meeting included presentations and breakout group discussions, fostering meaningful collaboration and conversation. Speakers highlighted the current status of their work, shared their successes, and reflected on key remaining challenges and opportunities. The goals of this meeting were to: i) convene members of the CeNCOOS community to update, share, and commemorate; ii) review progress achieved through recent investments and five-year award implementation; iii) communicate and discuss delivery of existing coastal resilience efforts; iv) identify remaining gaps and highest-priority opportunities; v) explore existing and emerging partnerships as opportunities to address remaining needs; and vi) assess unmet priorities for five-year strategic planning.

**Key Takeaways**

**1. Overall Progress and Success:**

- CeNCOOS has demonstrated substantial progress across its strategic pillars: engagement, observation systems, data management, and modeling.
- There is a positive net impact, with standout achievements in data quality and modeling.

**2. Strengths:**

- CeNCOOS is a trusted source of high-quality ocean and coastal data.
- CeNCOOS has successfully integrated inflation reduction act (IRA) /Bipartisan Infrastructure Law (BIL) funding into system upgrades (e.g., shore stations, gliders, high frequency radars).
- CeNCOOS leads regionally and nationally for instituting end-to-end data stewardship practices, including expanded data sources and geographic coverage.
- Operational models that demonstrate the value of observations and complement broader systems.

**3. Weaknesses:**

- Limited accessibility and interpretability of technical products for non-experts.
- Inadequate documentation of individual-level engagement and use cases.
- Geographic and capacity gaps in observation systems.



#### **4. Threats:**

- Sustainability challenges arising from peaks, and potential onward lows, in resources made possible by likely one-off investments in funding.
- Potential erosion of credibility through poorly vetted or misunderstood products.
- Balancing the benefits of a diversified funding portfolio with the added complexity and risk of taking on additional projects.
- Trade-offs in resource allocation, risking service gaps or inefficiencies.

### **Key Recommendations**

#### **1. Protect Core Systems:**

- Identify, recapitalize, and expand core observing assets to more consistently measure physical, biochemical, and biological variables across the entire domain (headwaters to Exclusive Economic Zone).
- Prioritize reinforcing IRA/BIL-funded initiatives, emphasizing long-term data value, community engagement, and reliability.

#### **2. Address Gaps in Observations:**

- Develop strategies for enhanced geographic and cross-shelf coverage, such as deploying high frequency radars in northern regions and expanding nearshore real-time moorings.
- Strengthen coastwide collaboration with Southern California Coastal Ocean Observing System (SCCOOS) and Northwest Association of Networked Ocean Observing Systems (NANOOS).

#### **3. Improve Accessibility and Engagement:**

- Enhance documentation, outreach, and tutorials to bridge the gap between technical products and user needs.
- Close the development-feedback loop by involving key players in product evolution.
- Strengthen engagement with community members, tribes, and other interested parties.

#### **4. Sustain Progress in Emerging Data Streams:**

- Invest in maturing technologies like eDNA, biodiversity, and HABs without risking core system integrity.

#### **5. Prepare for Future Challenges:**

- Position CeNCOOS to proactively address evolving Blue Economy issues, such as fisheries management.
- Ensure readiness for data integration and support systems aligned with its role and capacity.

### **Strategic Questions to Consider**

- What should be expanded, improved, or sustained to maximize effectiveness?
- How can CeNCOOS anticipate future needs while maintaining robustness and reliability?
- What are our collective strategic goals?
- What is missing?

## Session Overviews

### Day 1

#### Session 1: Pan-Regional & National Drivers of Regional Observing Systems

##### Overview:

Ocean observing systems are vital for monitoring and understanding how to help society be resilient to change, providing critical data to track and share information on sea-level rise, ocean acidification, and marine heatwaves while improving predictions of weather patterns and climate variability. They play a key role in disaster preparedness by enabling early detection and warning of events that can have major economic and societal impacts such as tsunamis, hurricanes, and harmful algal blooms (HAB), reducing risks to coastal communities. Additionally, these systems directly support marine ecosystem health by monitoring biodiversity, water quality, and critical habitats, aiding in the sustainable management and conservation of ocean resources. Economically, they enhance maritime safety and efficiency, support industries like fisheries and energy, and provide actionable insights that drive sustainable development of the blue economy and protect livelihoods. The following panelists discussed the applicability and importance of CeNCOOS to their respective workstreams, projects, and initiatives.

##### Panelists:

- **Henry Ruhl**, CeNCOOS | [hruh1@mbari.org](mailto:hruh1@mbari.org) & **Clarissa Anderson**, SCCOOS | [cra002@ucsd.edu](mailto:cra002@ucsd.edu) – California Ocean Observing Systems ([slides](#))
- **Kristen Yarensik**, Integrated Ocean Observing System | [kristen@ioosassociation.org](mailto:kristen@ioosassociation.org) – US Integrated Ocean Observing System (IOOS) and IOOS Association ([slides](#))
- **John Hansen**, West Coast Ocean Alliance | [john@westcoastcooceanalliance.org](mailto:john@westcoastcooceanalliance.org) – Regional Update ([slides](#))
- **Danielle Lipski**, Greater Farallones National Marine Sanctuary/Cordell Bank National Marine Sanctuary | [danielle.lipski@noaa.gov](mailto:danielle.lipski@noaa.gov) – National Marine Sanctuaries ([slides](#))
- **Justine Kimball**, Ocean Protection Council | [Justine.Kimball@resources.ca.gov](mailto:Justine.Kimball@resources.ca.gov) – CeNCOOS Science Impact Meeting ([slides](#))
- **David Senn**, San Francisco Estuary Institute | [davids@sfei.org](mailto:davids@sfei.org) – Eutrophication and HAB Research in SF Bay ([slides](#))

#### Session 2: State & Evolution of the Observing System

##### Overview:

To enhance coastal resilience in recent years, CeNCOOS has focused on revitalizing infrastructure like high-frequency radars, gliders, and sensors, alongside improving environmental monitoring through real-time HAB data, eDNA sampling, and acoustic marine life tracking. CeNCOOS is implementing advanced monitoring systems, data management, and biogeochemical observation, in addition to expanding ecosystem modeling and analysis. Moreover, CeNCOOS' strategic goals to streamline access to information through improved data management, educational outreach, and community engagement. The following presentations detail the mechanisms driving these advancements.

##### Panelists:



- **Henry Ruhl**, CeNCOOS | [hruhl@mbari.org](mailto:hruhl@mbari.org) – Coastal Resilience, Infrastructure Investments, and More ([slides](#))
- **Alex Harper**, CeNCOOS | [aharper@mbari.org](mailto:aharper@mbari.org) – Improved Service Delivery, CeNCOOS IRA Planning ([slides](#))

### Session 3: State of the Observing System (Past 5 Years)

#### Overview:

Ocean observing systems pull together information from a wide array of technologies, equipment, and data networks. Taken together, information from these respective systems can be used to describe weather patterns, ocean conditions, and health. CeNCOOS employs a ‘systems approach’ to information handling across the full data ‘life cycle’ that extends from the collection of observations to data management and product development, through to delivery of information to end-users. CeNCOOS coordinates a broad network of collaborators to expand the set of physics, biogeochemistry, biology and ecosystem variable observations collected from a comprehensive set of platforms, sensors and models. The following presentations highlight data observations in each of these subcategories.

#### Panelists:

##### a) *Physics*

- **Chris Edwards**, UC Santa Cruz | [cedwards@ucsc.edu](mailto:cedwards@ucsc.edu) – Modeling ([slides](#))
- **Chad Whelan**, CODAR Ocean Sensors, LLC | [chad@codar.com](mailto:chad@codar.com) – High Frequency Radar ([slides](#))
- **Jack Barth**, Oregon State University | [barth@coas.oregonstate.edu](mailto:barth@coas.oregonstate.edu) & **Dan Rudnik**, Scripps | [drudnick@ucsd.edu](mailto:drudnick@ucsd.edu) – Gliders ([slides](#))

##### b) *Biogeochemistry*

- **Tom Connelly**, Moss Landing Marine Labs | [thomas.p.connolly@sjsu.edu](mailto:thomas.p.connolly@sjsu.edu) – Coastal Observing Network ([slides](#))
- **Raphe Kudela**, UC Santa Cruz | [kudela@ucsc.edu](mailto:kudela@ucsc.edu) – National Harmful Algal Bloom Observation Network ([slides](#))
- **Alex Harper** – Ocean Acidification and Hypoxia ([slides](#))

##### c) *Biology & Ecosystems*

- **Francisco Chavez**, Monterey Bay Aquarium Research Institute | [chfr@mbari.org](mailto:chfr@mbari.org) – Marine Life & Marine Biodiversity Observation Network ([slides](#))

##### d) *Information delivery*

- **Rob Bochenek**, Axiom Data Science | [rob@axiomdatascience.com](mailto:rob@axiomdatascience.com) – Data Management and Communication Subsystem Update ([slides](#))

### Session 4: Information Delivery for Climate Resilience & Ecosystem Change

#### Overview:

Effective environmental management and policy must be rooted in science-based, credible data. However, for such data to influence policy meaningfully, regulatory bodies must not only receive it but also possess the tools to interpret and apply it effectively. As a U.S. government-accredited source of data, CeNCOOS holds a unique position in bridging the divide between complex ecological observations and actionable management strategies. The following panelists described how CeNCOOS supports management across various domains, showcasing its vital role in translating robust scientific insights into impactful environmental decision-making.



### Panelists:

- **Andrew Liesing**, Southwest Fisheries Science Center | [andrew.liesing@noaa.gov](mailto:andrew.liesing@noaa.gov) – From Observations to Management ([slides](#))
- **Andrew DeVogelaere**, Monterey Bay National Marine Sanctuary | [andrew.devogelaere@noaa.gov](mailto:andrew.devogelaere@noaa.gov) – Sanctuaries ([slides](#))
- **Susan Zaleski**, Bureau of Ocean Energy Management | [susan.zaleski@boem.gov](mailto:susan.zaleski@boem.gov) – Offshore Wind ([slides](#))
- **Gary Fleener**, Hog Island Oyster Co. | [gary@hogislandoysters.com](mailto:gary@hogislandoysters.com) – Shellfish ([slides](#))
- **Liz Whiteman**, Ocean Science Trust | [liz.whiteman@oceansciencetrust.org](mailto:liz.whiteman@oceansciencetrust.org) – Managers ([slides](#))

### Day 2

### Overview:

As CeNCOOS approaches the conclusion of its five-year core funding cycle (2020–2025), it is essential to assess current program-wide strategies to: i) evaluate progress in meeting designated priorities, and ii) identify key areas to focus on in the next funding cycle (2026–2031). The current strategies include:

- **Strategy 1:** Engage marine stakeholders in the development of integrated information products that support decision-making.
- **Strategy 2:** Monitor coastal and ocean physical, biogeochemical, biological, and ecosystem variables to address regional stakeholder needs.
- **Strategy 3:** Streamline access to information, including through a publicly accessible Data Portal.
- **Strategy 4:** Provide access to advanced ocean models and other tools to scale individual observations and make data more relevant for policy and management.

Also critical to future planning and prioritization is understanding how CeNCOOS is positioned as a leader, both from a regional and national perspective. Understanding these key elements is critical for identifying strengths, challenges and gaps of the program, which subsequently inform the framing and prioritization of activities for the next five years of the program. The following presentations elucidate progress, challenges, and recommendations that should be considered for the upcoming five year core funding cycle.

### Panelists:

- **Henry Ruhl**, CeNCOOS | [hruhl@mbari.org](mailto:hruhl@mbari.org) – CeNCOOS Strategy (2020-2025), Metrics, and Drivers ([slides](#))
- **Kristen Yarensik**, IOOS | [kristen@ioosassociation.org](mailto:kristen@ioosassociation.org) – National Landscape and CeNCOOS ([slides](#))
- **Eric Bjorkstedt**, National Oceanic and Atmospheric Administration/National Marine Fisheries Service Southwest Fisheries Science Center | [eric.bjorkstedt@noaa.gov](mailto:eric.bjorkstedt@noaa.gov) – Executive Committee Program Review Updates ([slides](#))

### 2025 At-a-Glance

2025 will be an exciting year for CeNCOOS. The team will continue implementing its four strategic pillars across various programs. New resources are being used to support initiatives such as coastal resilience to changing conditions, the California Current Acidification Network (C-CAN), and Ocean



Acidification and Hypoxia monitoring (OAH), as well as to hire new team members. Together, these investments will expand CeNCOOS' reach and capacity. Building on feedback and lessons learned from this meeting, CeNCOOS will develop a strategy refresh for the 2026–2031 core funding cycle, with the proposal to be submitted at the end of 2025.

### Participants

<b>Name</b>	<b>Organization</b>	<b>Governance</b>	<b>Attended?</b>
Alex Harper	CeNCOOS Deputy Director	Program Staff	Y
Alex Parker	CSU Maritime Academy	Governing Council, Principal Investigator	Y
Ali Boutros	CeNCOOS / MBARI	Program Staff	Y
Amy West	MBARI/Synchro	Associate Staff	Y
Andrew DeVogelaere	Monterey Bay National Marine Sanctuary, NOAA	Governing Council	Y
Andrew Leising	NOAA-SWFSC	Partner	Y
Chad Whelan	CODAR Ocean Sensors	Principal Investigator	Y
Chris Edwards	UC Santa Cruz	Principal Investigator	Y
Christina Frieder	SCCWRP	Partner	Y
Clarissa Anderson	SCCOOS	Partner	Y
Cyndi Dawson	CDFW	Partner	Y
Danielle Lipski	NOAA GFNMS/CBNMS	Partner	Y
David Senn	San Francisco Estuary Institute	Partner	Y
Eric Bjorkstedt	NOAA Fisheries SWFSC/ESD and Cal Poly Humboldt	Executive Committee	Y
Francisco Chavez	MBARI/CeNCOOS Executive Committee	Executive Committee	Y
Fred Bahr	CeNCOOS Information Manager	Program Staff	Y
Fred Meitz	World Ocean Council	Partner	Y
Gary Fleener	Hog Island Oyster Co.	Partner	Y
Henry Ruhl	CeNCOOS Director	Staff	Y
Jack Barth	Oregon State University	Principal Investigator	Y
Jaime Jahncke	Point Blue Conservation Science	Governing Council, Principal Investigator	Y
Jason Adelaars	Synchro	Associate Staff	Y
John Hanson	West Coast Ocean Alliance	Partner	Y

John Largier	UC Davis Bodega Marine Lab	Governing Council, Principal Investigator	Y
Julia Cheresh	CeNCOOS / MBARI	Program Staff	Y
Justine Kimball	Ocean Protection Council	Governing Council	Y
Kory Powell-McCoy	U.S. Representative Nancy Pelosi	Partner	Y
Kristen Yarincik	IOOS Association	Partner	Y
Laura Rogers-Bennett	California Department of Fish and Wildlife	Governing Council	Y
Leslie Rosenfeld	Past CeNCOOS Director	Partner	Y
Libe Washburn	SCCOOS	Partner	Y
Liz Whiteman	Ocean Science Trust	Governing Council	Y
Lynn DeWitt	NOAA Fisheries/SWFSC	Governing Council	Y
Maria Murray	U.S. IOOS Office	Partner	Y (virtual)
Marine Lebrec	CeNCOOS/MBARI	Program Staff	Y
Mary Miller	CeNCOOS Executive Committee	Executive Committee, Governing Council	Y
Megan Medina	SCCOOS	Partner	Y
Melinda Meitz	Center for Sea Rise Solutions	Partner	Y
Micah Wengren	NOAA/US IOOS	Partner	Y
Nathalí Cordero Quirós	SCCOOS	Partner	Y
Rob Bochenek	Axiom Data Science	Principal Investigator	Y
Raphe Kudela	UC Santa Cruz / CeNCOOS Executive Committee	Executive Committee, Governing Council, Principal Investigator	Y
Richard (Dick) Ogg	Commercial Fisherman	Partner	Y
Rosa Laucci	Tolowa Dee-ni' Nation	Governing Council	Y
Terry Sawyer	Hog Island Oyster Co.	Partner	Y
Tessa Hill	UC Davis Bodega Marine Lab	Principal Investigator	Y
Tom Connolly	Moss Landing Marine Labs	Principal Investigator	Y
Scott Humphrey	Marine Exchange of the San Francisco Bay Region	Governing Council	Y

*Disclaimer: AI was used to generate certain components of this summary.*