MBON in the Northern California Current:
understanding patterns and drivers of biodiversity and ecosystem function from plankton to seascapes

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NOAA National Oceanic and Atmospheric Administration U.S. Department of Commerce

National Marine Sanctuaries

IOOS Integrated Ocean Observing System

NANOOS

Office of Naval Research Science & Technology ONR

BOEM Bureau of Ocean Energy Management

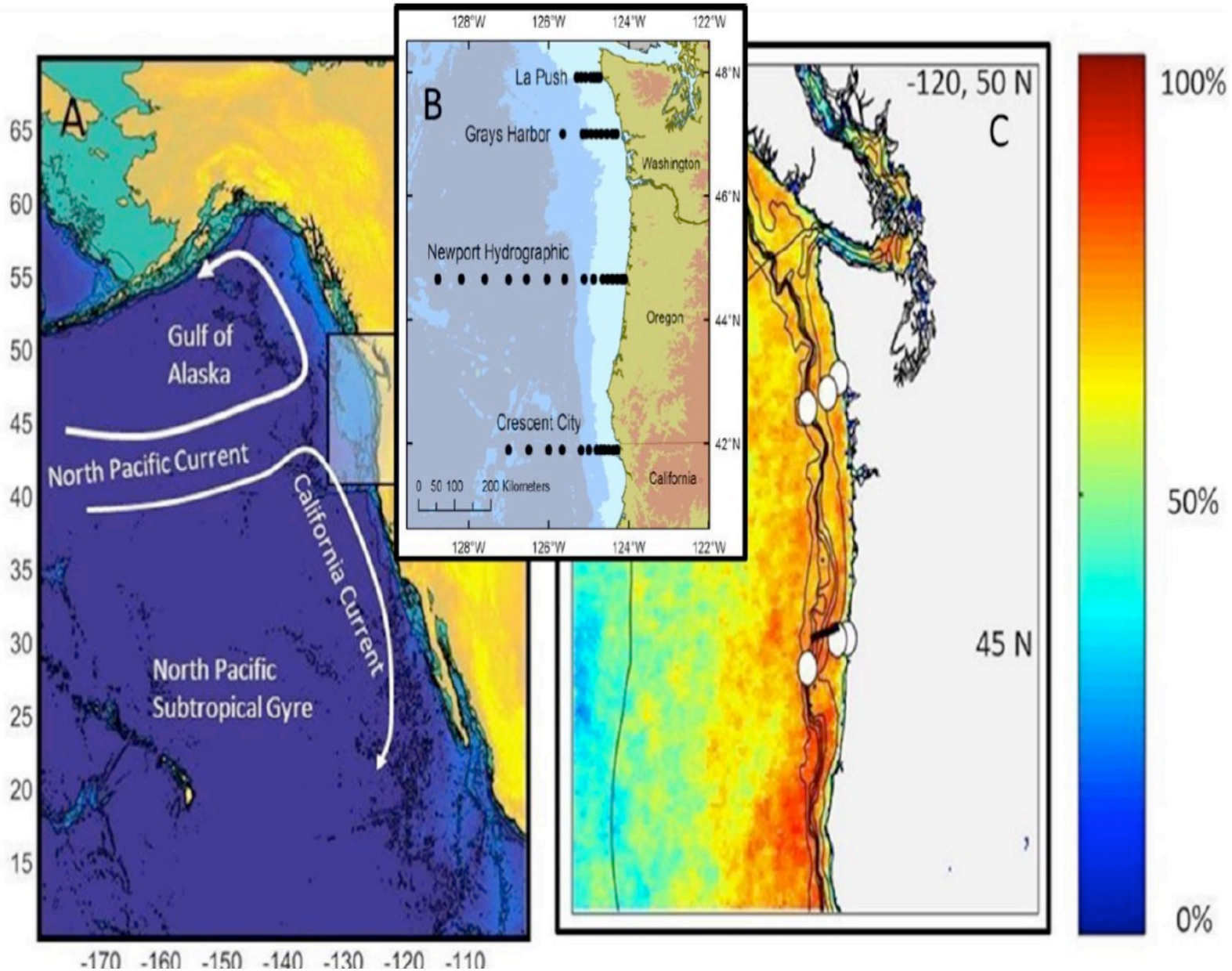
CIMRS

CoastWatch

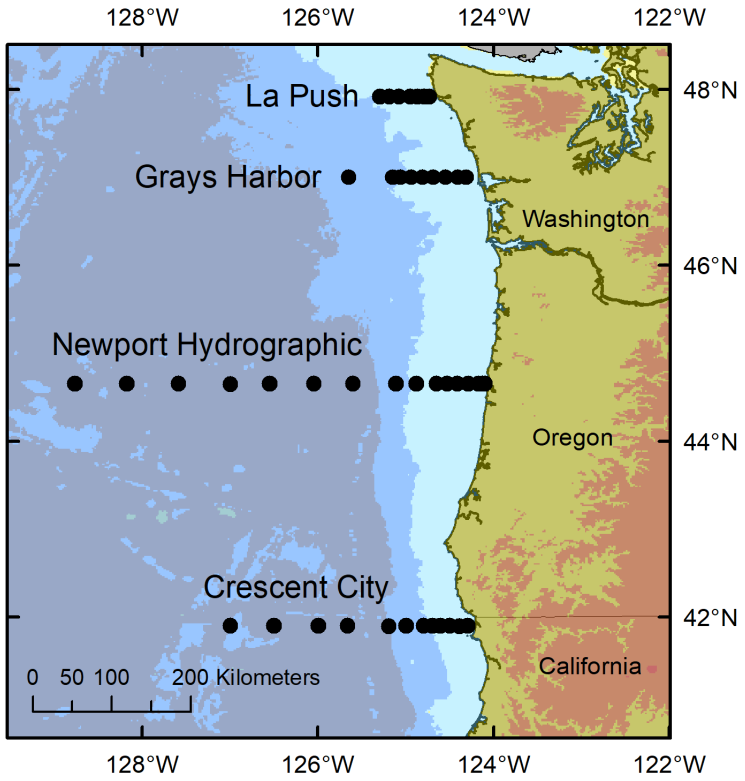
NASA

Establish an MBON node for the Northern California Current

- leverage existing ecological surveys (NOAA NWFSC) integrates data through IOOS, the Ocean Observing Initiative, and National Marine Sanctuaries (OCNMS)
- Advances MBON science through integration of remote sensing and in situ data, new technologies
- provides end to end coverage for the MBON along the US West Coast



1. Build from existing surveys: NOAA Shimada & Newport Hydrographic Lin



NCC Shimada cruises: 2-3 x year

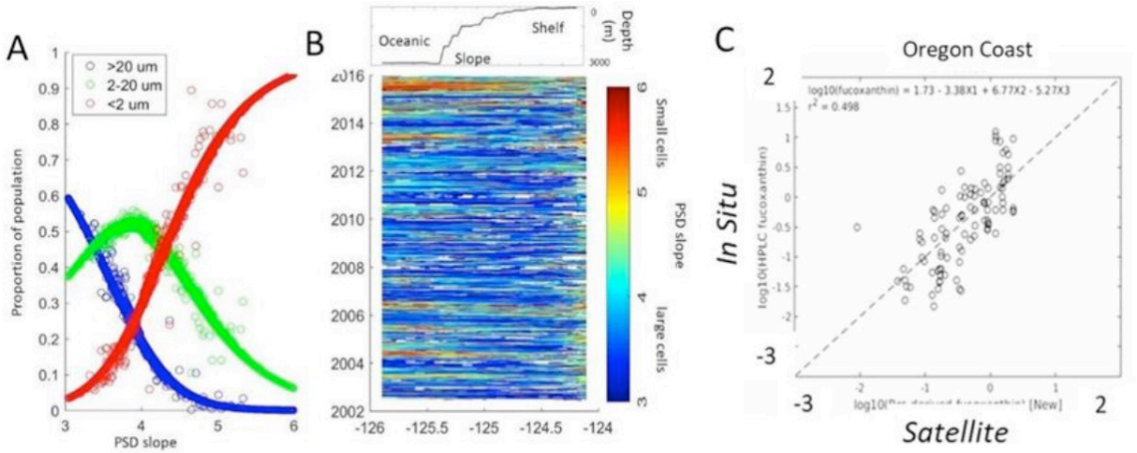
- CTD, chlorophyll, nutrients
- Phytoplankton (HABs), copepods, krill, fish larvae, pteropods (OA), invertebrate larvae (e.g., Dungeness crab)

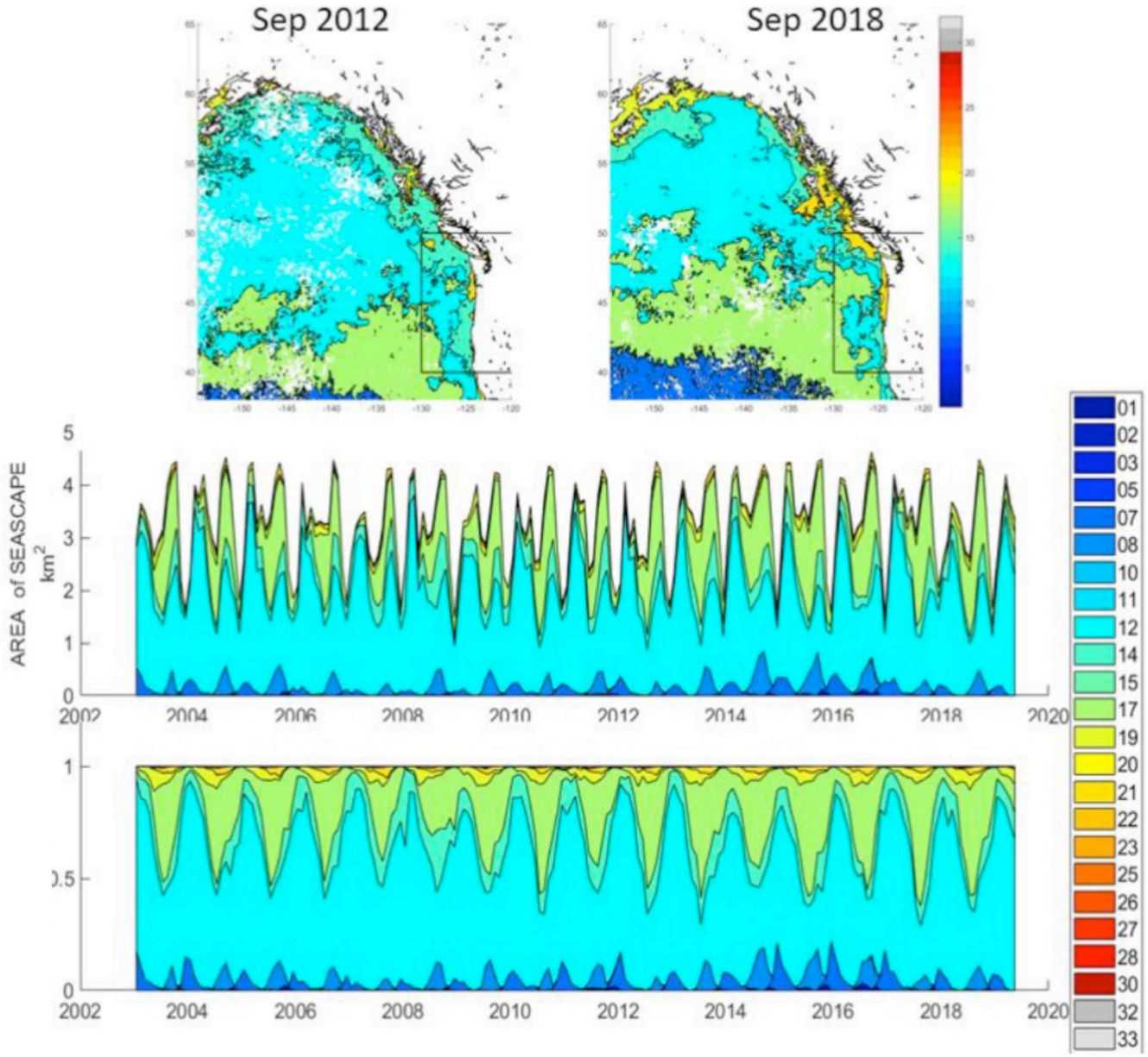
NH Line: biweekly for >22 years

- 1996 - present
- 7 stations (1 – 25 nm)
- Single transect but high frequency (only 10 missing months)

2. Apply MBON remote sensing practices to the NCC: develop meaningful species-habitat relationships and functional diversity indices

Advance multivariate, dynamic seascapes and regionally-tuned satellite plankton functional type algorithms.





3. Increase taxonomic resolution & technological capacity of MBON in situ sampling

Recurring NOAA Shimada Surveys:

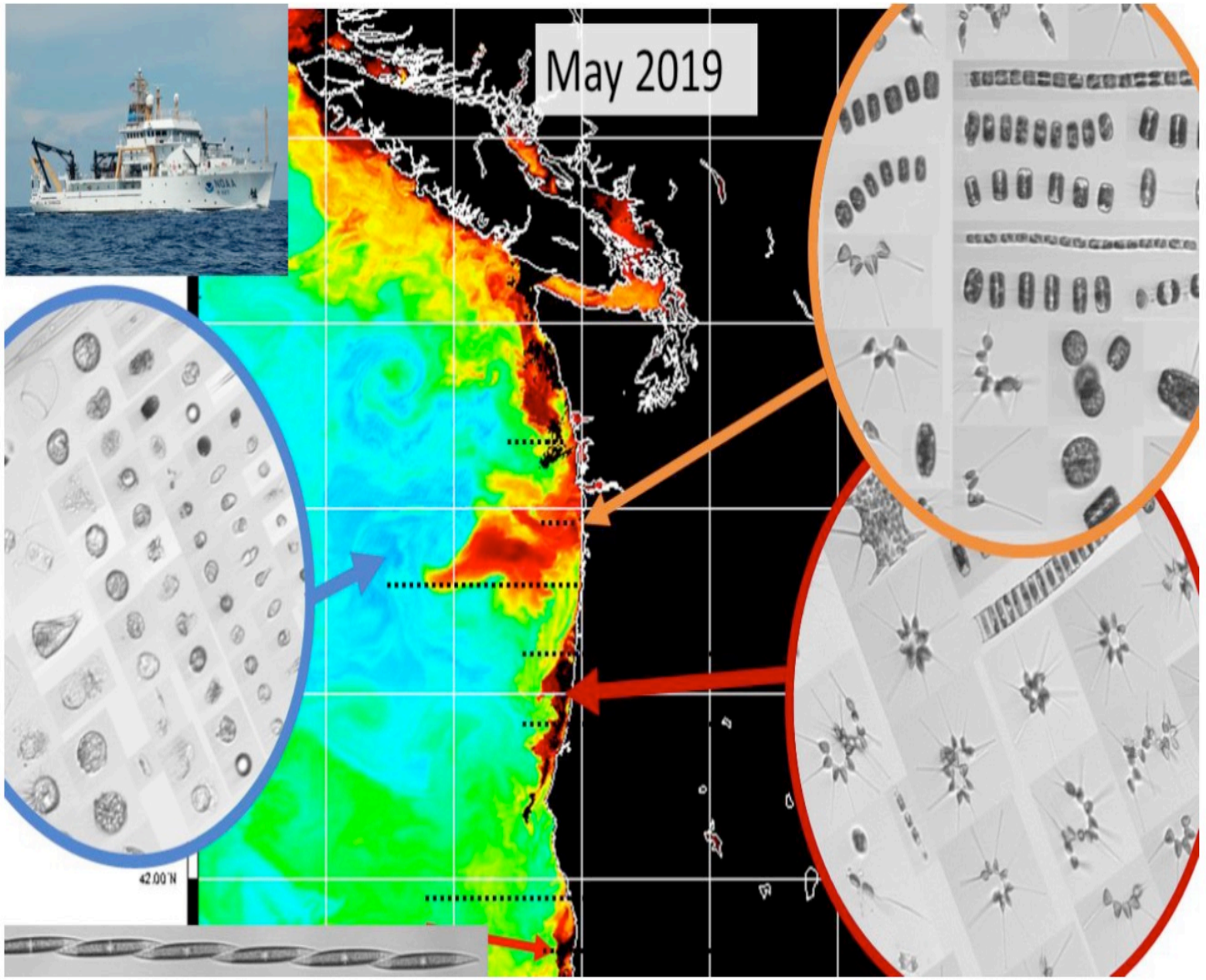
Imaging flow cytometer (Cytobot)

In situ Ichthyoplankton Imaging System (ISIIS),

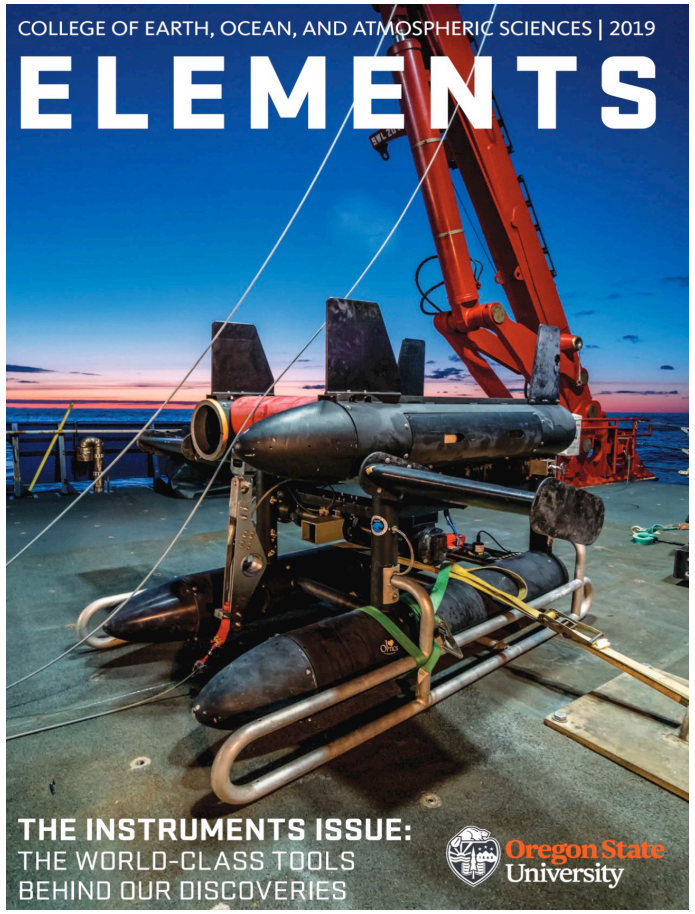
Environmental DNA (NWFSC and Smithsonian)

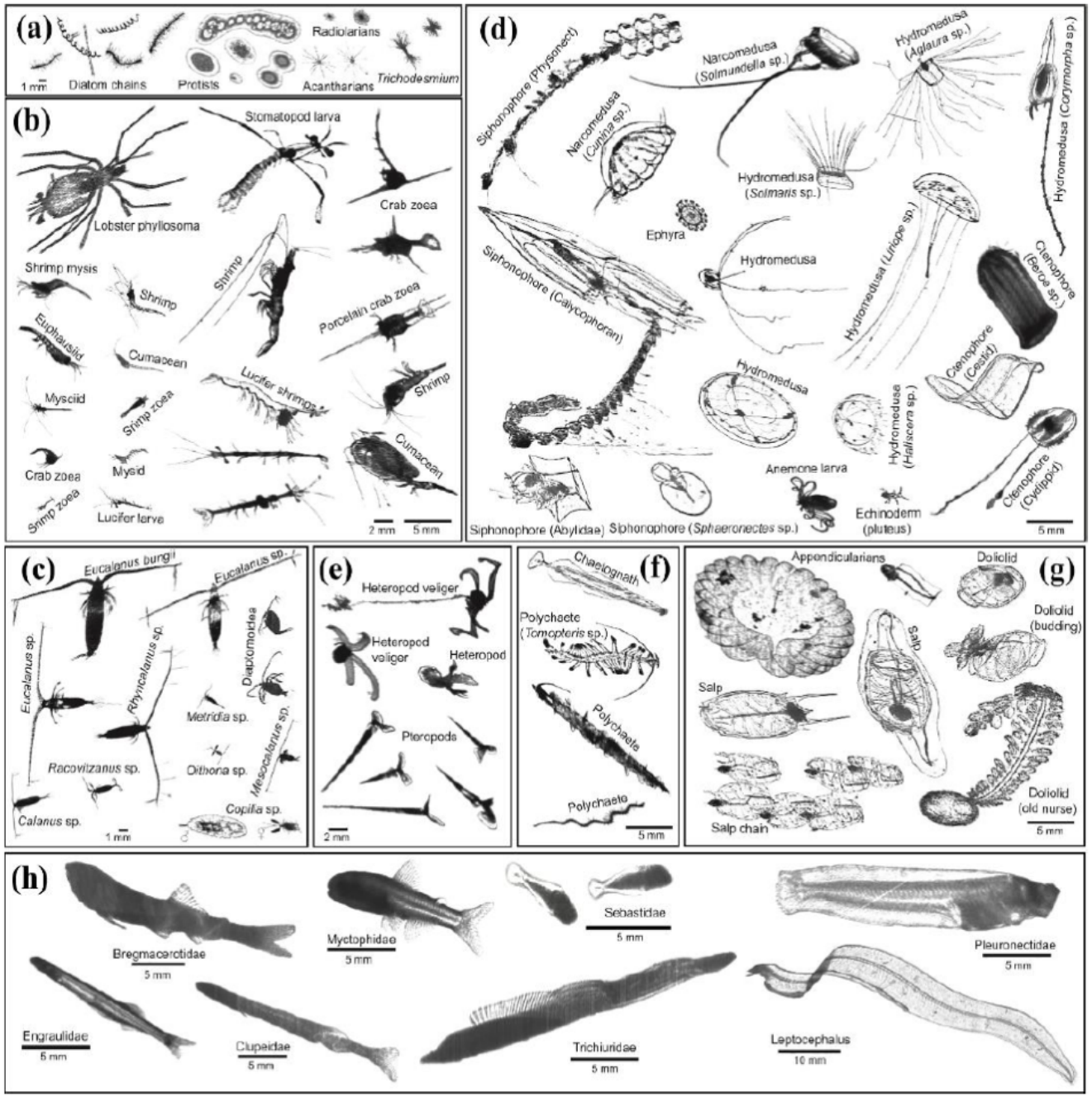
Ecosystem function: net community production

Traditional optics, microscopy, zooplankton, chemistry, and physics



IFCB (< ~200 um)+ISIIS (> 250 um): broad size spectrum and multitrophic level imaging





4.Develop & contribute pipelines/best practices for big ecological data

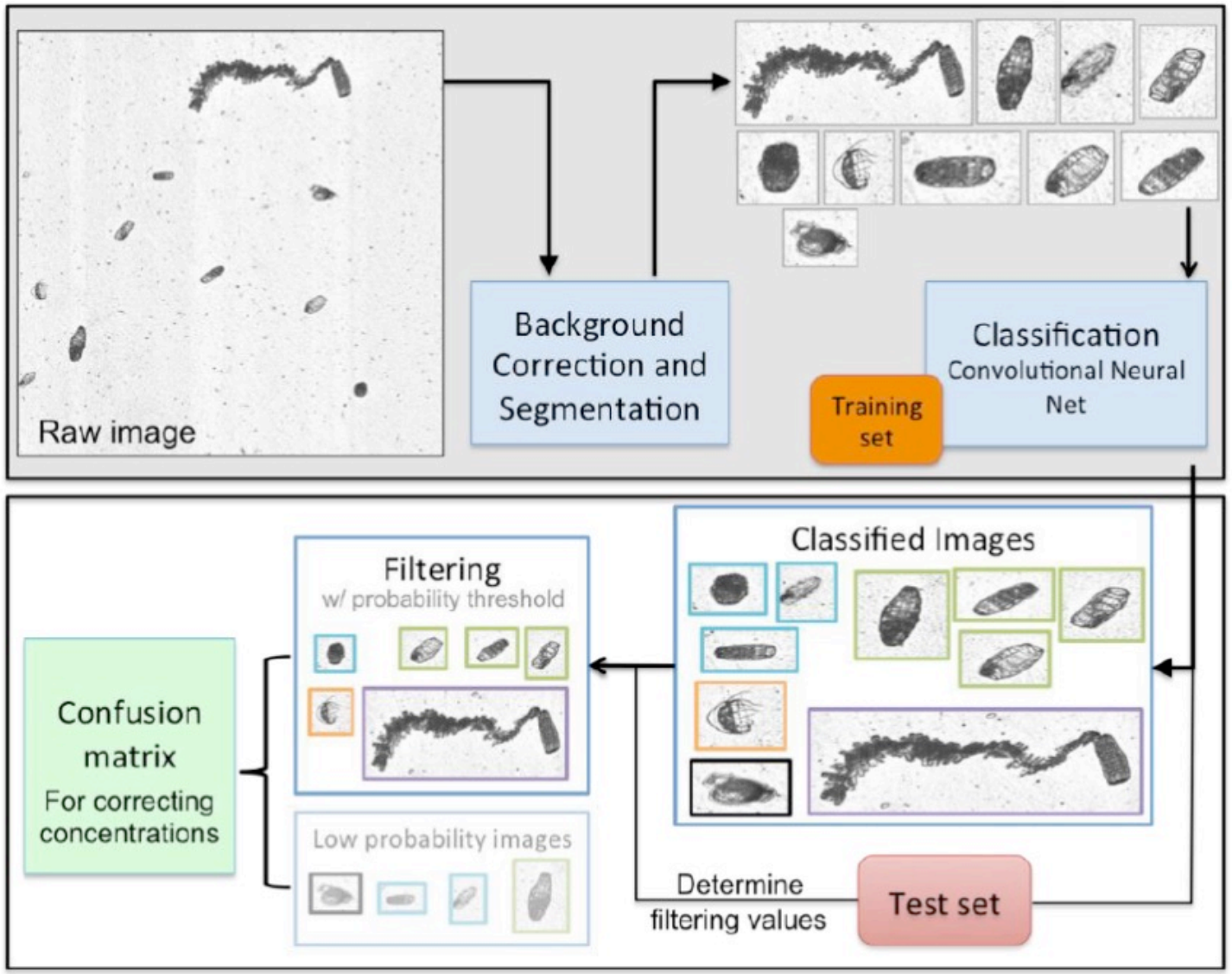
Segmentation & Classification

CNN: ISIIS

Random Forest: IFCB

Raw Storage

Darwin Core Compliant



OBIS
OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM

WOODS HOLE OCEANOGRAPHIC INSTITUTION
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5a. Build on a suite of robust, existing indicators developed through NOAA's NWFSC (https://www.nwfsc.noaa.gov/oceanconditions), to inform CCIEA.

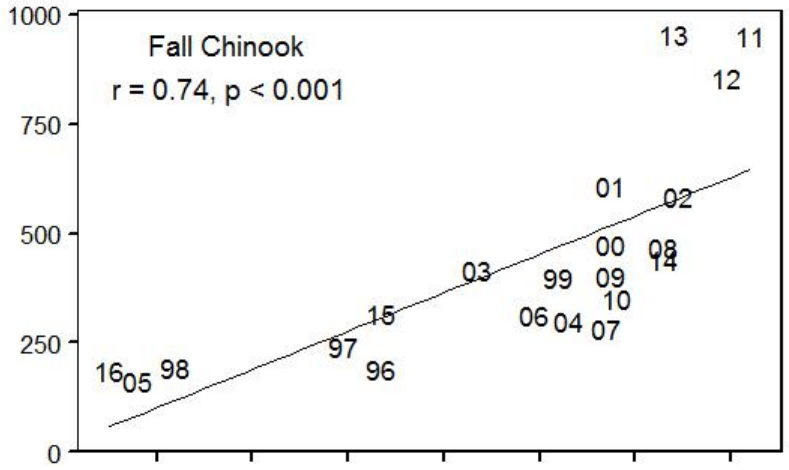


Table SF-01. Ocean ecosystem indicators of the Northern California Current. Colored squares indicate positive (green), neutral (yellow), or negative (red) conditions for salmon entering the ocean each year. In the two columns to the far right, colored dots indicate the outlooks for adult returns based on ocean conditions in 2018 (coho salmon) and 2017 (Chinook salmon).

	Juvenile Migration Year				Adult Return Outlook	
	2015	2016	2017	2018	coho 2019	Chinook 2019
Large– scale ocean and atmospheric indicators						
PDO (May - Sept)	■	■	■	■	●	●
ONI (Jan - Jun)	■	■	■	■	●	●
Local and regional physical indicators						
Sea surface temperature	■	■	■	■	●	●
Deep water temperature	■	■	■	■	●	●
Deep water salinity	■	■	■	■	●	●
Local biological indicators						
Copepod biodiversity	■	■	■	■	●	●
Northern copepod anomalies	■	■	■	■	●	●
Biological spring transition	■	■	■	■	●	●
Winter ichthyoplankton biomass	■	■	■	■	●	●
Winter ichthyoplankton community	■	■	■	■	●	●
Juvenile Chinook salmon catch – June	■	■	■	■	●	●
Juvenile coho salmon catch – June	■	■	■	■	●	●

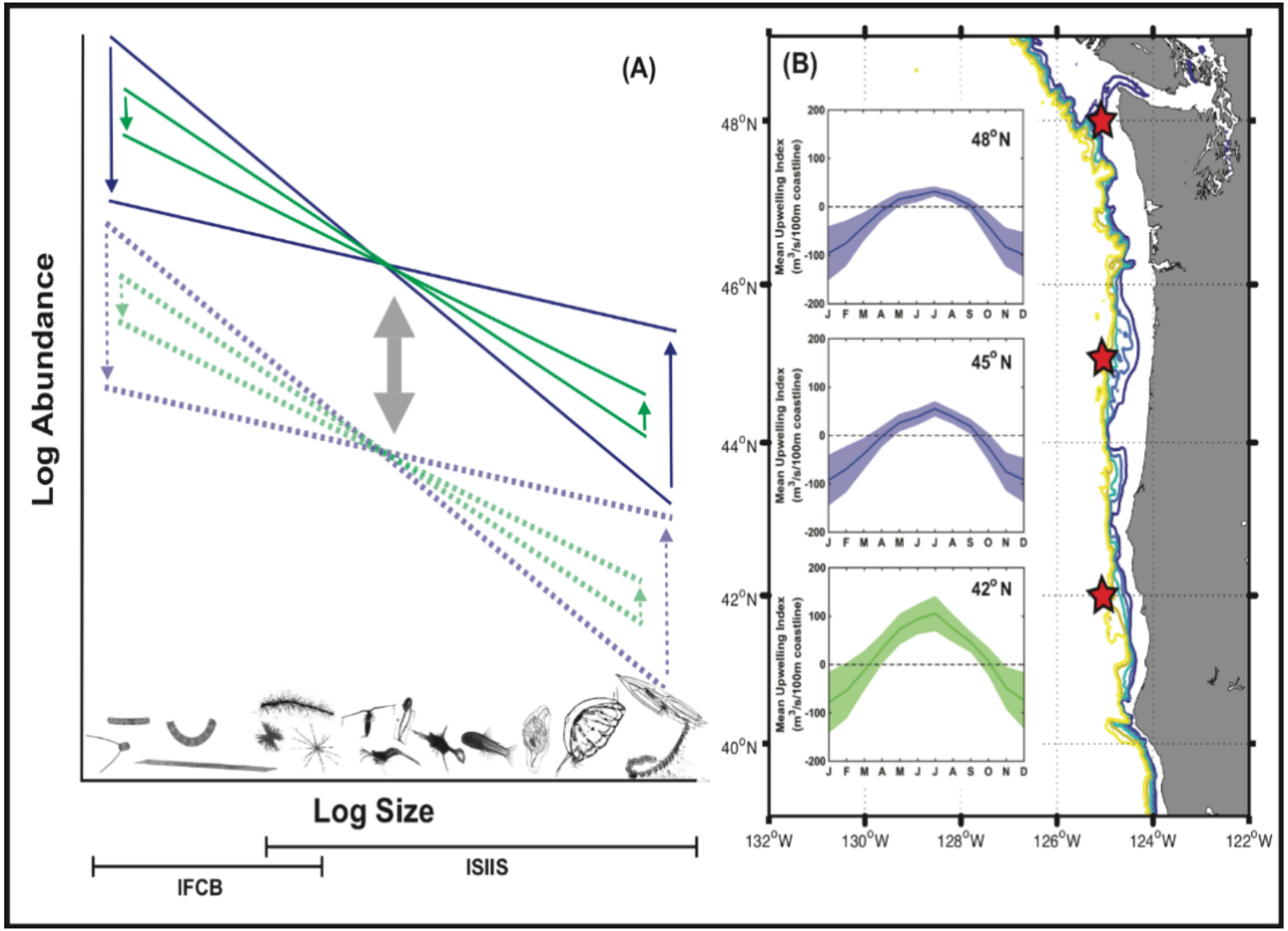
5b. While testing hypotheses on environmental drivers of biodiversity, seascape habitat distributions, ecosystem functioning

Seascape-specific :

Plankton composition

Size distribution

Net community production



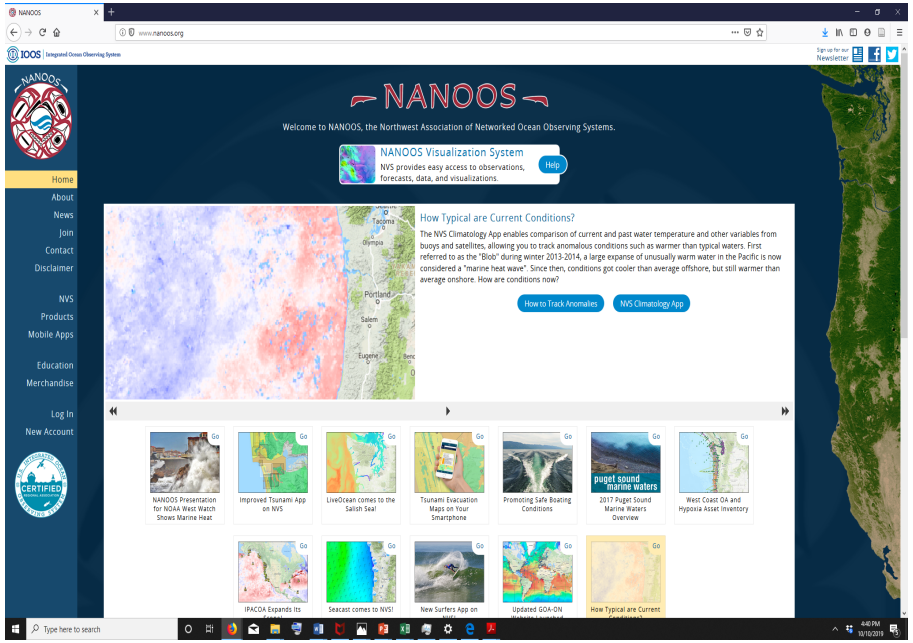
Christian Briseno-Avena & Moritz Schmid

6. Contribute to a community of practice and stakeholder engagement

NANOOS Partnerships

Sanctuary Partnerships: Northwest Indian Fisheries Commission Habitat Framework

EBVs: Ecosystem Structure, Ecosystem Function, Community Composition, Species Traits (e.g. size).



RCRV Taani: RCRV Datapresence partnership

GEO BON
Group on Earth Observations
Biodiversity Observation Network