



GREATER  
FARALLONES  
ASSOCIATION



# LIMPETS

Long-term Monitoring Program and  
Experiential Training for Students



**Rosemary Romero PhD**

GFNMS Advisory Council Meeting

May 22, 2019

# Teach students how science can be used to inform management

## Sandy Beach Monitoring

- Pacific mole crab

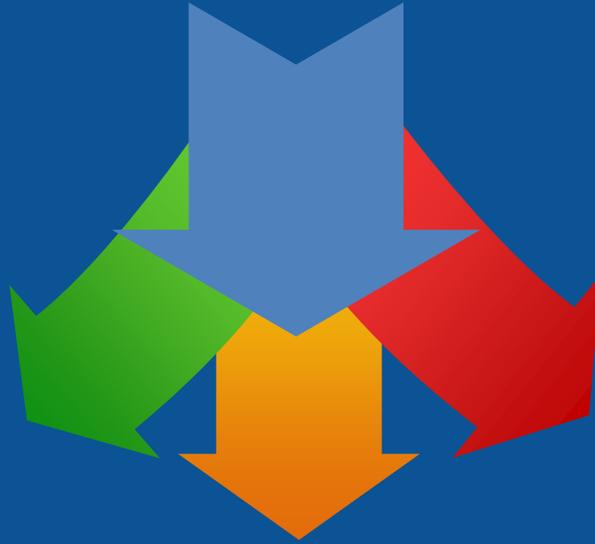


## Rocky Intertidal Monitoring

- 27 invertebrates & algae



# **LiMPETS: Citizen Science & STEM Education**



## **Educate**

students in ocean science

## **Inform**

scientists & managers

## **Empower**

students by doing real science

## **Collect**

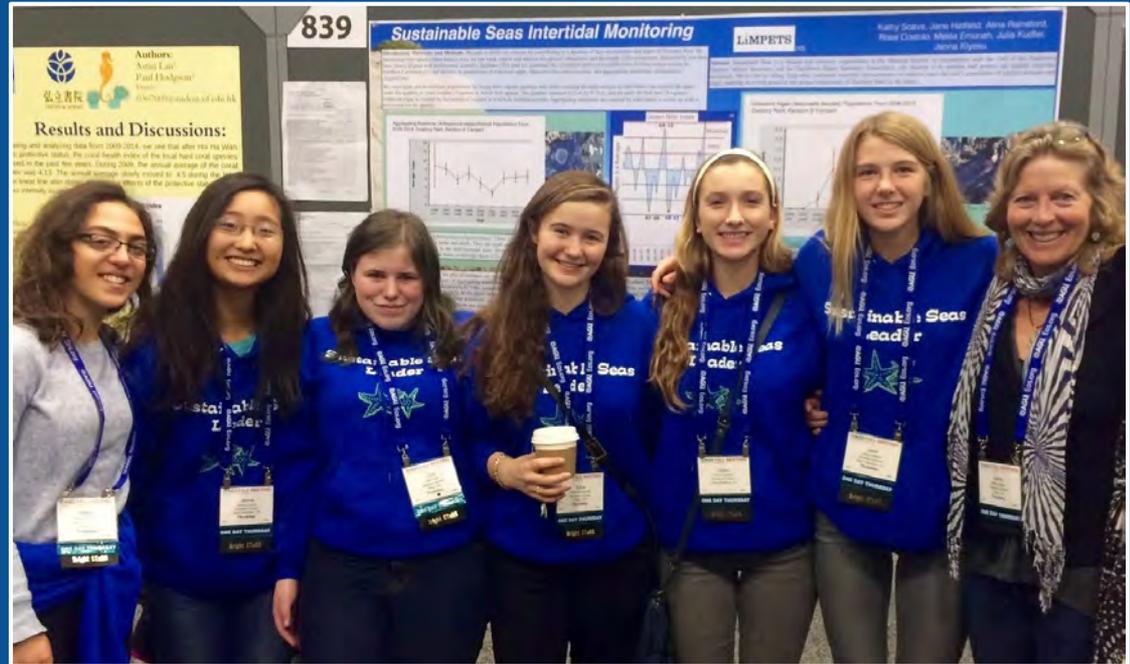
important long-term data

## **Inspire**

students to be environmental stewards

# Key Elements of Program

1. Teacher Workshop
2. Student Training
3. Monitoring
4. Data Entry
5. *Optional*: Science communication

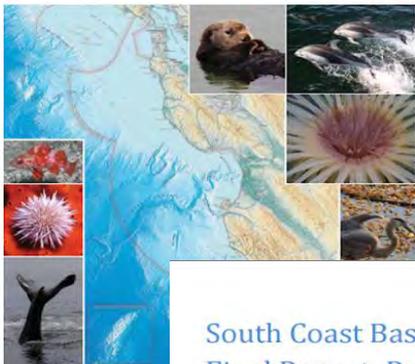


# LiMPETS Data Contributes to Management

## Monterey Bay

National Marine Sanctuary

**CONDITION REPORT  
PARTIAL UPDATE:  
A New Assessment of  
the State of Sanctuary  
Resources 2015**



December 2015

## South Coast Baseline Program Final Report: Rocky Intertidal Ecosystems

Lead PI: Carol A. Blanchette

Co-PIs: Peter Raimondi, Jayson Smith, Jennifer Burnaford and Julie

Contributors: Rani Gaddam, Jessica Altstatt, Jenifer Dugan, David H



Photo Credit: Michael Blake

Marine Sanctuaries Conservation Series ONMS-15-10



## Long-term Monitoring of Surfgrass Meadows in the Monterey Bay National Marine Sanctuary: Recovery followed by Stability after the Termination of a Domestic Sewage Discharge.

U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Ocean Service  
Office of National Marine Sanctuaries



December 2015

## Baseline Characterization of Sandy Beach Ecosystems Along the South Coast of California

Final Report

Jenifer E. Dugan, David M. Hubbard, Karina J. Nielsen, Jessica Altstatt and  
Julie Bursek



North Central Coast MPA Baseline Report  
LiMPETS 2013



## Final Report

## An Analysis of Citizen Science Data From LiMPETS

In Support of the North Central Coast Baseline  
Characterization Project

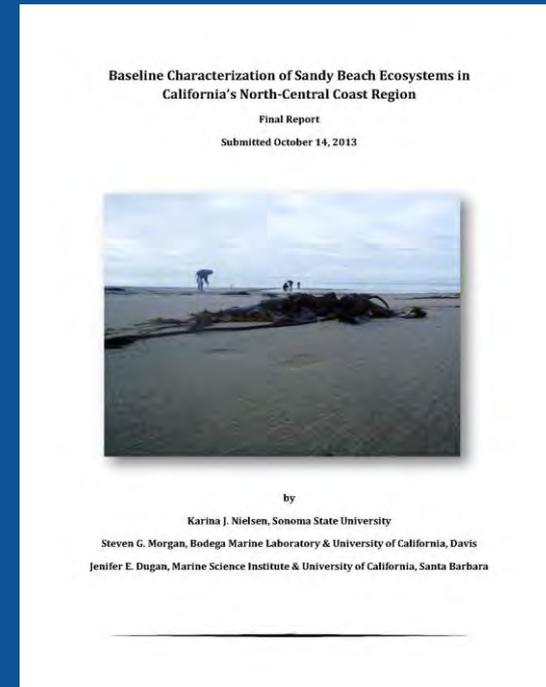


Prepared for:  
CALIFORNIA SEA GRANT PROGRAM STATE COASTAL  
CONSERVANCY (SCC),  
OCEAN PROTECTION COUNCIL (OPC), AND  
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE  
(CDFW)

**LiMPETS** Long-term Monitoring Program and  
Experiential Training for Students

# LiMPETS Science Advisory Panel

- Refine network-wide curriculum and training materials to meet science needs
- NOAA NMS staff, researchers, partners and various other state resource managers
- Recent contributions:
  - Updated Sandy Beach protocols
  - Updated Rocky Intertidal field guide
  - 360 photo protocol for Rocky Intertidal sites



NATIONAL  
MARINE  
SANCTUARY  
FOUNDATION

# Methods: Sandy Beach

- Methods revised by sandy beach ecologists to minimize disturbance
- Improved accuracy of mole crab abundances with adaptive sampling
- Sampling 4 to 24 times a year per site
- Sand crab adult and recruit abundance to 20 cm water depth



# Methods: Rocky Intertidal

- 6 monitoring sites in GFNMS management region
- Sampling 4 to 15 times a year per site
- Estimate presence/absence & abundance of 27 intertidal invertebrates and algae
- Total Counts and size measurements
  - Adoption of MARINe Ochre star size measurement protocol



# Can student data be used to detect changes in the intertidal?

- Seasonality
- Species die-offs
- Zonation shifts



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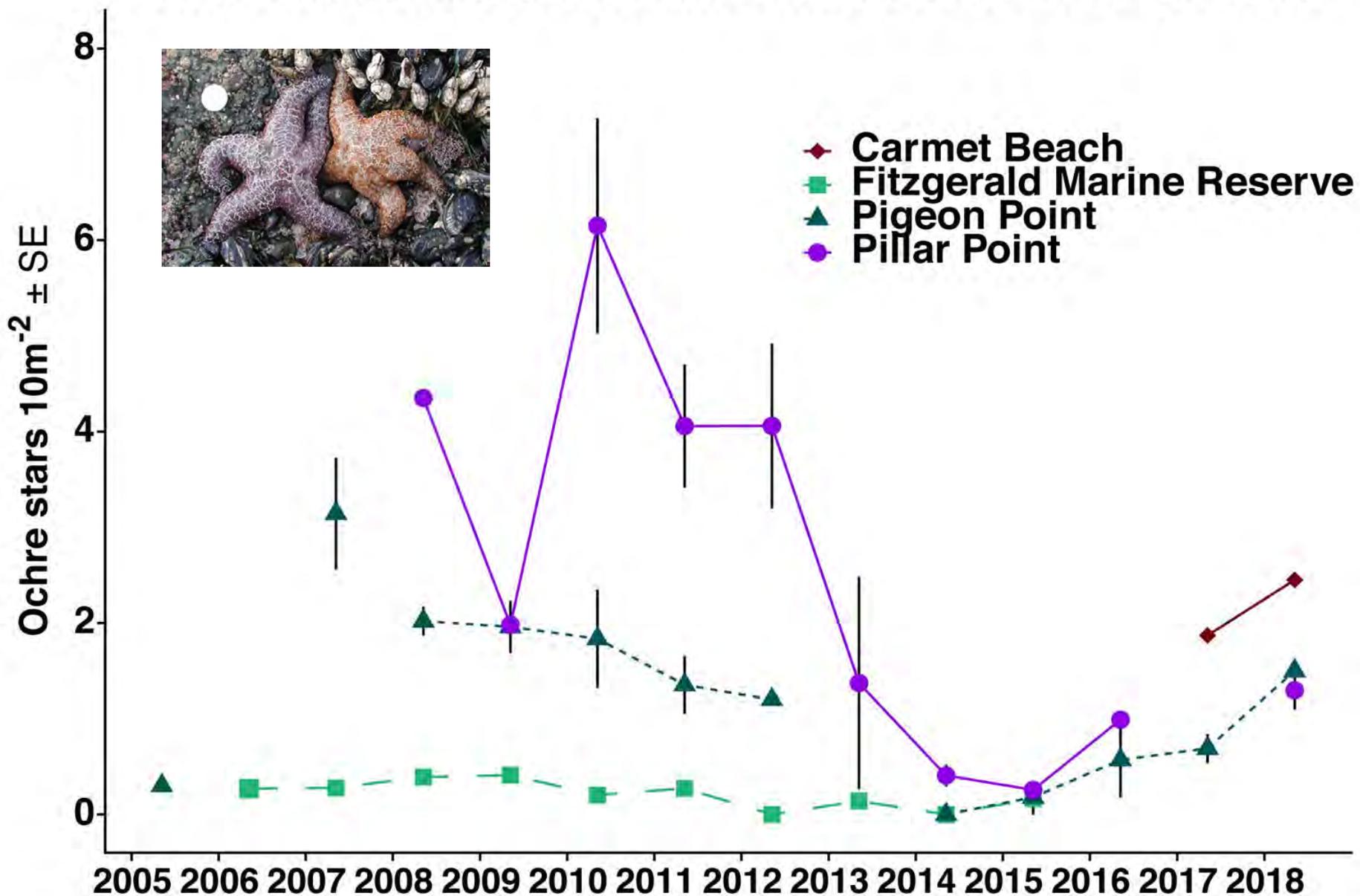


# Sea Star Wasting Syndrome

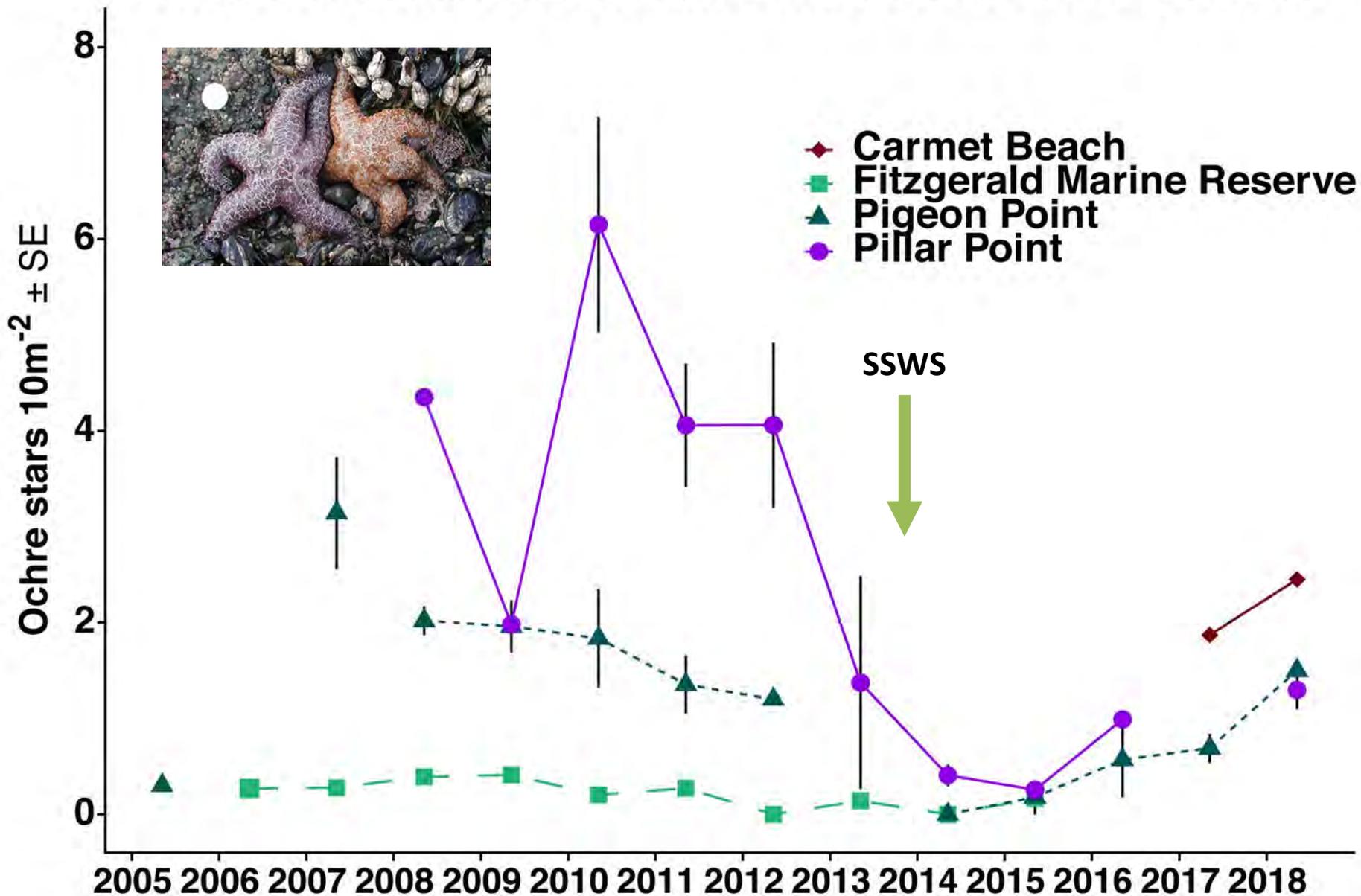
- Die off began in 2013/2014
- Decline in all sea stars
  - intertidal: ochre star (*Pisaster ochraceus*)
  - subtidal: sunflower sea star (*Pycnopodia helianthoides*)
- Outbreak with highest mortalities on record



# Ochre star densities at North Central Coast LiMPETS Sites



# Ochre star densities at North Central Coast LiMPETS Sites



# STARS Collaboration

Contributing LiMPETS data to PISCO Post-doc, Sara Gravem (OSU), tracking the recovery of Ochre stars from SSWS

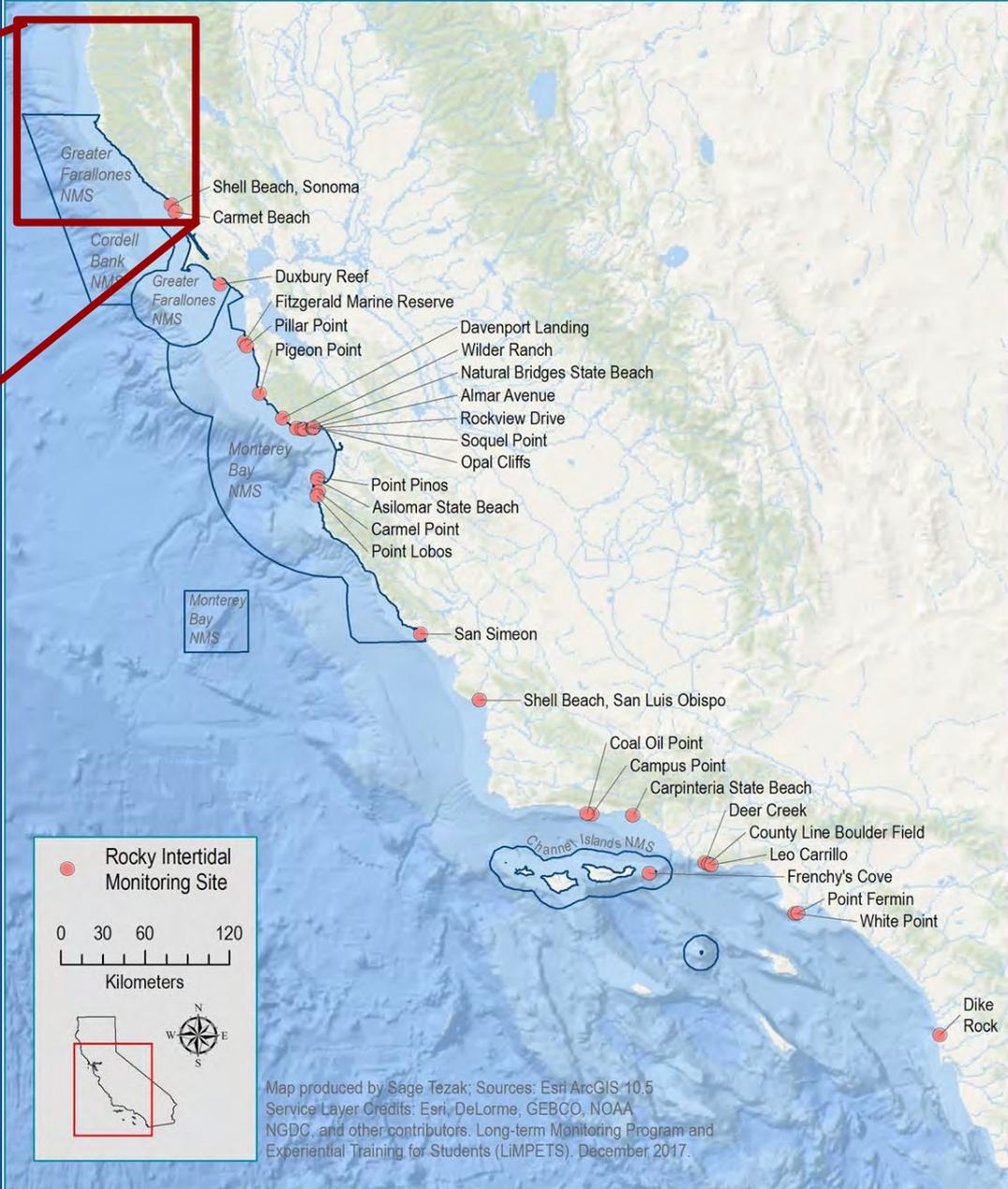
- Size measurements to track recruitment (MARINE protocols)
- Photographing Ochre stars with visible lesions



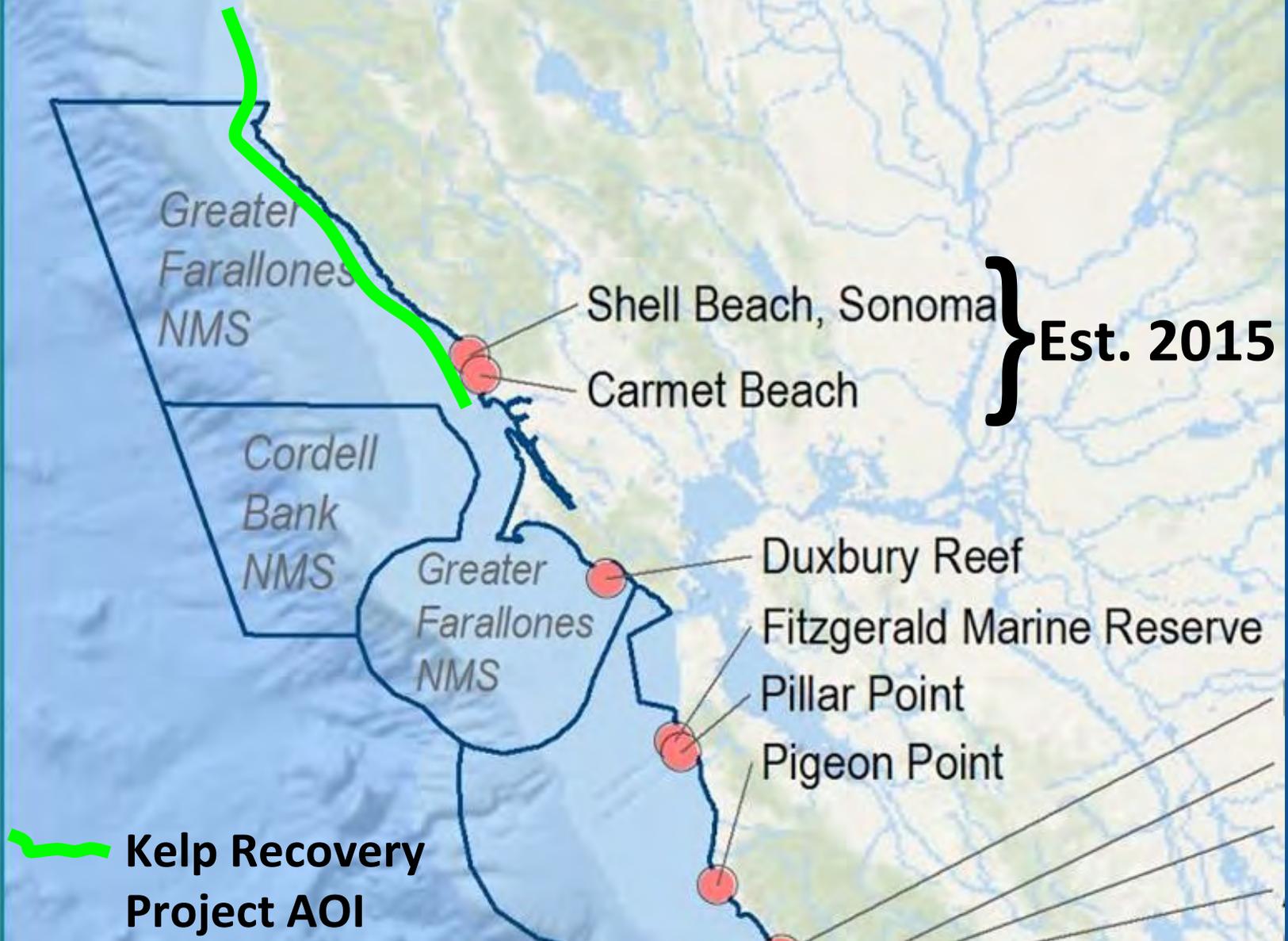
# LiMPETS

## Rocky Intertidal Monitoring Sites

Kelp Recovery  
Program  
Area of Interest  
(AOI)



# North Central Coast LiMPETS sites



# How LiMPETS data can contribute to the Kelp Recovery Program

- Abundances of intertidal ochre sea stars, abalone, and purple urchins
- Ochre star densities and recruitment can be easily tracked in intertidal by students
- Document new SSWS infections
- Herbivores may move between subtidal and intertidal in search of food

Fort Ross 2018

Photo: J. Stillman



# Thank You

- ★ David & Lucile Packard Foundation
- ★ Disney Conservation Fund
- ★ California State Coastal Conservancy
- ★ California Coastal Commission
- ★ Change Happens Foundation
- ★ NOAA B-WET
- ★ National Environmental Education Foundation
- ★ National Marine Sanctuary Foundation
- ★ Friends of Fitzgerald Marine Reserve
- ★ Greater Farallones National Marine Sanctuary

