



Kelp Management

16 July 2025

Presented to:

Marine Resources Committee
CA Fish and Game Commission

Presented by:

Dr. Kristen Elsmore
Sr. Environmental Scientist Specialist
CDFW Marine Region



Overview

- Development of the Kelp Restoration and Management Plan (KRMP)
- Kelp Restoration and Recovery Tracking
 - Kelp status statewide
 - Update on ongoing projects
- Commercial Bull Kelp Harvest Regulatory Sunset Date and Recommendations



PC: S. Kawana



PC: A. Dias



PC: K. Elsmore



Kelp Restoration and Management Plan



Kelp Restoration and Management Plan (KRMP)

- **Overarching Goal:**
 - To develop a robust, adaptive, climate-ready approach to managing, protecting, and restoring giant and bull kelp forest ecosystems statewide for consideration and adoption by the Fish and Game Commission
- **Core Components:**
 - Overarching ecosystem-based management framework
 - Adaptive kelp harvest framework
 - Restoration toolkit



KRMP Development Timeline



Science Advisory
Committee

Tribal
Engagement and
Consultation

Community Working
Group



2023-2026

Recommendations informing the KRMP



On the Ground
Research

2025 - 2026

KRMP Drafting, CEQA, Peer
Review, and Finalization

2026 - 2027

Management Plan and
Regulatory Process



2027

Implementation



KRMP Tribal Engagement



- Listening Sessions, Forums, and Consultations
- Representation on Community Working Group and Science Advisory Committee
- Exploration of co-management pathways



PC: K. Elsmore | CDFW



KRMP Community Working Group (CWG)



- Role and Composition:
 - Tasked with informing KRMP development, including gathering and sharing information with their communities
 - 23 Members
 - Representing regional community sectors
- Meeting Discussions to Date (6):
 - Ecosystem-based management
 - Monitoring and assessment of kelp forest ecosystems
 - Restoration approaches and success factors
 - Harvest management strategies
 - Permitting



KRMP Science Advisory Committee (SAC)



- Role and Composition:
 - To provide scientific expertise on all aspects of the KRMP
 - 12 Members
 - Representing broad scope of disciplines and geographic areas
- Meeting Discussions to Date (7):
 - Kelp Socio-ecological Conceptual Framework
 - Key indicators to assess the health of the kelp resource
 - Monitoring and existing data
 - Identifying thresholds for key indicators
 - Identify and evaluate potential management strategies
 - Spatial and temporal considerations



KRMP CWG and SAC Joint Meeting



- Purpose:
 - Provide progress updates and support interaction, questions, and discussion
- Interactive Exercises and Discussions:
 - Defining kelp ecosystem health status (qualitatively and quantitatively)
 - Identifying potential management strategies based on forest conditions and available resources
 - Integrating scientific data and community insights into monitoring and management
- Poster Session:
 - Showcased kelp-related projects
 - Supported cross-learning and statewide knowledge exchange



KRMP: Next Steps 2025-2026



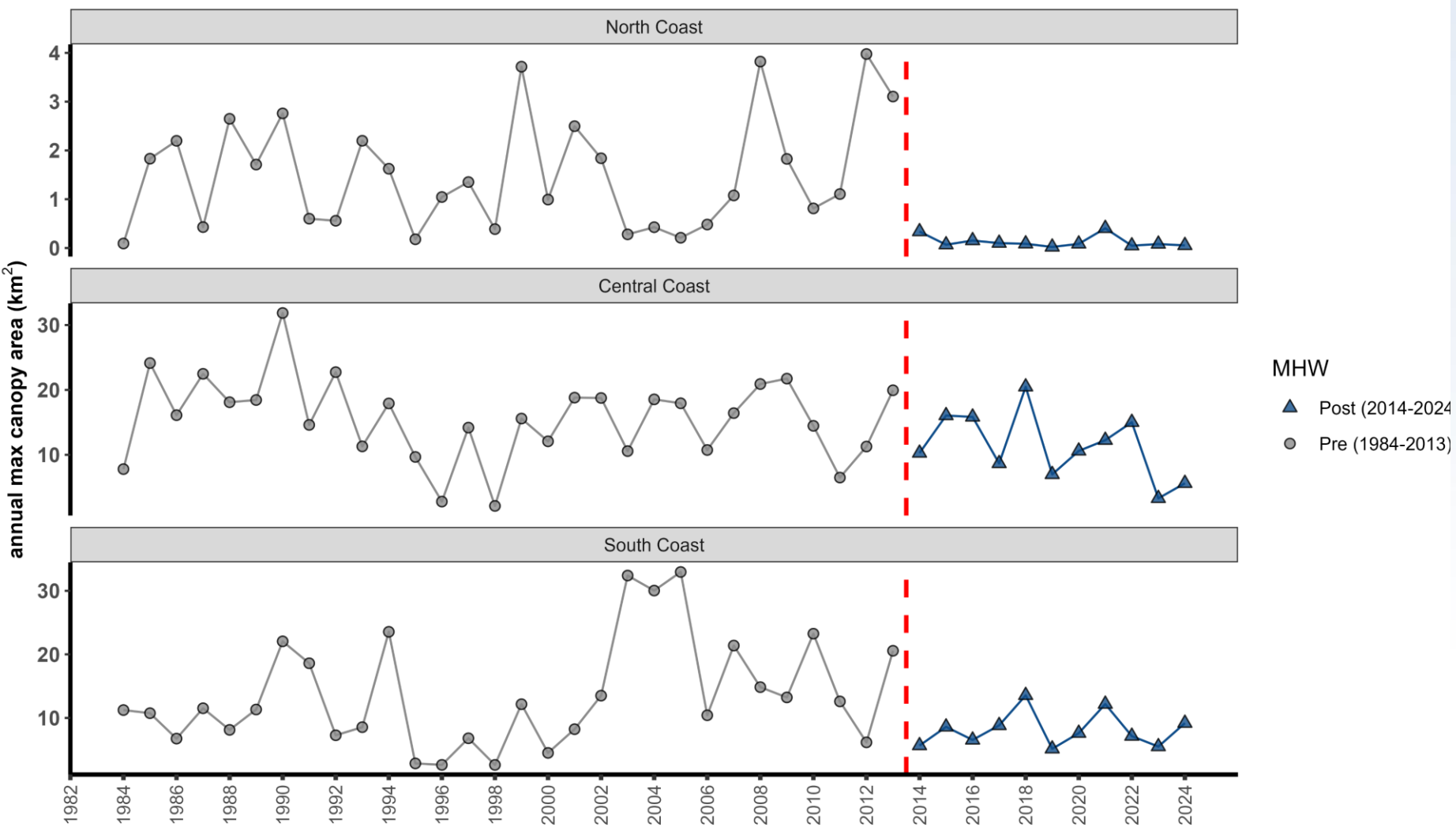
- Tribal Engagement:
 - Support additional opportunities for input and engagement
 - Consultation and co-management conversations
- Community Working Group:
 - Continue gathering community input and priorities
 - Draft and discuss recommendations
- Science Advisory Committee:
 - Integrate results from ongoing projects to inform evaluation of potential restoration tools and approaches, harvest frameworks, other considerations
 - Build out decision tree for overarching management framework



Kelp Status Overview



Kelp Canopy Status by Region



Data Source: Santa Barbara Coastal LTER et al. 2025





Kelp Recovery Research Projects Underway

Advancing Kelp Research in California

- Kelp Recovery Research Program (CASG)

2020-2022



- Accelerating Kelp Research and Restoration (CASG)

2024-2026



- Adaptive Management and Resilience of Kelp Forest Projects

2025-2027



- Other research by scientific community

Ongoing



- Ghvtlh-k'vsh shu'-srnelh-'i~ (Kelp Guardians)
 - Location: Del Norte
 - Project Leads: Tolowa Dee-ni' Nation
 - Build capacity and integrate Western and Indigenous sciences
 - Subtidal monitoring and scientific dive training
 - Pilot tumble culture for cultural practices and tribal food sovereignty
 - Engage Indigenous youth in kelp restoration workshops rooted in community-based methods



PC: R. Laucci

Sequencing Restoration Techniques

- Accelerating Bull Kelp Recovery Using Sequencing of Restoration Techniques
 - Locations: Big River, Albion, Noyo (Mendocino)
 - Project Lead: The Nature Conservancy
 - Testing novel restoration approaches:
 - Traps and commercial urchin divers to reduce grazing pressure
 - Supplementing drift to modify grazer behavior
 - Elevated kelp modules to increase spore supply
 - Testing efficacy of sequencing multiple restoration approaches





Approaches to Minimizing Grazing Pressure



- Evaluating Giant Kelp Recovery Following Localized Removal of Grazers
 - Locations: Monterey, Sonoma, and Humboldt
 - Project Lead: UC Santa Cruz
 - Testing key aspects of managing grazing pressure:
 - Modifying grazing pressure along edges of remnant kelp forests
 - Considering multiple grazer taxa (urchins, snails, etc.)
 - Grazer removal frequencies and associated costs
 - Evaluating oceanographic parameters important for restoration site selection



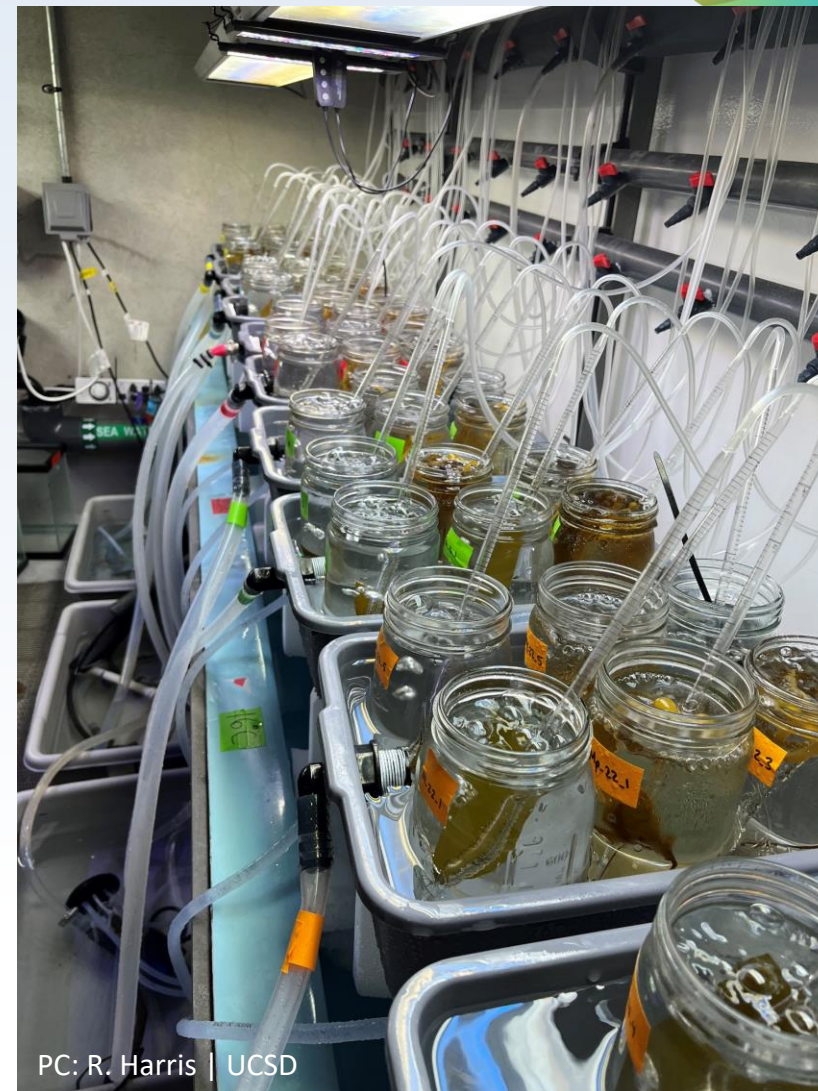
Forecasting to Inform Restoration

- A Proactive Approach to Help Restoration in California: Forecasting Kelp Loss and Optimal Restoration Times
 - Location: Statewide
 - Project Lead: UC Santa Barbara
 - Modeling long-term survival under different climate scenarios
 - Incorporate tool to evaluate seasonal drivers to inform decisions around timing and locations for kelp restoration
 - Informing climate-readiness and resilience within the KRMP



Thermal Tolerance

- Thermal Tolerance, Population Variability and Experimental Restoration in Southern California
 - Location: San Diego
 - Project Lead: UC San Diego
 - Investigating thermal tolerance of giant kelp, bull kelp, and a suite of key understory algae
 - Evaluating linkages across genetics, thermal tolerance, growth and survival
 - Informing climate-readiness and resilience within the KRMP

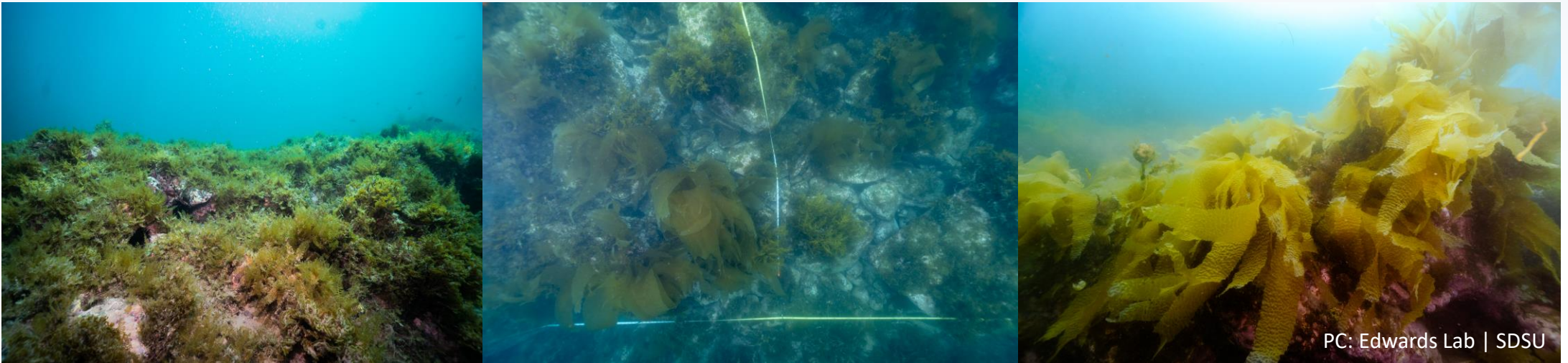


PC: R. Harris | UCSD



Experimental *Sargassum horneri* Removal

- Evaluating giant kelp recovery following localized removal of invasive algae (*Sargassum horneri*) and perennial turf algae
 - Locations: Catalina Island
 - Project Lead: San Diego State University
 - Evaluating efficacy of localized removal of competitive species and conditions under which spore supplementation is important





Greater Farallones Association/GFNMS

- Evaluating Bull Kelp Restoration Approaches Along the Sonoma Coast
 - Locations: Ft. Ross, Timber Cove, Sea Ranch (Sonoma)
 - Project Leads: Greater Farallones Association, Greater Farallones National Marine Sanctuary; Kashia Band of Pomo Indians
 - Evaluating efficacy of urchin grazer suppression and kelp outplanting





Palos Verdes Kelp Restoration Project

- Evaluating giant kelp recovery following localized removal of grazers
 - Locations: Palos Verdes Peninsula (Los Angeles)
 - Project Lead: The Bay Foundation
 - Ongoing effort over past 12 years
 - Spans 78 acres to date
 - Reducing grazing pressure via crushing urchins in situ
 - Minimal maintenance of restoration sites
 - Increase in giant kelp, inverts, fish diversity and biomass, and red urchin gonad weight
 - Partnership with commercial urchin divers and recently launched volunteer program





Temporary Regulations for Urchin Take

- Assessing the efficacy of urchin culling by recreational divers under temporary regulations
 - Locations: Caspar Cove (Mendocino) and Tanker Reef (Monterey)
 - Caspar Cove:
 - Temporary regulations in place through April 2029
 - Increase in diver participation
 - Commercial urchin harvest on north portion of cove
 - Tanker Reef:
 - Temporary regulations sunset April 2024
 - Urchin densities reduced
 - Initial kelp regrowth, with canopy persisting through spring 2025 surveys

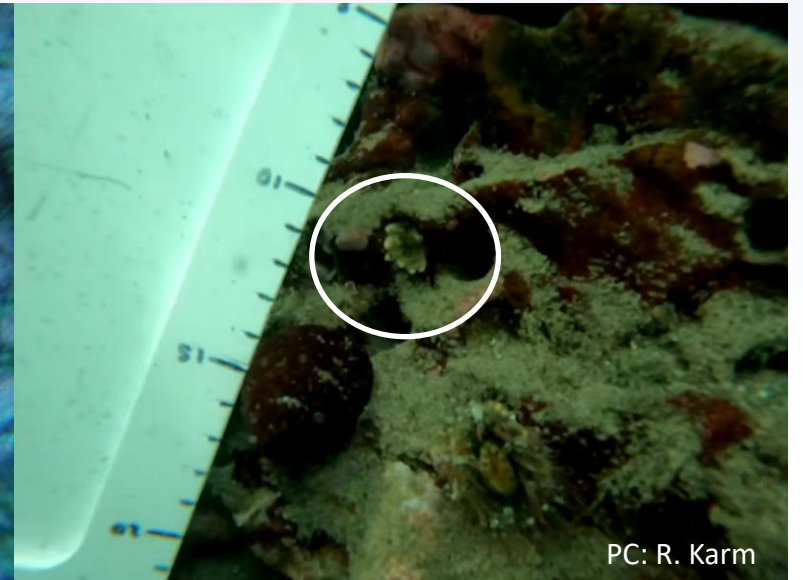


PC: T.A. McHugh | The Nature Conservancy



Sunflower Star (Pycnopodia)

- Subtidal and intertidal sightings in Northern California
- Advances in eDNA as potential monitoring tool
- Advances in disease research
- Advances in captive breeding research



- Strategic Mapping of Giant and Bull Kelp Genomic Diversity
 - Location: Statewide
 - Project Lead: UC Santa Cruz
 - Map giant and bull kelp genomic diversity in California
 - Identify where genetics may be driving patterns of loss and persistence
 - Informing climate-readiness and resilience within the KRMP



Kelp Biomass and Harvest Assessment

- Assessment of Biomass, Production, and Harvest Impact for Canopy-forming Kelps in California
 - Location: Statewide
 - Project Lead: Woods Hole Oceanographic Institution
 - Providing quantitative metrics for giant and bull kelp biomass and production
 - Partnership with commercial harvesters in Northern, Central and Southern California
 - Informing the adaptive harvest framework within the KRMP





Commercial Bull Kelp Harvest Regulatory Sunset Date



Background, Outreach, and Engagement

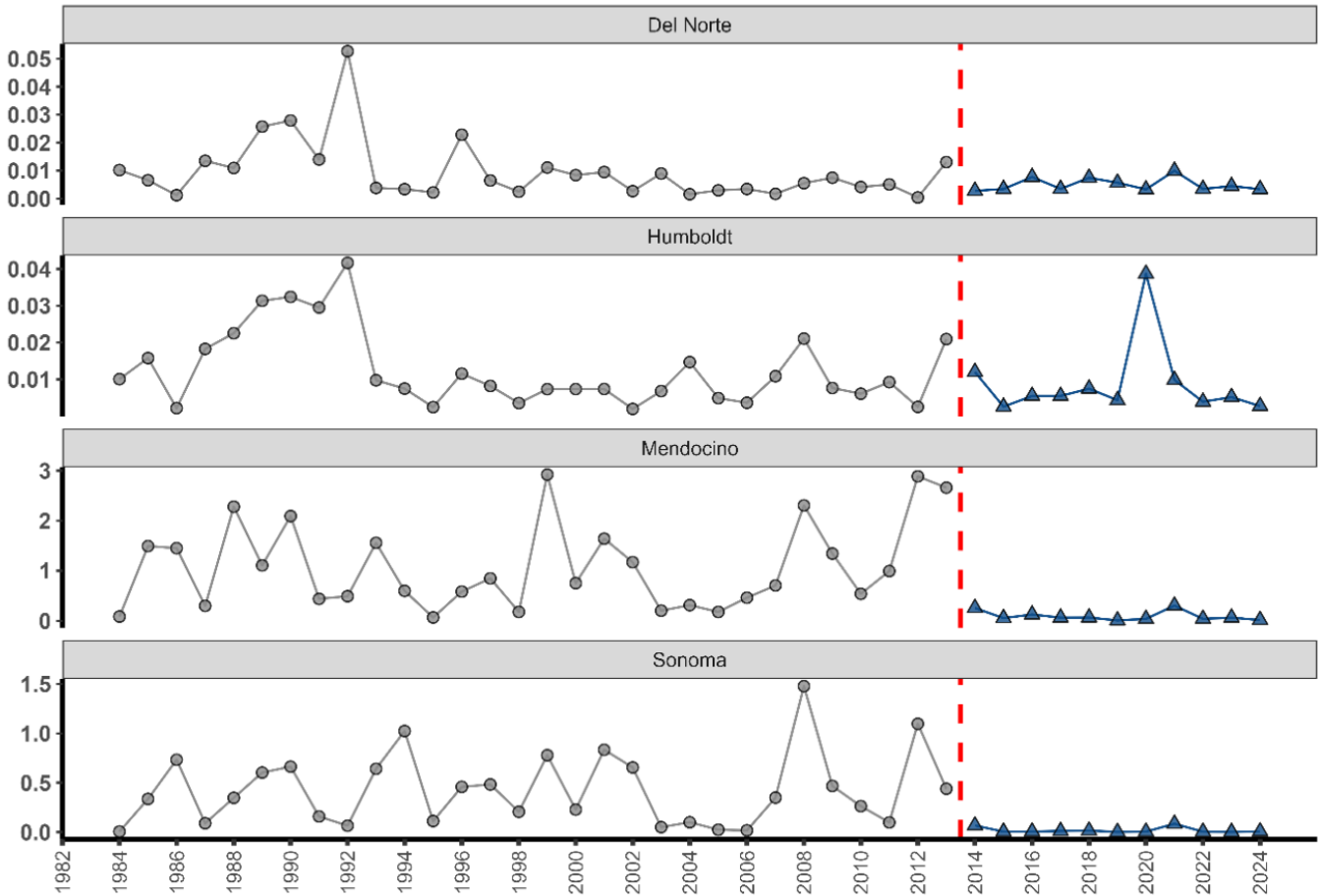
- Background
 - Commercial bull kelp harvest temporary regulations CCR, Title 14, Sections 165 and 165.5
 - January 1, 2023 - January 1, 2026
 - Enacted as a precautionary approach
 - Allow development of the KRMP
- Outreach and Engagement
 - May 28, 2025 – Tribal Notification
 - July 1, 2025 – Stakeholder informational meeting
 - Today's MRC meeting



Bull Kelp Canopy Area

County	2022 Pre-Adoption Statement of Reasons 2014 – Third Quarter 2021 Percent Change Time Frame (Compared to 1984-2013)	Updated 2014 – Fourth Quarter 2024 Percent Change Time Frame (Compared to 1984-2013)
Mendocino	90% decline	91% decline
Sonoma	95% decline	96% decline
Humboldt	20% increase	29% decline
Del Norte	5% decline	48% decline

Max canopy area (km²)



Timeframe

- ▲ Post (2014-2024)
- Pre (1984-2013)



Proposed Bull Kelp Regulations

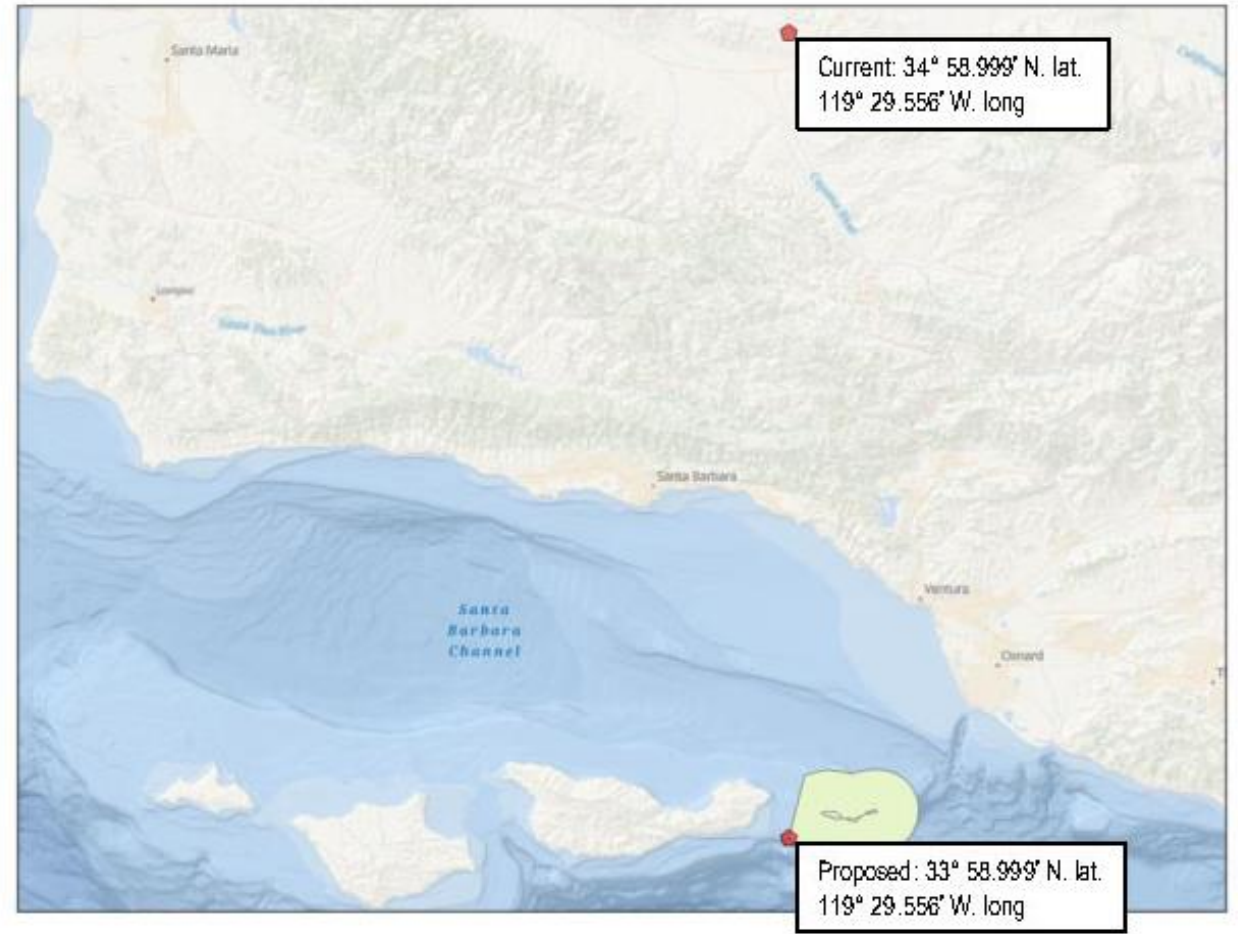
- Recommend extending temporary restrictions through January 1, 2029
 - Closure in Mendocino and Sonoma counties
 - Four ton (8,000 lbs.) wet weight annual fishery quota in Humboldt and Del Norte counties, weekly reporting
 - Closure and lease prohibition on lease only administrative kelp beds 308, 309, 312
 - Availability to lease the lease only beds amended to on or after January 2, 2029





Proposed Kelp Bed Regulation

- Correct typographical error in administrative kelp bed 109 coordinate





Proposed Commerical Harvest Timeline/Next Steps

- Notice: August 2025
- Discussion and Adoption: October 2025
 - Effective January 1, 2026
 - Sunset January 1, 2029
- Continue to work with researchers and stakeholders to fill priority research gaps and complete the development of the Kelp Restoration and Management Plan



Recap

- Development of the Kelp Restoration and Management Plan (KRMP)
- Kelp Recovery and Restoration Research Tracking
 - Kelp status statewide
 - Ongoing projects
- Proposed Commercial Bull Kelp Harvest Regulatory Sunset Date Extended to January 1, 2029
- Correct coordinate error for administrative kelp bed

Thank You

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Senior Environmental Scientist Specialist

State Managed Finfish and Nearshore Ecosystems Program

Department of Fish and Wildlife

Marine Region

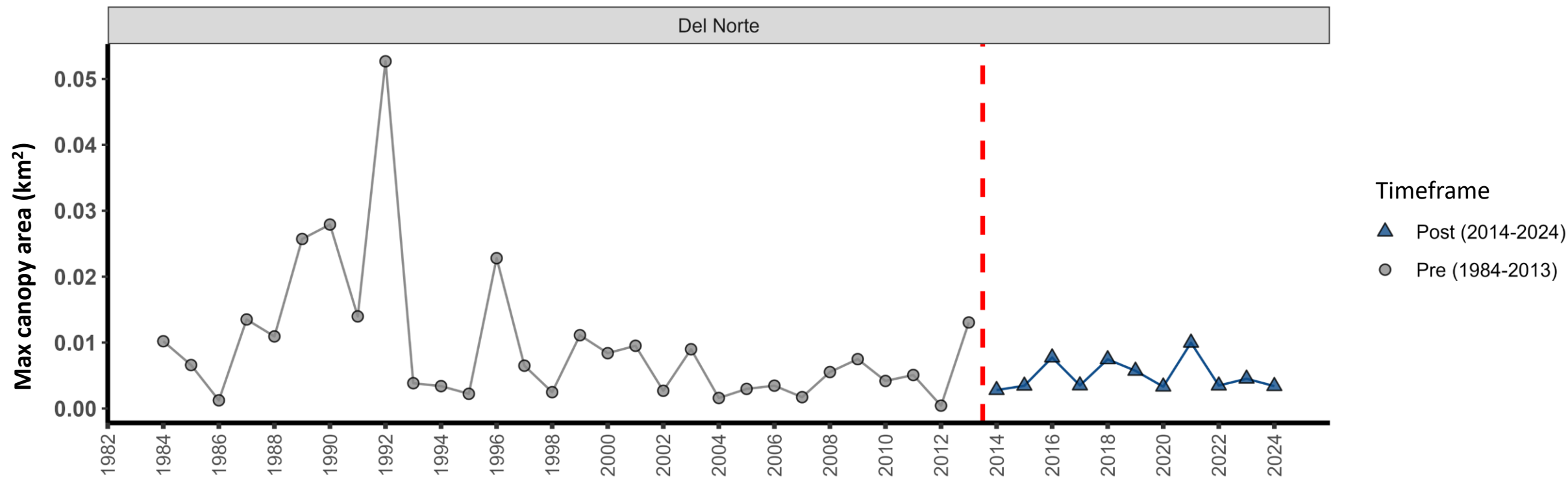
Email: kelp@Wildlife.ca.gov



Kelp Canopy Data By County



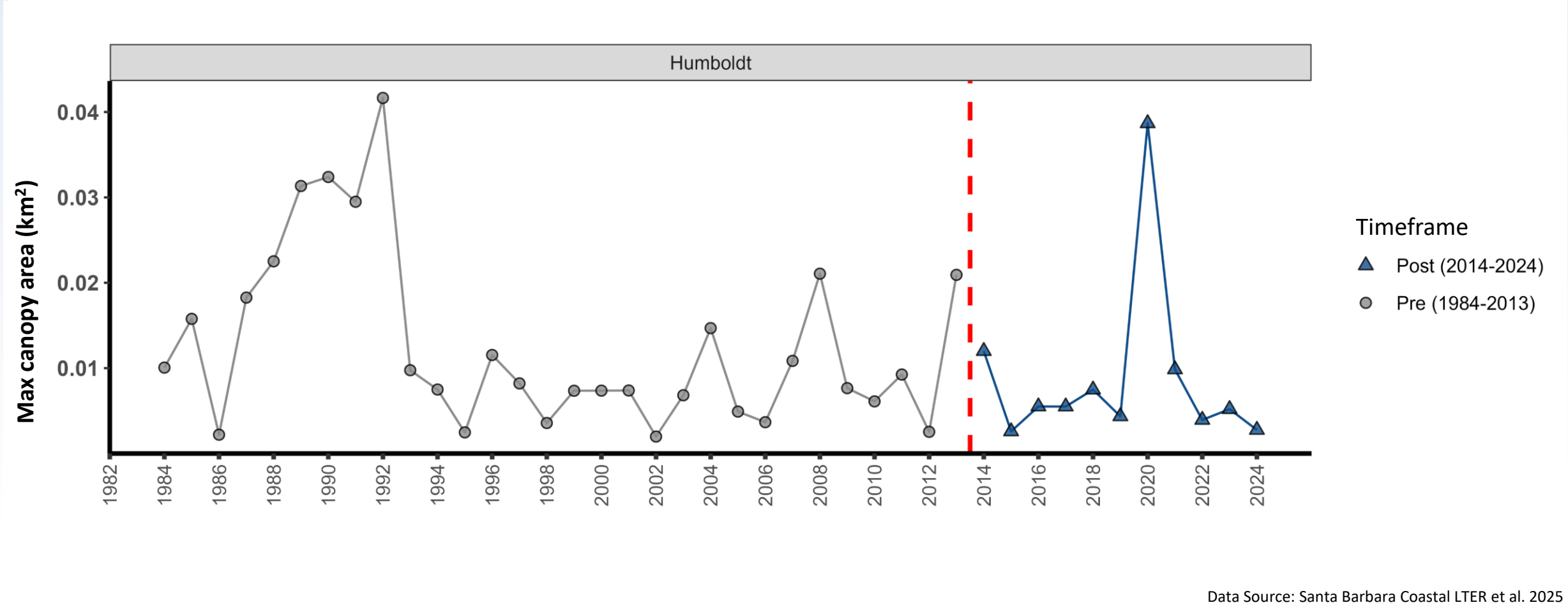
Kelp Canopy Status: Del Norte County



Data Source: Santa Barbara Coastal LTER et al. 2025

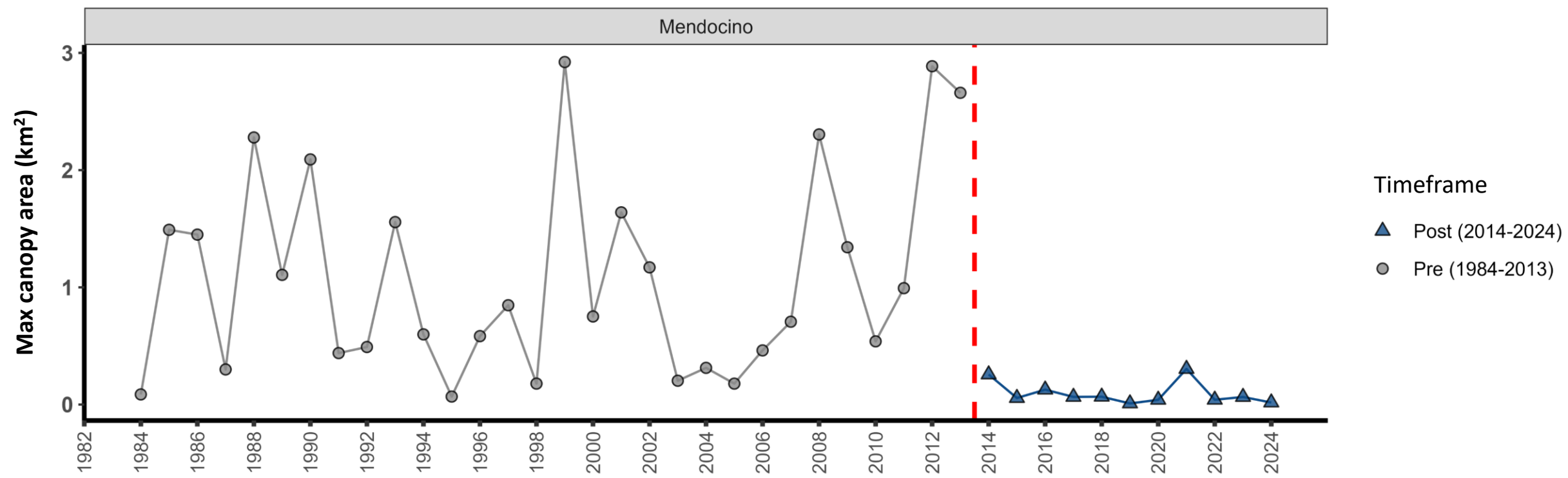


Kelp Canopy Status: Humboldt County





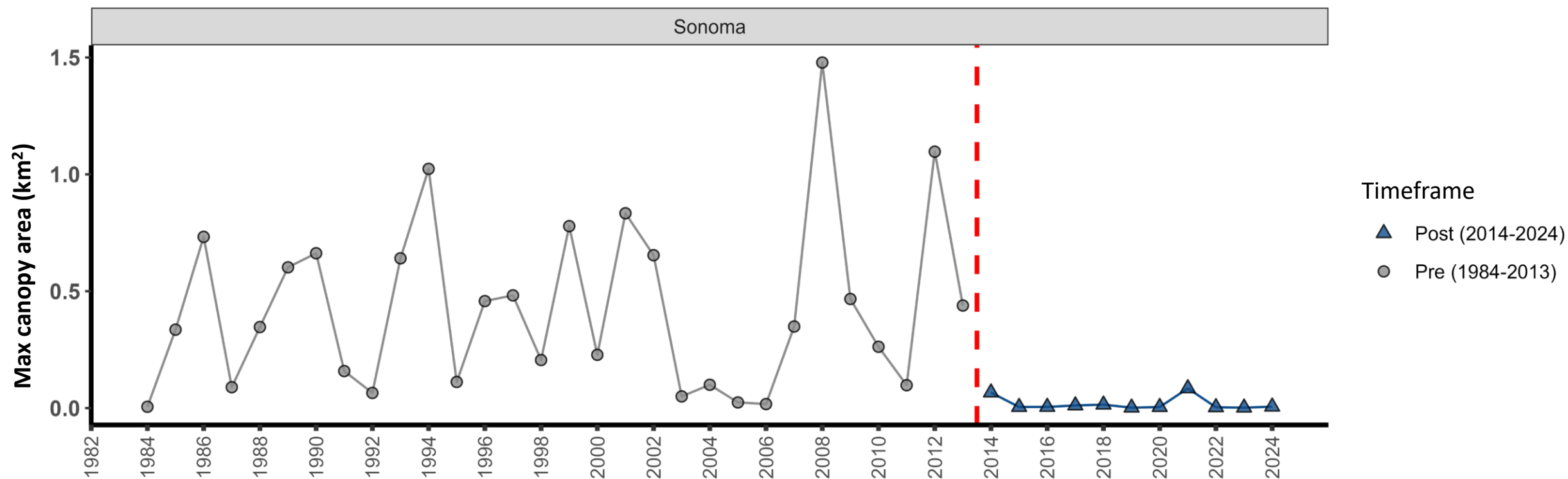
Kelp Canopy Status: Mendocino County



Data Source: Santa Barbara Coastal LTER et al. 2025



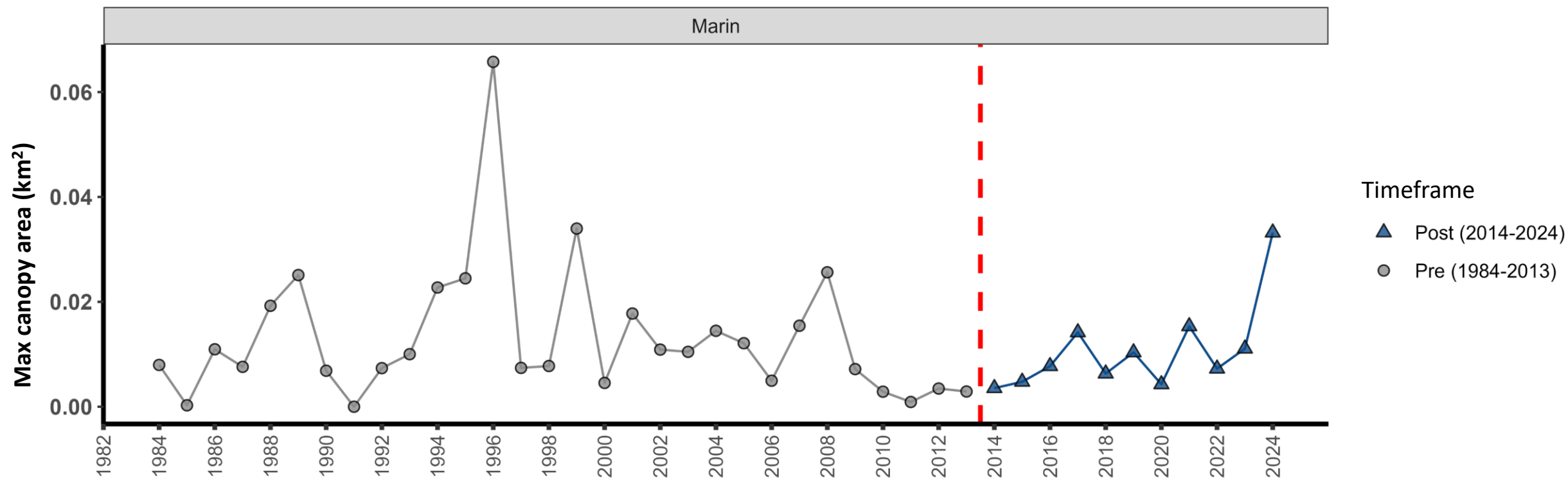
Kelp Canopy Status: Sonoma County



Data Source: Santa Barbara Coastal LTER et al. 2025



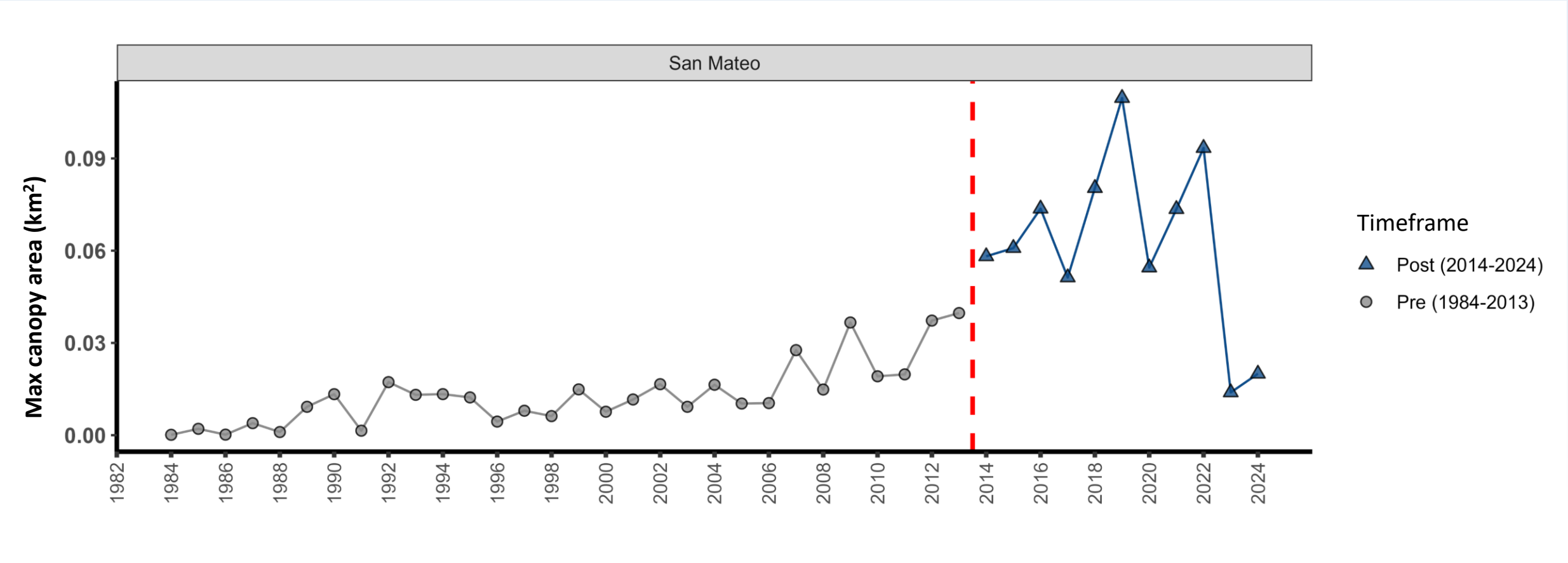
Kelp Canopy Status: Marin County



Data Source: Santa Barbara Coastal LTER et al. 2025



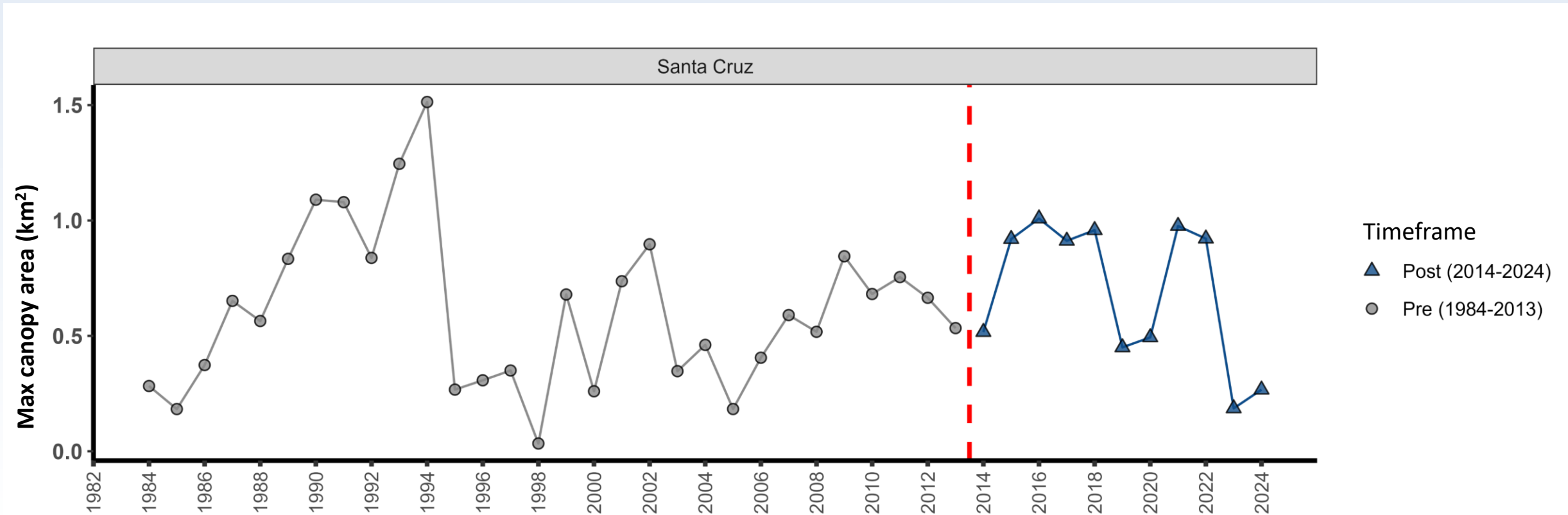
Kelp Canopy Status: San Mateo County



Data Source: Santa Barbara Coastal LTER et al. 2025



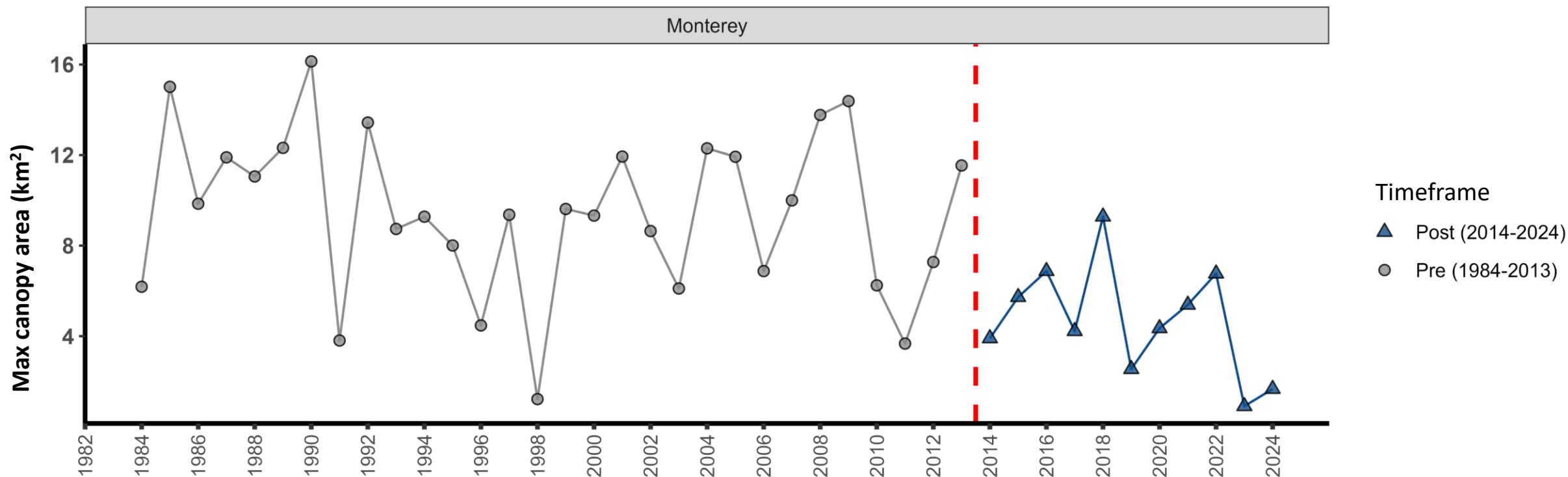
Kelp Canopy Status: Santa Cruz County



Data Source: Santa Barbara Coastal LTER et al. 2025



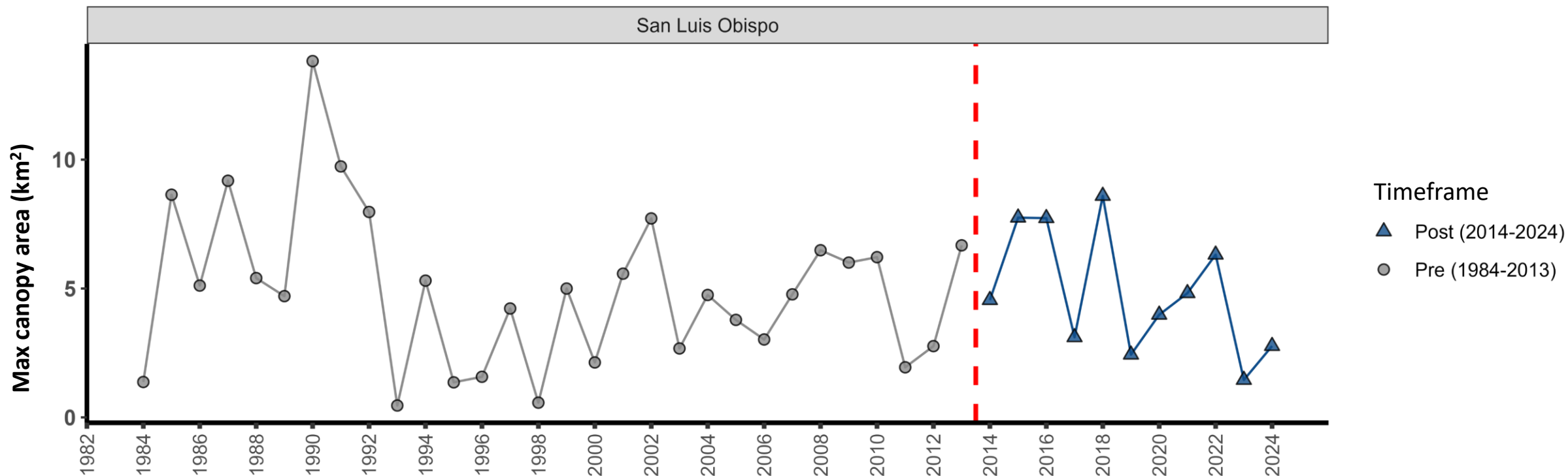
Kelp Canopy Status: Monterey County



Data Source: Santa Barbara Coastal LTER et al. 2025



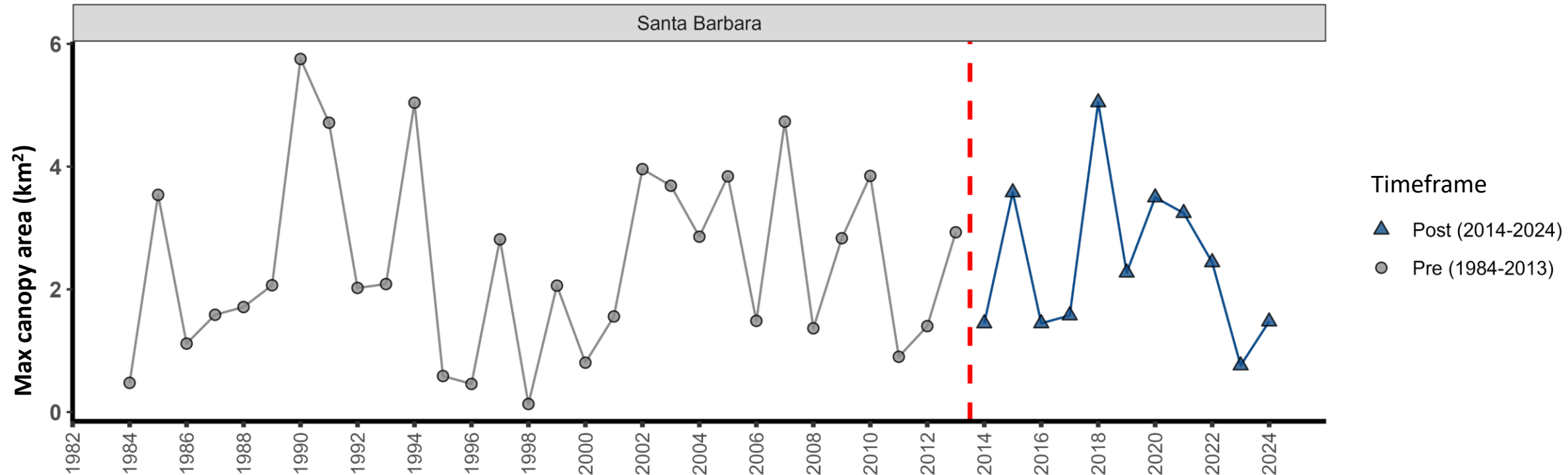
Kelp Canopy Status: San Luis Obispo County



Data Source: Santa Barbara Coastal LTER et al. 2025



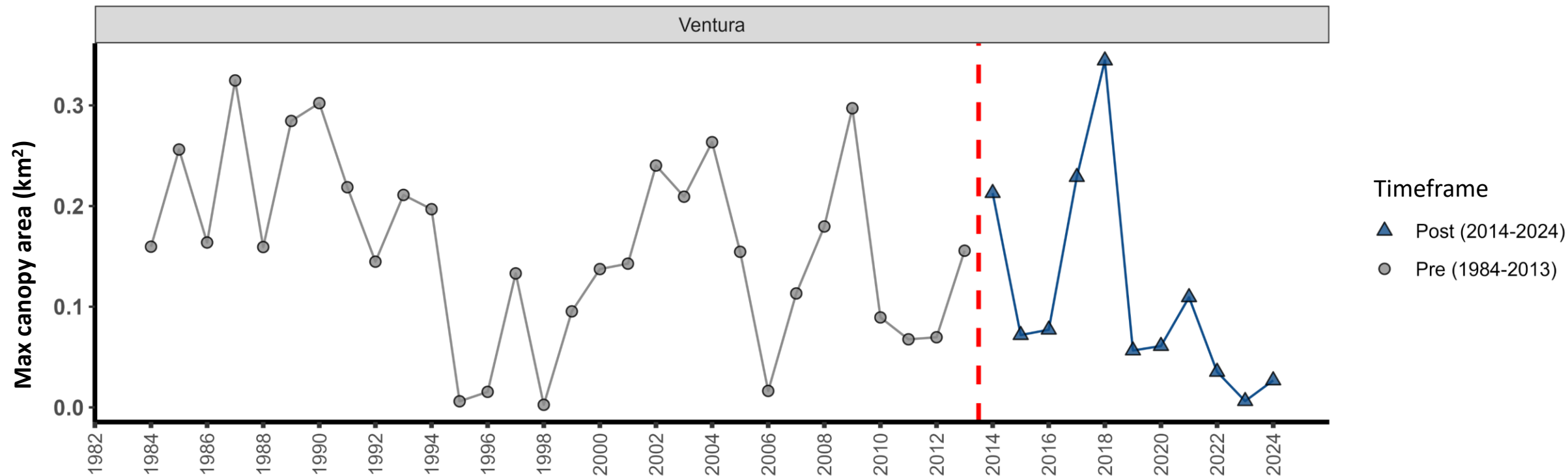
Kelp Canopy Status: Santa Barbara County



Data Source: Santa Barbara Coastal LTER et al. 2025



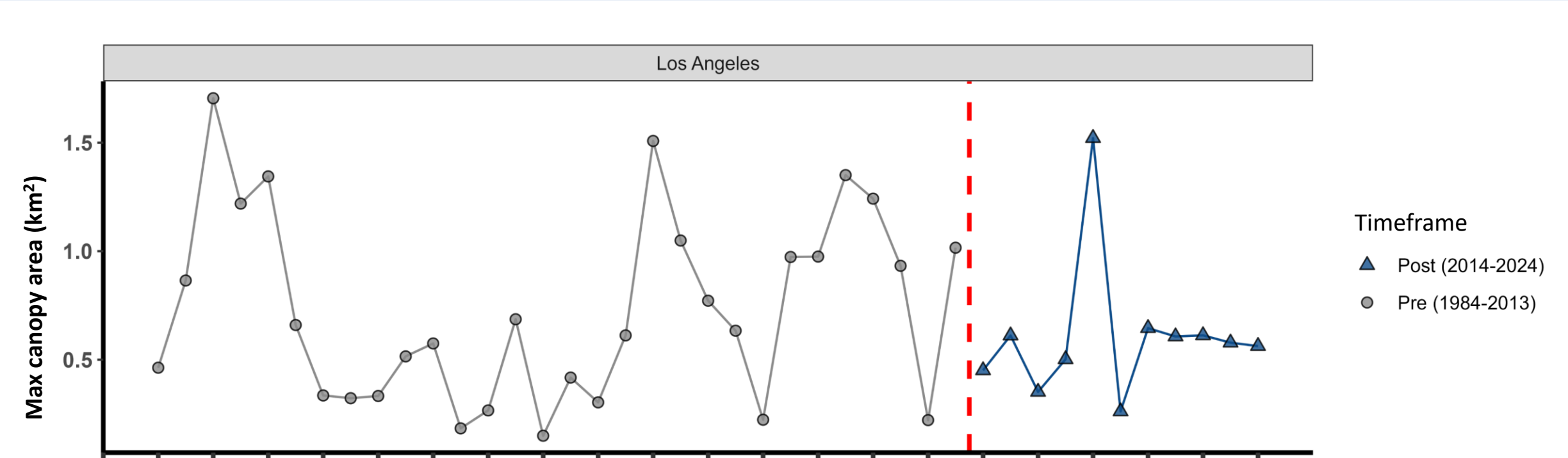
Kelp Canopy Status: Ventura County



Data Source: Santa Barbara Coastal LTER et al. 2025



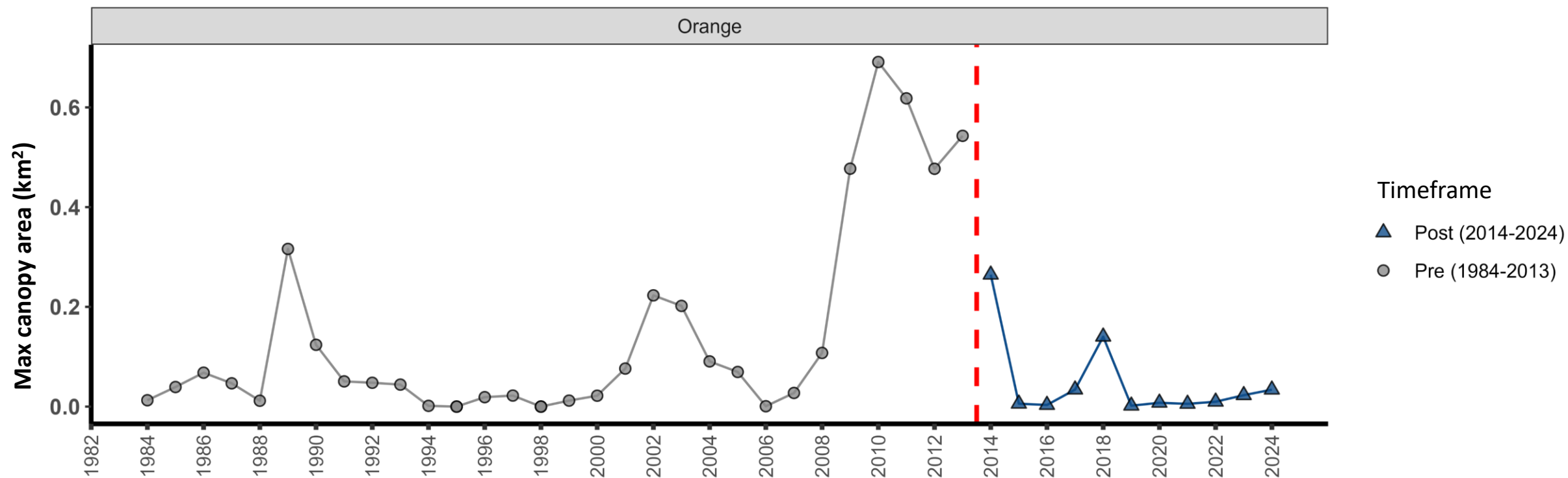
Kelp Canopy Status: Los Angeles County



Data Source: Santa Barbara Coastal LTER et al. 2025



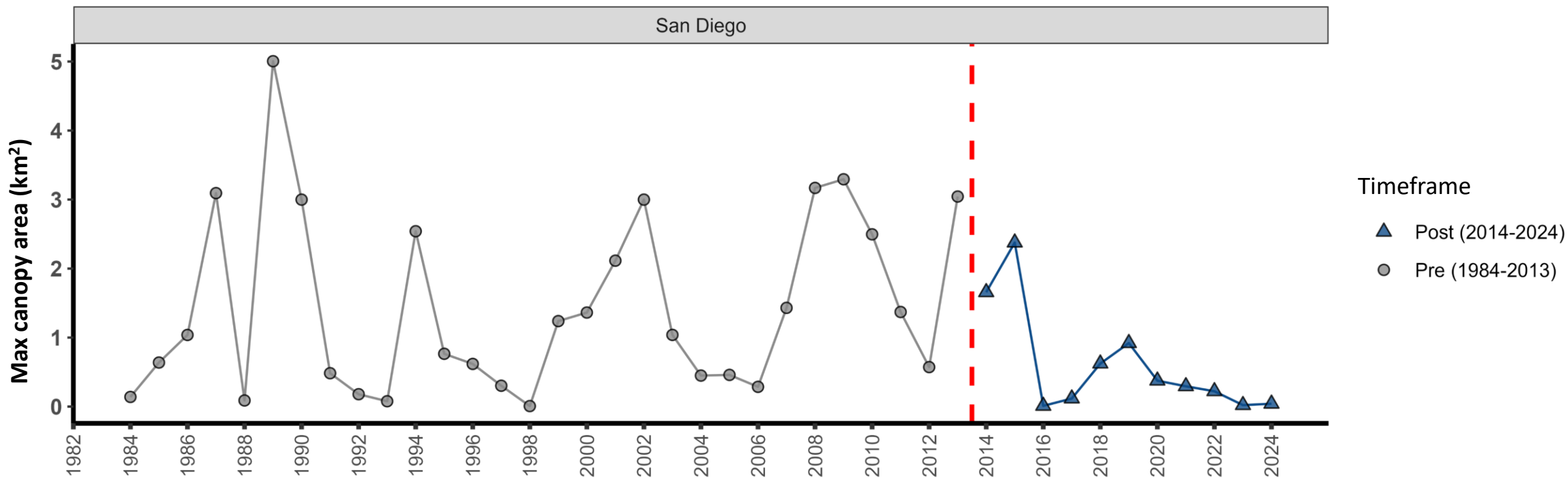
Kelp Canopy Status: Orange County



Data Source: Santa Barbara Coastal LTER et al. 2025



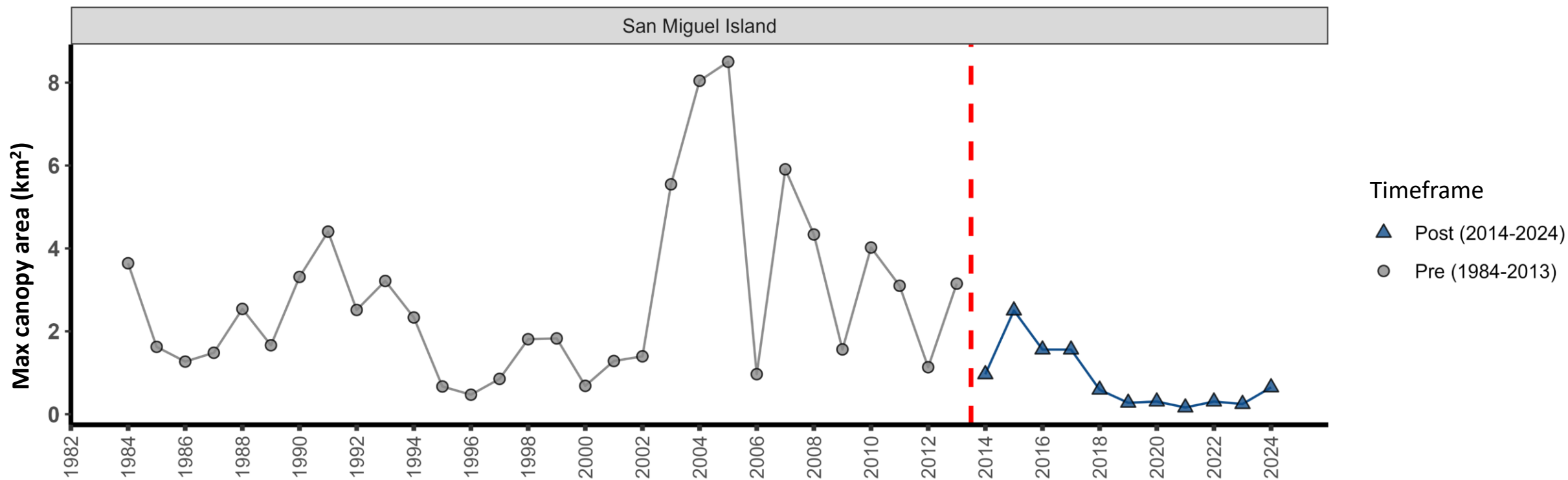
Kelp Canopy Status: San Diego County



Data Source: Santa Barbara Coastal LTER et al. 2025



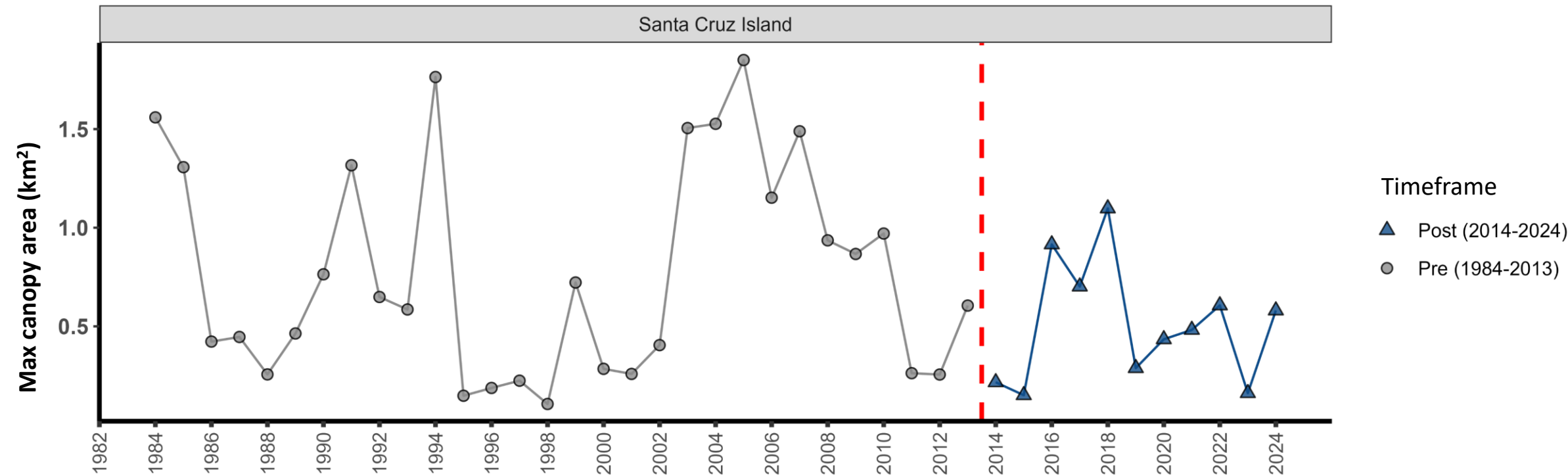
Kelp Canopy Status: San Miguel Island



Data Source: Santa Barbara Coastal LTER et al. 2025



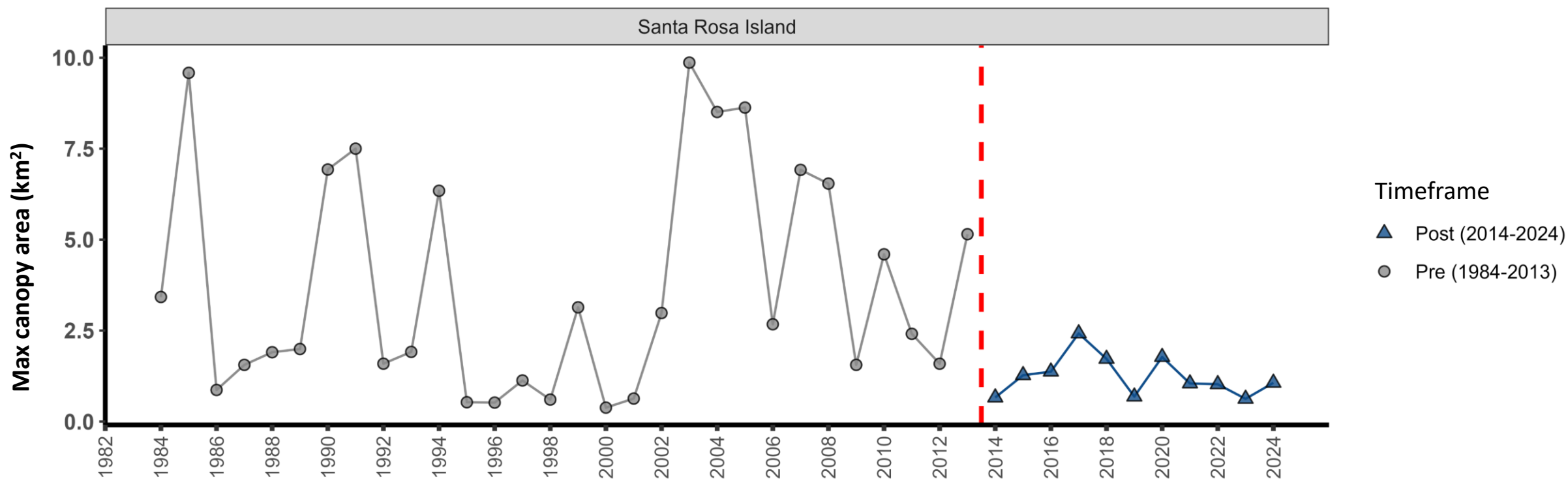
Kelp Canopy Status: Santa Cruz Island



Data Source: Santa Barbara Coastal LTER et al. 2025



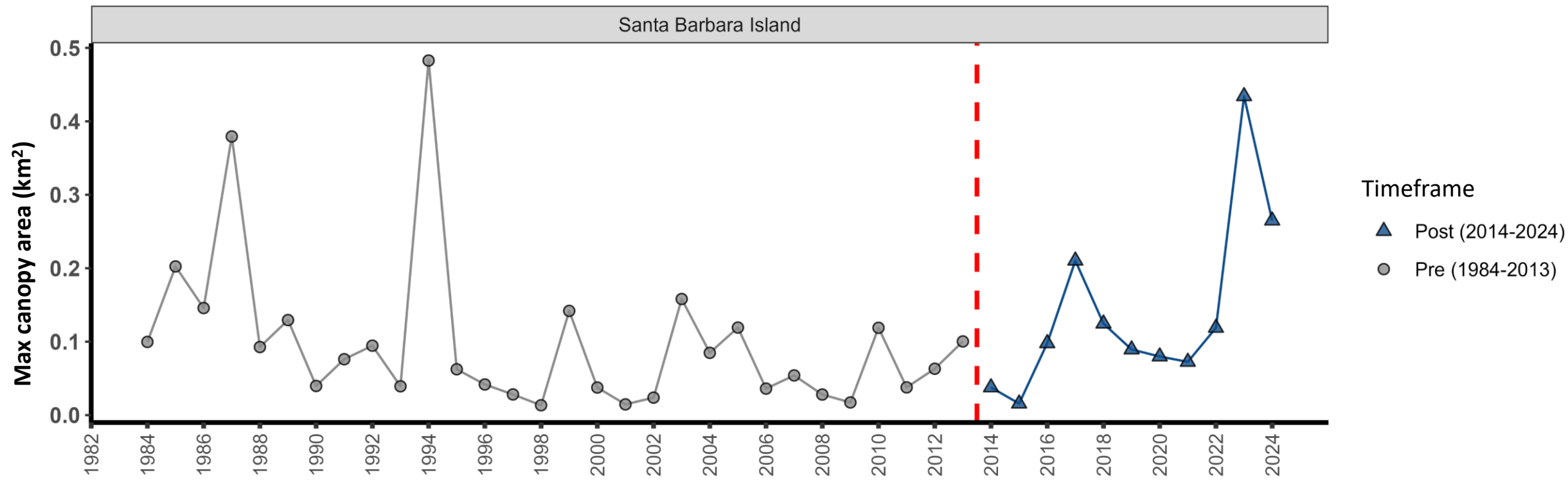
Kelp Canopy Status: Santa Rosa Island



Data Source: Santa Barbara Coastal LTER et al. 2025



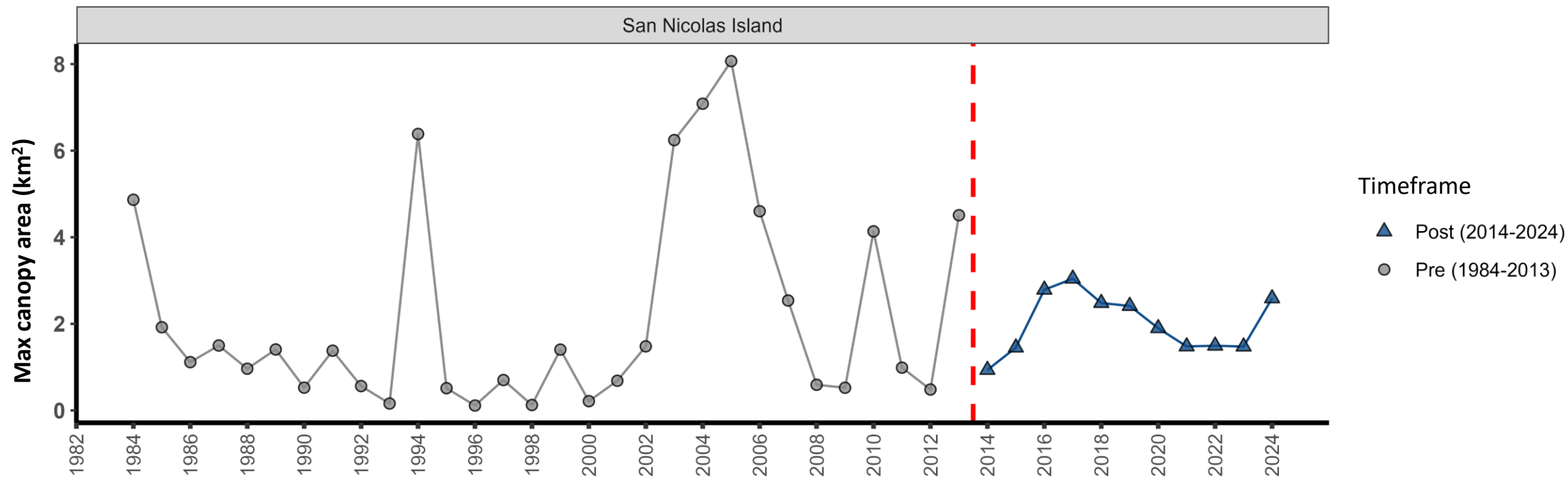
Kelp Canopy Status: Santa Barbara Island



Data Source: Santa Barbara Coastal LTER et al. 2025



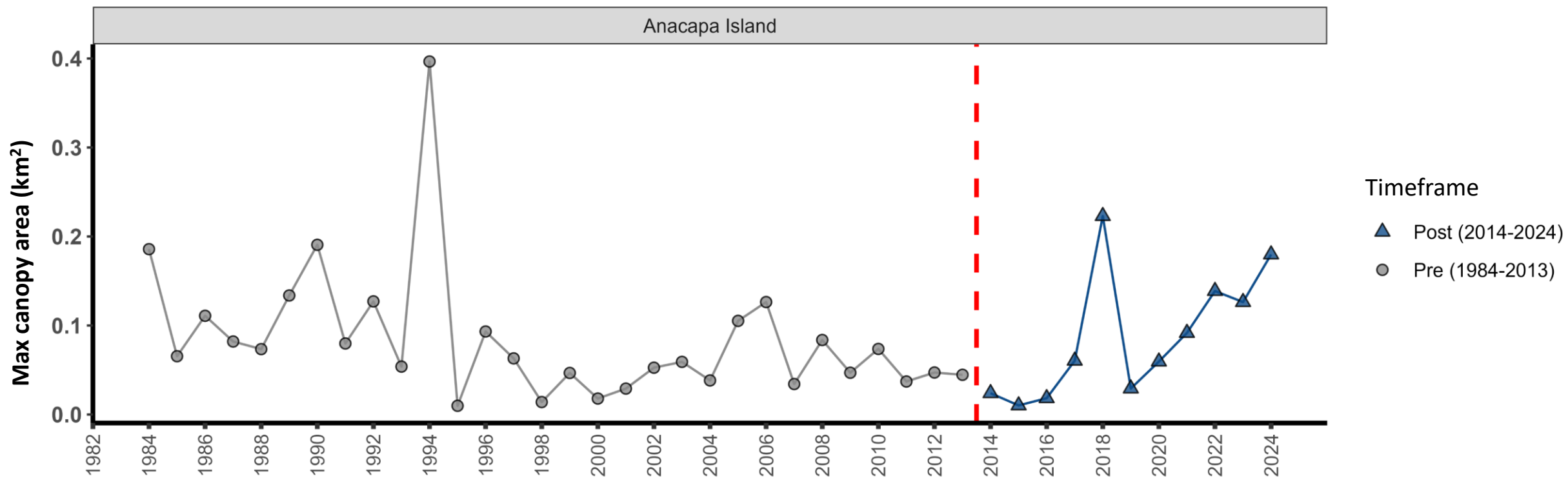
Kelp Canopy Status: San Nicolas Island



Data Source: Santa Barbara Coastal LTER et al. 2025



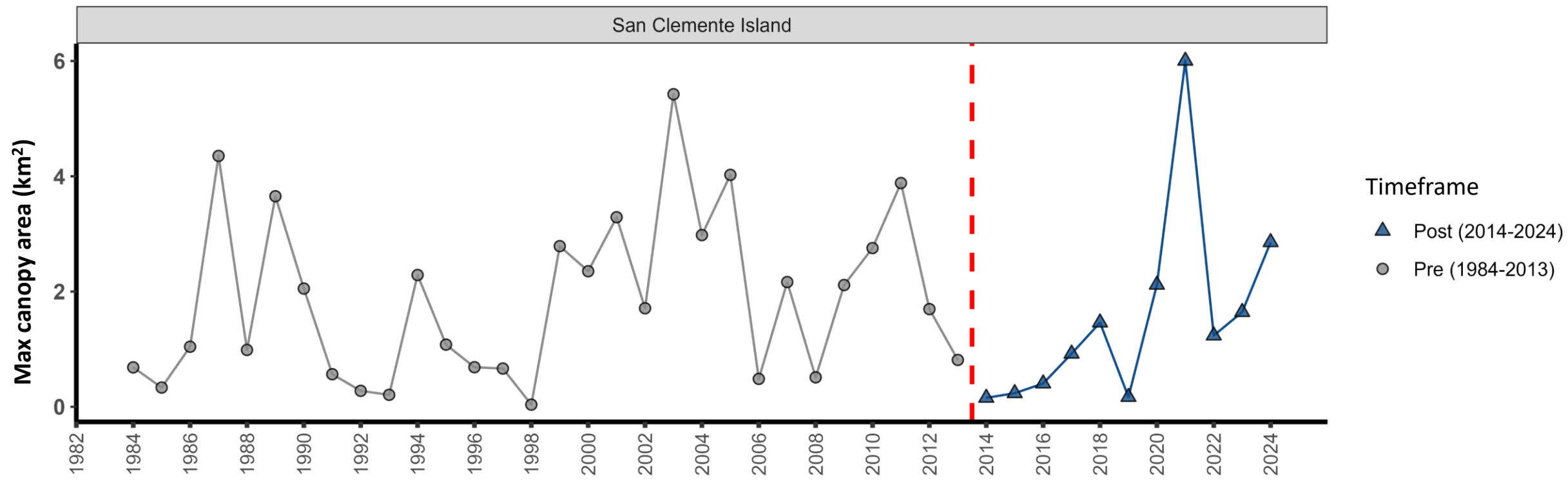
Kelp Canopy Status: Anacapa Island



Data Source: Santa Barbara Coastal LTER et al. 2025



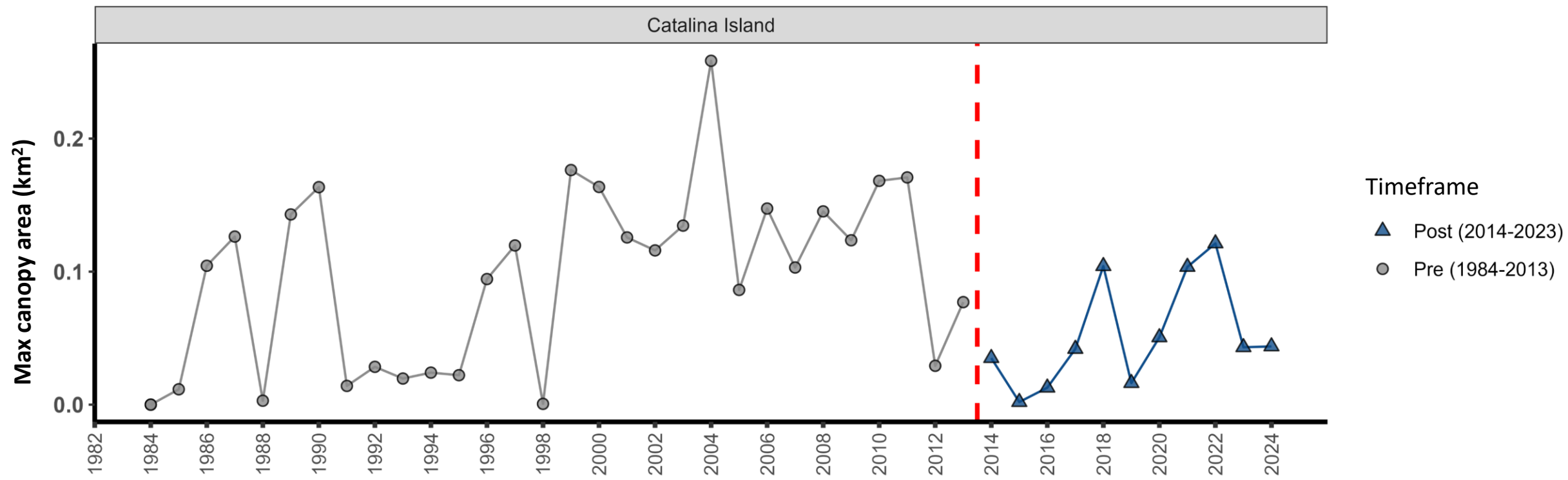
Kelp Canopy Status: San Clemente Island



Data Source: Santa Barbara Coastal LTER et al. 2025



Kelp Canopy Status: Catalina Island



Data Source: Santa Barbara Coastal LTER et al. 2025