Point Conception Institute and La Kretz Research Institute at Sedgwick Reserve
2025 Joint Science Symposium

Sedgwick Reserve
April 18, 2025

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Background

When The Nature Conservancy (TNC) launched the Point Conception Institute (PCI) at the Jack and Laura Dangermond Preserve, we set out to build an active and coordinated conservation research community that would work synergistically to advance our understanding of California's coastal ecosystems, with the goal of more effectively protecting, managing, and restoring critical habitat. Over the years since, PCI has developed a robust network of observational and modeling tools at the Dangermond Preserve (also known as the preserve's Digital Twin) and has made these tools—as well as the preserve itself—available to researchers and conservation practitioners. Beginning with an inaugural Specialist Meeting in 2019, PCI has brought together scientists to help guide the development of impactful conservation science that would leverage the unique attributes of the Dangermond Preserve. Since then, we have held annual gatherings or symposiums with the goal of growing and connecting our community. We also envisioned the opportunity to use the symposium to deepen engagement on specific themes, partnerships, or approaches.

For this year's symposium, we structured the program around a core body of work developed in partnership with the La Kretz Research Institute at the University of California's Sedgwick Reserve, as well as distinctive examples of work specific to Dangermond Preserve and Sedgwick. Situated inland near Santa Ynez, Sedgwick offers an extremely useful complement to the Dangermond Preserve; together, the two properties represent two ends of an ecological gradient from inland to coast.

In the spirit of complementarity and collaboration, this year PCI and the La Kretz Research Institute merged their annual symposia, giving attendees the opportunity to learn about research in both places. On April 18, the two centers co-hosted the 2025 Joint Science Symposium at the Sedgwick Reserve. This report summarizes the day-long gathering and provides links to the slides and recordings[1] from the presentations. All symposium-related materials can be found here.

Acknowledgements

We thank the Jack and Laura Dangermond Conservation Foundation for their generous co-sponsorship of the symposium. We also thank the Symposium Steering Committee (Frank Davis, Mark Reynolds, Heather Constable, Kristen Zumdahl, Elizabeth Hiroyasu, Emily McFadden, Kai Wise, Linda Garcia, and Karin Lin) for the thoughtful planning that made for a fantastic event and the Sedgwick and La Kretz teams for being such a pleasure to work with. Thank you to all of the 'day of' help from Emily McFadden, Kai Wise, Heather Constable, Kristen Zumdahl, Kelly Easterday, Elizabeth Hiroyasu, Moses Katkowski, Keith Miller and others.

[1] Due to technical difficulties, we are unable to provide recordings for every presentation.

We would also like to thank all the many presenters for sharing your findings and for your creativity and enthusiasm throughout. Finally, we would like to express our appreciation for the Zegar Family Foundation, Morton La Kretz, and other funders who have supported the vital research presented at the symposium. In this very challenging time for science, conservation, and the world, creating and sustaining community is more important than ever. It was uplifting to spend a day together among the oaks, immersed in science, nature, and camaraderie.

Session One

Presentation 1: "The Opportunity of the Geographic Approach" | slides | recording

Presenter: Trisalyn Nelson, Ph.D., Professor and Jack and Laura Dangermond Endowed Chair, Department of Geography, and Director, Center for Spatial Studies and Data Science, University of California, Santa Barbara (UCSB)

In this talk, Dr. Trisalyn Nelson illustrated the geographic approach to conservation research through the example of a study of grizzly bears in the Canadian province of Alberta. By combining spatial datasets such as landcover with field data such as GPS collar locations and instances of bear mortality, researchers were able to see that 90% of bear deaths were occurring within 500 meters of a road. This is just one example of the power of spatial analysis to integrate large amounts of data, reveal patterns that can be linked to processes and outcomes, and inform management decisions.

Presentation 2: "High Frequency Imaging Spectroscopy Data from SHIFT Show Phenological Changes in Trait Expression in Grazed Landscapes" | slides | recording

Presenter: Natalie Queally, Ph.D., Postdoctoral Researcher, Department of Ecology and Evolutionary Biology, University of California, Los Angeles (UCLA)

Dr. Natalie Queally presented on her use of data from the NASA Surface Biology and Geology High-Frequency Time Series (SHIFT) campaign to study the effects of grazing on vegetation at the Sedgwick Reserve and the Dangermond Preserve. Using SHIFT hyperspectral data, Dr. Queally could relate phenological traits in grasslands to the length and intensity of grazing. Her analysis showed that long-term grazing led to higher leaf mass per area but lower plant nutrient content, whereas recent, short-term grazing produced lower leaf mass per area but higher plant nutrient content.

Presentation 3: "Balancing Biodiversity Benefits and Feasibility in Large Scale Restoration Projects" | slides | recording

Presenter: Nick Saglimbeni, Ph.D. student in Ecology, Evolution, and Marine Biology, UCSB

With more than 1,000 acres covered by invasive ice plant, the Dangermond Preserve provides a testbed for techniques to remove invasives and restore native plant communities. In this experiment on land cleared of ice plant, Nick Saglimbeni compared planting seedlings, which is time- and cost-intensive, with seeding, which can be done quickly and

relatively inexpensively over a large area. After one year, seeding produced the greatest degree of native plant cover, whereas planting produced the greatest species richness. These complementary approaches can be used together for cost-effective, large-scale restoration efforts.

Presentation 4: "Remote Sensing of the Lake Fire" | slides

Presenter: Dar Roberts, Ph.D., Distinguished Professor, Department of Geography, UCSB

In August 2024, the Lake Fire burned more than 38,000 acres in Santa Barbara County, including a portion of the Sedgwick Reserve. Dr. Dar Roberts presented on his lab's use of remote sensing to map the condition of fuels before the fire, active burn areas during the fire, and the severity of burning after fire has passed. The team is also assessing the landscape's recovery in the months after the fire.

Presentation 5: "Fire Intensity and Burn Severity for Oaks in Prescribed Fires at Sedgwick Reserve" | slides

Presenter: Kaili Brande, Ph.D. candidate, Bren School of Environmental Science and Management, UCSB

In recent years, Prescribed Fire Training Exchange (TREX) events at the Sedgwick Reserve have afforded an opportunity to study prescribed fire in oak woodlands—an area that is currently understudied. Before TREX burns were carried out on reserve oak woodlands in 2022 and 2023, Kaili Brande placed on oak trees devices that measure fire temperatures; afterward, she recorded observations of burn severity. Comparing these metrics across burn sites provides useful information about the effects of prescribed fire on oak tree health.

Presentation 6: "Plant Physiology at the Nexus Between Drought and Fire" | slides

Presenter: Lee Anderegg, Ph.D., Assistant Professor of Ecology, Evolution, and Marine Biology, UCSB

In this talk, Dr. Lee Anderegg discussed work by members of his lab to follow two lines of inquiry: 1) How does drought stress in oaks influence their flammability, and can remote sensing measure this? and 2) Are oaks sensitive to when prescribed fire occurs? To answer the first question, Ph.D. Indra Boving assessed water stress in 55 oak trees at 11 time points over spring and summer, comparing in situ data with remote sensing data. She found that remote sensing can capture both water stress and live fuel over time, and that the relationship between the two attributes is complicated by plant physiology. In the second investigation, M.S. student Ryan Fass found that conducting prescribed burns when black oaks are dormant reduces damage to and death of trees, compared to burning after leafout.

Session Two

Presentation 7: "Remote Sensing Investigations into Vegetation Structure and Composition at Sedgwick Reserve and Dangermond Preserve" | slides | recording

Presenter: Dan Sousa, Ph.D., Associate Professor of Geography, San Diego State University

In this talk, Dr. Dan Sousa summarized the work that members of his lab are engaged in at the Sedgwick Reserve and Dangermond Preserve (as well as other TNC preserves). Their projects include using SHIFT data to characterize the dynamics of plant phenology over space and time, mapping oak woodland resilience, and modeling burn severity metrics based on remotely sensed predictors.

Presentation 8: "Fire Behavior Responses to Fine Fuels Biomass Removal Suggest Management Targets for Wildfire Mitigation Using Targeted Grazing" | slides | recording

Presenter: Marc Mayes, Ph.D., Senior Scientist, Spatial Informatics Group–Natural Assets Laboratory (SIG–NAL)

Dr. Mark Mayes shared the results of a project aimed at determining how much grass removal (such as from targeted grazing) is necessary for a successful and safe prescribed burn on California's oak-savanna rangelands. His team conducted burns on experimental plots on Sedgwick Reserve, testing the effects of grass removal on flame height, surface temperature, and spread rate. They found that the amount of biomass removal typical with grazing can mitigate fire behavior, given mild weather conditions.

Presentation 9: "Preserving Smarter: Leveraging Technology for Impactful Protected Area Management and Conservation" | slides | recording

Presenter: Kelly Easterday, Ph.D., Director of Conservation Technology at TNC's Point Conception Institute

In this talk, TNC's Dr. Kelly Easterday presented on the application of technology to translate remote-sensing and field station ecological data into actionable information that can help conservationists manage and rewild lands efficiently and effectively. She shared information on geospatial data–driven decision support tools under development at PCI, including a water systems monitoring toolkit and a fire decision toolkit.

Presentation 10: "The Impact of Wildfire on Environmental Stress in Valley Oak" | slides | recording

Presenter: Lily D. Peck, Ph.D., Postdoctoral Scholar, Department of Ecology and Evolutionary Biology, UCLA

As part of her postdoctoral work in Dr. Victoria Sork's lab, Dr. Lily Peck investigated how the July 2024 Lake Fire impacted valley oak at the Sedgwick Reserve. Sampling burnt trees at shortly after the burn in August, Dr. Peck found that fire stressed them in various ways, causing disruptions to carbon dioxide uptake and transpiration and morphological changes

in newly grown leaves. In addition, trees in the fire zone produced fewer acorns but also had a higher rate of germination.

Presentation 11: "Serpentine's Toxic Touch: Plants Know, but Do They Show?" | slides | recording

Presenter: Piper Lovegreen, Ph.D. Student in Ecology, Evolution, and Marine Biology, UCSB

In this presentation, Piper Lovegreen shared work aimed at determining whether remote-sensing of plant traits can provide insights into the subsurface. She used SHIFT data to compare the spectral signatures of plants growing in the Sedgwick Reserve over two different geologic formations, one of them containing serpentine soils with a much lower ratio of calcium to magnesium than the other. She found that the plant traits made detectable by spectral imaging did indeed reflect the soil differences between the two regions, indicating there is potential for remote sensing to help us understand subsurface conditions without disturbing plants.

Session Three

Presentation 12: "CATALYST Preserves: Mapping Invasive Vegetation Using Imaging Spectroscopy Data" | slides | recording

Presenter: Latha Baskaran, Ph.D., Geospatial Technologist, NASA Jet Propulsion Laboratory (JPL)

Dr. Latha Baskaran presented on her use of SHIFT data to map invasive plants as part of the CATALYST project, a collaboration among JPL, PCI, La Kretz Research Institute, and NASA project SHIFT partners. The Dangermond Preserve contains about 1,000 acres dominated by ice plant, an invasive succulent that TNC is working to remove. By mapping ice plant with remotely sensed data over time, the team can see how ice plant extent changes over time, allowing them to measure the effects of removal efforts. In future work, Dr. Baskaran will test the use of SHIFT data to map nonnative grasses on the Sedgwick Reserve.

Presentation 13: "Species on the Move: Planning for Future Habitat Shifts at the Dangermond Preserve Under Climate Change" | slides | recording

Presenter: Amy Frazier, Ph.D., Professor of Geography and Jack and Laura Dangermond Endowed Chair of Conservation Science, UCSB

With climate change pushing species toward the poles and upward in elevation in search of habitable conditions, it is important to understand how these shifts might play out on protected lands. In this talk, Dr. Amy Frazier presented on lab's ongoing work to map projected long-term climate zone shifts, as well as modeled shifts in the habitable range of sensitive species, at the Dangermond Preserve.

Presentation 14: "Conserving California's Future Coasts" | slides | recording

Presenter: Erica Nielsen, Ph.D., Anthony LaFetra Research Fellow, PCI

In this presentation, Dr. Erica Nielsen described her efforts to characterize climate vulnerability along the California coast, particularly in rocky intertidal ecosystems where conservationists are working to restore and protect endangered black abalone. Having mapped various attributes of coastal climate vulnerability—including climate refugia potential and species richness and genetic diversity, Dr. Nielsen has confirmed that the Point Conception area is a climate refugia hotspot. She is now working on translating these results into a tool to help conservationists prioritize coastal areas for protection given their potential for climate resilience.

Presentation 15: "Macroecological Tools for Local-Scale Conservation: Understanding the Biogeographic Context of the Jack and Laura Dangermond Preserve" | slides | recording

Presenter: Giovanni Rapacciuolo, Ph.D., Chief Executive Officer, Elimia

Dr. Giovanni Rapacciuolo presented on how macroecological tools that identify patterns over space and time in ecosystem attributes like species richness and distribution can be applied to conservation decision-making at small spatial scales. In recent work, Dr. Rapacciuolo and collaborators used a macroecological approach to identify the northern and southern limits for species as they shift range with continued climate change and found that the Dangermond Preserve is situated along the southern limit for many species.

Presentation 16: "Using Watershed Science and Restoration to Return Endangered Southern California Steelhead to Jalama Creek" | slides | recording

Presenter: Matthew Mensinger, Ph.D., PCI Fellow and Postdoctoral Scholar, Ecology and Evolutionary Biology, UC Santa Cruz

In this talk, Dr. Matthew Mensinger discussed his work to support the restoration of endangered Southern California steelhead to the Jalama Creek watershed at the Dangermond Preserve. He and collaborators have conducted steelhead habitat surveys in the watershed and are monitoring the effects of the recent removals of two fish barriers in Jalama Creek.

Presentation 17: "Using Landscape Genomics to Predict Coast Live Oak's Response to Climate Change and Provide Guidance for Conservation" | slides | recording

Presenter: Ryan Buck, Ph.D., Postdoctoral Scholar in Ecology and Evolutionary Biology, UCLA

In the work he presented, Dr. Ryan Buck and his colleagues at the Sork Lab and TNC explored the use of landscape genomics as a conservation tool in the specific context of protecting coast live oaks. Using genetic samples from oaks on TNC's preserves across California, the team identified regions where coast live oaks are most vulnerable to continued warming, as well as seed sources that are already well-adapted and can be used in propagation at troubled sites. Among the findings were that oaks at Dangermond Preserve are relatively resilient, and conservation efforts should focus on maintaining and expanding existing populations.

Pitch Session

The final session of the day focused on gathering ideas for future research, collaborations, or tool development. PCI Director Mark Reynolds and La Kretz Director Frank Davis challenged attendees to think from the perspective of ecologists 50 years in the future, imagining what they would wish we would have been doing Dangermond and Sedgwick right now. Participants shared ideas for lines of inquiry, which included the following:

- Creating geospatial information on grazing history on rangelands
- Monitoring birds, making use of the Motus tower at Dangermond Preserve, to inform windmill siting
- Developing a systematic method for tracking conservation actions and outcomes
- Assessing carbon storage on the Dangermond and Sedgwick landscapes, both above and underground
- Improving our understanding of landscape hydrology, geohydrology, and geomorphology on the landscapes
- Reimagining the role and oversight of field stations to maximize the impact of resources and research

Concluding Comments

With more than 80 attendees representing the depth and breadth of research spanning Dangermond Preserve and Sedgwick Reserve, the symposium showcased the many synergies and partnerships emerging. The presentations, posters, and pitch session discussion offered a sample of the exciting work underway and the enthusiasm for what's ahead. The diversity and quality of research on display—including oak genomics, NASA earth observation, GIS and remote sensing, changing species distributions, coastal conservation, watershed science, restoration, invasive species, and fire management—was truly impressive. And the nesting great horned owls with two young owlets near the Tipton Conference Center at Sedgwick certainly set a great vibe for the day.

Once again, we thank the Jack and Laura Dangermond Conservation Foundation for supporting this important and productive gathering. TNC is proud to be part of the conservation research community that came together, and we look forward to continuing to help one another unlock the learning that will help us protect nature.