Cal Poly Humboldt
Sea Level Rise Institute
Annual Report
Academic Year 2022 - 2023

August 2023

Adam Canter, co-chair
Laurie Richmond, co-chair
Kristen Orth-Gordinier, secretary

Cal Poly Humboldt

SLRI

Sea Level Rise Institute

Photos by Alexandra Hootnick / Special to The Chronicle

Andrea Pickart, an ecologist at U.S. Fish and Wildlife Service, has worked to restore native plants at Lanphere Dunes.

Sea on West Coast rising fastest at Humboldt Bay

Executive Summary:

As a core vision, the Cal Poly Humboldt Sea Level Rise Institute (SLRI) "envisions a diverse network of collaborators working together across disciplines, sectors, and ways of knowing to develop sea-level rise research and planning that informs equitable, sustainable, and community-centered local climate action." The SLRI had a productive academic year from 2022 - 2023 in service of this vision. Key accomplishments included:

- **Governance** - Over the summer of 2022, the group formally became an institute at Cal Poly Humboldt and adopted a formal charter including a vision statement, values, goals, and governance structure.
- **Participation** - Over the course of the academic year, participation in the SLRI more than doubled from 20 in August 2022 to 48 in July 2023.
    - Participation includes representatives from academic institutions, Tribes, government agencies, NGOs, the private sector, and civic and community groups in the region.
- **Projects and Awards** - Participants in the SLRI have been a part of over ten funded projects which total over $3.68 million dollars in awarded funds.
    - Grants and projects have been led by a variety of entities including: Cal Poly Humboldt, the Wiyot Tribe, Humboldt Baykeeper, and US Fish & Wildlife Service.
- **Publications & Presentations** - SLRI participants were authors or influencers of 10 publications and/reports and over 11 presentations related to SLR topics.
    - SLRI members developed their first joint publication (25 authors) for the Humboldt Journal of Social Relations titled: Transformative Sea-level Rise Research and Planning: Establishing a University, Tribal, and Community Partnership for a Resilient California North Coast
- **Media** - Work of the SLRI was mentioned in over 24 media pieces this year in venues including the San Francisco Chronicle, the North Coast Journal, the Eureka Times Standard, the Lost Coast Outpost, and Humboldt Magazine, and the Econews podcast.
- **Events** - The SLRI hosted two major events, a king tide viewing activity and a community discussion about locally stored nuclear waste following the staging of the play "The Children"
- **Students** - SLRI employed two student research assistants; had five graduate student members; led four SLR-related undergraduate capstone projects (in ESM and ERE); and collaborated with the Wiyot Tribe on the hosting of a summer ecocultural restoration program for five native students.

Governance:

Charter and Institute Status

The 2022 - 2023 academic year brought big changes to the SLRI. In the summer of 2022, the Sea Level Rise Initiative transformed into the Sea Level Rise Institute as the university granted it formal institutional status. A complete list of Cal Poly Humboldt centers and institutes can be found here. This Institute status solidifies the role of a collaborative, community-based network planning for climate resilience around Wigi or Humboldt Bay. Transforming to an institution increases the visibility of the work and provides increased mechanisms for fundraising.

In the process of becoming an institute, the SLRI developed a charter that outlines a governance framework. The structure consists of a University Oversight Committee, Executive Committee, Advisors, Voting Members, and Non-Voting Participants. This Executive Committee is made up of two co-chairs and a secretary/treasurer. One of the co-chairs must be connected to the University. Laurie Richmond (Professor of Environmental Science & Management at Cal Poly Humboldt) and Adam Canter (Wiyot Tribe Natural Resources Director) are the current co-chairs and Kristen Orth-Gordinier (GHD) is the current secretary.

Membership

Over the course of the 2022/2023 academic year, participation in the SLRI more than doubled. In August 2022, the SLRI had 20 participants, and as of July 2023 that number has increased to 48. We added members from new organizations including the Coastal Commission, the Regional Water Board, the Coastal Ecosystems Institute, US Fish and Wildlife Service, Trinidad Rancheria, and Blue Lake Rancheria. A full list of participants in the SLRI and their affiliations can be found at the end of this report. Participation includes representatives from academic institutions, tribes, government agencies, NGOs, the private sector, and civic and community groups in the region.

Vision, Values, and Goals

Vision

The Sea Level Rise Institute views sea level rise planning as a transformative moment to reimagine the future of the California North Coast. We envision a diverse network of collaborators working together across disciplines, sectors, and ways of knowing to develop sea-level rise research and planning that informs equitable, sustainable, and community-centered local climate action.

Values

- **Collaboration:** We believe we can do more and be more effective if we work together, develop partnerships, and center community in our work.

- **Leadership:** Indigenous Peoples must be centrally involved in SLR research and planning on their ancestral territories. The SLRI maintains partnerships with local tribes to support their leadership in SLR response.
- **Interdisciplinary:** The spaces of intersection between diverse systems of knowledge (e.g. natural, physical, and social sciences, humanities, traditional ecological knowledge, community knowledge) inform our approach to SLR planning.
- **Justice:** Our research and projects contribute to equity-centered and "race aware" SLR research that furthers equity, inclusion, diversity, and justice.
- **Applicability:** The SLRI prioritizes engaged, applied research that can further community goals. We seek to engage our work with policy and decision-making processes at multiple scales.
- **Education:** SLR outreach and engagement is a pathway to empower students and communities to be informed and to fully participate in conversations about the future of the North Coast region.
- **Accountability:** The SLRI is composed deliberately as an academic-tribal-community-government partnership, which makes us well-positioned to develop robust research that is accountable to community needs, concerns, and interests.

Goals

- **Build and Maintain a Network:** Facilitate opportunities for tribes, researchers, community members, leaders, governmental, nongovernmental, and other partners from and beyond the Humboldt region to share knowledge and ideas about SLR risks and opportunities, collaborate on potential projects, and coordinate activities.
- **Educate Students, Faculty, and the Public:** Make information about SLR meaningful and accessible to tribes, community partners, government, planners, policy-makers, and the general public. Ensure that SLR research opportunities support the development of Cal Poly Humboldt faculty and students.
- **Focus Attention:** Bring attention, expertise, funding, and other resources to the SLR issue in our local area.
- **Develop Collaborative Research:** Seek out funding for SLR research projects that support creative and interdisciplinary collaborations, support community and tribal leadership, and contribute to further understanding of this complex issue.
- **Contribute to Best Available Science:** Assure our projects are supported by and contribute to innovations in best available science.
- **Build Capacity:** Seek out opportunities to build local capacity and student talent in our region and help support and train the next generation of climate leaders.
- **Keep True:** Develop road maps to remain accountable to our vision, values, and goals and to assure that our work is responsive to, and in conversation with, emergent community needs.
- **Be a Model:** Model approaches for building local capacity for just and effective climate action in a rural, underfunded region.

Projects and Grants:

Members of the SLRI have been involved in numerous projects related sea-level rise and coastal resilience. This section summarizes some of the projects and/or grants that SLRI members are involved with. Note that some of these projects were started or funded this year, while others are ongoing.

Reclaiming Mouralherwaqh: Wiyot Tribe Acquisition of Coastal Property for Cultural and Water Quality Protection
Funder: California Ocean Protection Council Prop 1 Coastal Environmental Justice Program
Awardees: Wiyot Tribe (Adam Canter, PI) and Cal Poly Humboldt (Laurie Richmond, PI)
Award: $1.2 million
Funding Period: January 2022 - December 2024
Description: There are over nine members of the SLRI supporting this project which involved the Wiyot Tribe acquiring a 46 acre parcel of land on a site known as Mouralherwaqh and developing a baseline assessment and ecocultural restoration and management plan. The acquisition helps to increase the Tribe's coastal resilience, by increasing ownership of coastal land that is more upland and less at risk from SLR inundation. The Wiyot Tribe is leading the effort with support from Cal Poly Humboldt and Humboldt Baykeeper. The Tribe completed the acquisition in July 2022 and held a Mouralherwaqh return ceremony in August of 2022. This AY the team has been working on community and cultural engagement, site assessment, and water quality monitoring related to the project.

Wiyot Climate Adaptation Plan Phase I
Funder: California Ocean Protection Council Prop 68
Awardee: Wiyot Tribe (Adam Canter, PI)
Award: $250,000
Description: In 2021, the Wiyot Tribe was awarded a grant to support the development of a Phase I of a Climate Adaptation Plan. The effort would include an assessment related to effects of and adaptation to sea-level rise. The project included interviews and outreach with Tribal members and elders around climate topics – conducted by fellow Tribal members and staff. Work on analysis and plan development occurred over the past AY.

Prioritization of Contaminated Sites for Sea Level Adaptation in the Humboldt Bay Area
Funder: California Environmental Protection Agency Environmental Justice Small Grants Program
Awardee: Humboldt Baykeeper (Jen Kalt, PI)
Amount: $48,691
Description: Over the past AY, Humboldt Baykeeper began work on this project to assess the risk of contaminated sites around Humboldt Bay from inundation from SLR. As a part of this effort, they are developing a GIS database of contaminated sites, sea level rise projections, rising groundwater projections, dioxin test results, and relevant infrastructure; analysis of data gaps and sampling of potentially contaminated sites vulnerable to SLR and rising groundwater.

Humboldt Bay Rising Tides (A SLR Podcast Series)
Funder: California Coastal Commission's Whale Tail Grant Program
Awardee: Humboldt Baykeeper (Jen Kalt, PI)
Award: $48,730
Description: For this project, Humboldt Baykeeper is working on a podcast series featuring interviews with people who live, work, or have cultural connections to places at risk from rising sea level.

The Cascadia Coastlines & People Hazards Research Hub
Funder: National Science Foundation Coastlines and People Program
Awardees: Cal Poly Humboldt: Jennifer Marlow (co-PI) and Laurie Richmond (co-PI); PIs: Peter Ruggerio (OSU) and Anne Bostron (UW)
Funding Period: 2021 - 2026
Award: $19 million over 5 years; $452,861 to Cal Poly Humboldt
Website: https://cascadiacopeshub.org/
Description: The Cascadia Coastline and Peoples Hazards Research Hub, or Cascadia CoPes Hub, is a team of researchers funded by the National Science Foundation to increase knowledge about natural hazards and climate change–risks coastal communities face and explore ways to increase their resilience. Two faculty and four students from the SLRI have been a part of the Hub over the past year, mainly focusing their research on social science aspects of coastal hazards (Hub Team 3). Two graduate students have been developing thesis projects related to coastal resilience in northern California. The Hub has funded two undergraduate research assistants to support the SLRI and other research activities. One faculty and four students traveled to the annual All-hands meeting/retreat on Bainbridge Island, WA, to network and collaborate with other researchers and practitioners in the Cascadia region (Washington, Oregon, and Northern California). Humboldt also has enrolled two undergraduate students in the Hub's CHARTER Fellows program, whose goal is to increase the participation of underrepresented students in STEAM research and in the Hub.

Coastal Resilience and Adaptation to Sea-level Rise in the Rural and Underserved California North Coast Region
Funder: California Sea Grant
Awardee: Cal Poly Humboldt (Laurie Richmond - PI)
Description: In fall of 2022, SLRI member Laurie Richmond secured funding to join California Sea Grant for a quarter of her time. She will act as an Extension Specialist with a focus on coastal resilience and SLR – with a goal to help communities and Tribes in the North Coast understand and address sea-level rise, coastal flooding, erosion, and other changes. In this role, she hopes to leverage this position to bring more resources and attention to marine and coastal issues in our region.

44 Feet Project
Funder: California Sea Grant & CSU COAST ($96,923); Cascadia CoPe
Awardees: Cal Poly Humboldt Jennifer Marlow - PI
Project Website: www.44feetproject.com/

Description: Thirty-seven tons of commercial nuclear waste are stored on the inland coast of Humboldt Bay, California, in an underground storage vault called the Humboldt Bay Independent Spent Fuel Storage Installation (HB ISFSI). Its location is vulnerable to three adjacent earthquake faults, encroaching sea level, potential tsunamis, bluff inundation, tsunamis, and erosion. 44 Feet is a forward-looking, transdisciplinary research project that explores these risks to the ISFSI by engaging participants from the Humboldt public in scenario analysis, a well-established method for facilitating complex information exchange about highly uncertain conditions; theater; public talks; proposals for regulatory and legislative reform; and panel discussions.

Trinidad Community Coastal Resilience Planning Project
Funder: California Ocean Protection Council Prop 68
Amount: $440,000
Awardee: City of Trinidad; Kristen Orth-Gordinier, GHD, project consultant
Website: https://trinidad.ca.gov/coastal-resilience-project
The Trinidad Community Coastal Resilience Planning Project (TCCRP) will develop the Trinidad Community Coastal Resilience Action Plan for the benefit of its coastal and marine ecosystems, coastal economy, residents, and visitors. The City of Trinidad will collaborate with Planning Partners, community members and the public to engage in coastal resilience planning. SLRI secretary Kristen Orth-Gordinier has been involved as a member of the project's consultant team, helping to facilitate community engagement and planning.

Eureka-Arcata Highway 101 Corridor SLR and Coastal Hazards Engineering Assessment
Funder: Caltrans
Amount: $549,950
Awardees: Cal Poly Humboldt - Bonnie Ludka, Eileen Cashman, Jo Archibald
Description: Caltrans will be giving a contract to SLRI members from the Cal Poly Humboldt Environmental Resources Engineering Department to provide subject matter expertise and address technical study needs related to the Comprehensive Adaptation and Implementation Plan (CAIP) for the Highway 101 Eureka-Arcata Corridor. Cal Poly Humboldt will assist Caltrans in two two major CAIP-related tasks: (1) Task 1 - Evaluate Existing and Anticipated Conditions and (2) Task 2 - Review of Conceptual Adaptation Strategies and Develop Strategies for Analysis and Assessment.

Humboldt Coastal Resiliency Project
Amount: $430,750
Funders: Coastal Conservancy and Ocean Protection Council
Awardees: U.S. Fish and Wildlife Service; Andrea Pickart and Friends of the Dunes
Websites: Coastal Dune Science Network; Friends of the Dunes
Description: This is a collaborative research project focusing on the outer coast in the Eureka littoral cell. Work has been ongoing since 2015, with a series of grants to support the work. This study will improve understanding of sediment movement along the entire Eureka littoral cell, a 32-mile unit of coastline. The study will identify potential vulnerabilities to climate change and potential response to future sea level rise. Two demonstration adaptation sites were established

and monitored, demonstrating that restoration of invaded foredunes to native species increases resiliency to extreme events.

Publications & Reports

Members of the SLRI were involved in the development of several reports and/or publications related to SLR and coastal resilience over the past year. In addition, the SLRI has continued to update and develop its document repository that helps to organize and make accessible documents and reports related to SLR and coastal resilience in our region. SLRI member Jen Marlow led the efforts to develop a repository with documents specifically related to the ISFSI. If folks have additional documents to add to the repository they can contact SLRI Research Amelia Vergel De Dios (email: arv50@humboldt.edu). Key publications from the SLRI the past year or so included:

(1) Richmond, Laurie, Jeff Anderson, Josephine Archibald, Alec Brown, Eileen Cashman, Joice Chang, Clancy De Smet, Yvonne Everett, James Graham, Nayre Herrera, Bente Jansen, Jennifer Kalt, Aldaron Laird, Lonyx Landry, Daniel Lipe, Bonnie Ludka, José Marín Jarrín, Jennifer Marlow, Kristen Orth-Gordinier, Jason Patton, Frank Shaughnessy, Alyssa Suarez, Alexandra Toyofuku, Amelia Vergel de Dios, and Hilanea Wilkinson. 2023. "Transformative Sea-level Rise Research and Planning: Establishing a University, Tribal, and Community Partnership for a Resilient California North Coast." Humboldt Journal of Social Relations 1 (45): 67-93. DOI: https://doi.org/10.55671/0160-4341.1167

Details: The SLRI membership worked together to develop this publication that describes the SLR issue in our local region and presents the SLRI vision for working together to address SLR; particularly in light of the University's transition to a Polytechnic. The paper contains sections related to: Indigenous Knowledge & Leadership; Geosciences; Marine & Coastal Science; Engineering; and Social Science, Policy, Law, & Planning. This is part of a special issue of the Humboldt Journal of Social Relations: 50th Anniversary Edition: Becoming a Polytechnic.

(2) Patton, J. R., Williams, T. B., Anderson, J. K., Hemphill-Haley, M., Burgette, R. J., Weldon II, R., McPherson, P.C., & Leroy, T. H. (2023). 20th to 21st Century Relative Sea and Land Level Changes in Northern California: Tectonic Land Level Changes and Their Contribution to Sea-Level Rise, Humboldt Bay Region, Northern California. DOI: https://doi.org/10.55575/tektonika2023.1.1.6

Details: SLRI members Jay Patton and Jeff Anderson co-authored this article with a group of Northern California-based geologists and engineers. This paper highlights the way that geological subsidence heightens vulnerability to sea level rise. It identifies distinct areas around Humboldt Bay that are experiencing this increased relative sea level rise due to ground movement. These areas include the Eel River Valley of southern Humboldt Bay.

(3) Hilgendorf, Z., Walker, I.J., Pickart, A.J. & Turner, C.M. (2022) Dynamic restoration and the impact of native versus invasive vegetation on coastal foredune morphodynamics, Lanphere Dunes, California, USA. Earth Surface Processes and Landforms, 1–17. link

Details: This paper explores the role of dune restoration in increasing coastal resilience. The paper shows how restored dunes with native vegetation performed better than those with non-native vegetation. Restored foredunes increased in breadth, height and volume, and recovered from erosive events up to two years aster than invaded foredunes.

(4) Humboldt County Civil Grand Jury 2022-2023. (2022). “The Sea Also Rises”. Humboldt Released September, 2022. Link

Details: The public interest in SLR inspired the Humboldt County Civil Grand Jury to investigate why SLR is happening, how damaging its effects will be, and what must be done to adapt to it. In September 2022, the conclusion of a study conducted by the County’s Planning Department is expected to recommend the collaborative approach that should be pursued to address SLR around Humboldt Bay. The report cites data gathered by SLRI graduate student Kristen-Orth

(5) Brown, A., Marlow, J., Marlow, T. 2023. 44 Feet: Focus Group Workshops Report. Report Submitted to California Sea Grant and CSU COAST in Fulfillment of Grant Agreement No. NA180AR4170073. Link.

Details: This 73-page report developed by SLRI faculty and students makes six recommendations for responsible long-term management of spent nuclear fuel on Humboldt Bay in a climate-changed era: 1) Form collaborative partnerships; 2) fund joint fact finding; 3) review existing standards and practices; 4) update industry and government standards; 5) explore (beyond-design-basis) nightmare accident scenarios, and 6) enhance public engagement. Recommendations are derived from four future scenarios envisioned by tribal, citizen, industry, government, NGO, and academic participants in Focus Group workshops.

(6) Marlow, J., Pero, M., Brown, A. 2022. Site Characteristics: Vulnerabilities, Opportunities, and Strategies for Managing Risk from Sea-Level Rise to Humboldt Bay’s Spent Nuclear Fuel Site. Report Submitted to California Sea Grant and CSU COAST in Fulfillment of Grant Agreement No. NA180AR4170073. Link.

Details: This 57-page report developed by SLRI faculty and students describes in detail the Humboldt Bay Independent Spent Nuclear Fuel Installation, provides a thorough site and waste characterization, examines sea level rise and coastal hazard risks to the site, and issues recommendations for mitigating risk in consideration of current legal and policy contexts.

(7) Humboldt County Civil Grand Jury 2022-2023. (2023). Humboldt County Emergency Preparedness: Ready or Not? Released June 16, 2023. Link

Details: While not (that we know) written by SLRI members, this report is linked to SLRI work, specifically the 44 feet project led by Jennifer Marlow. The Civil Grand Jury finds that Humboldt

County is not adequately prepared to deal with a major natural and unnatural disaster. It particularly calls out emergency planning related to the ISFSI.

(8) McNerthney, M. 2023. Saltmarsh & Sea Level Rise in Arcata Marsh: Modeling Current and Future Saltmarsh Distribution. Cal Poly Humboldt Masters Thesis

(9) Ludka, B. C., Young, A. P., Guza, R. T., O'Reilly, W. C., & Merrifield, M. A. (2023). Alongshore variability of a southern California beach, before and after nourishment. Coastal Engineering, 179, 104223.

Details: We investigate the link between wave-driven alongshore currents and hotspots of erosion and accretion on a sandy southern California beach. Additionally, we analyze the effectiveness (both positive and negative impacts) of beach nourishment as a coastal management technique to manage hotspots. The influence of alongshore sand transport on the migration and closure of a nearby river mouth is also discussed. This work will become increasingly important to develop best management practices as vulnerable hotspots and river mouths evolve under rising seas.

(10) Warrick, J.A., Buscombe, D, Vos K., Bryan, K. Castelle, B., Cooper, A., Harley, M.D., Jackson, D.W.T., Ludka, B.C., Masselink, G., Palmsten, M.L., Ruiz de Alegria-Arzaburu, A., Sénéchal, N., Sherwood, C.R., Short, A.D., Sogut, E., Splinter, K.D., Stephenson, W.J.. Syvitski, J., Woodroffe, C.D., Young, A.P. Evaluating Climate Signals on Global Coastal Shoreline Positions: A commentary on "Influence of El Niño on the variability of global shoreline position". Submitted to Matters Arising of Nature Communications.

Abstract: Almar and colleagues are correct in stating that, "understanding and predicting shoreline evolution is of great importance for coastal management." Amongst the different timescales of shoreline change, the interannual and decadal timescales are of particular interest to coastal scientists as they reflect the integrated system response to the Earth's climate and its natural modes of variability. Therefore, establishing the links between shoreline change and climate variability at the global scale would be a major achievement. However, we find that the work of Almar et al. does not achieve this goal because: (i) the satellite-based method does not meet the current standards of practice and produces inaccurate results, (ii) the spatial coverage of the shoreline dataset is not adequate for a global analysis, (iii) the relevance of the statistical analyses between the shoreline data and independent variables is questionable, and (iv) the findings do not capture physical patterns of shorelines developed from field-based observations.

Presentations

Canter, A. and L. Richmond. 2022. Reclaiming Mouralherwaqh: Wiyot Tribe Acquisition of Coastal Property for Cultural and Water Quality Protection. Presentation UC Hastings Law School American Indian Law: Enhanced Law Access Discussion. Organizer: Jo Carillo. November 14, 2022.

Richmond, L. and Adam Canter. 2022. CSU COAST Annual Meeting Panel: Community engagement and community science - Mouralherwaqh Discussion. Panelist. October 28, 2022

Richmond, L. 2023. Living in the 'blue zone' of a sea-level rise inundation map: Community perceptions of coastal flooding in King Salmon, CA. Association of American Geographers Annual Meeting. March 27, 2023.

Andrea Pickart. 2022/23. Humboldt Dunes Coastal Resilience Project Presentation: Dunes Symposium and Friends of the Dunes Coastal Naturalist Training.

J. Marlow, A. Brown. 2023. 44 Feet: Governance, Policy, and Planning. At What Point Managed Retreat?: Habitability and Mobility in an Era of Climate Change. Columbia University. June 23, 2023.

J. Marlow, A. Brown. 2023. "44 Feet: Vulnerabilities, Opportunities, and Strategies for Managing Risk from Sea-Level Rise to Humboldt Bay's Spent Nuclear Fuel Site," Cal Poly Humboldt, Schatz Renewable Energy Research Center's Climate and Clean Energy Speakers' Series. Feb. 23, 2023. Link.

A. Brown, J. Kalt, J. Marlow, S. Kullman. 2022. Discussants. Which Way the Wind Festival, Panel Discussion, "Humboldt Bay: Opportunities and Challenges." Oct. 14, 2022.

McNerthney, M. 2023. Saltmarsh & Sea Level Rise in Arcata Marsh: Modeling Current and Future Saltmarsh Distribution. Masters Thesis Presentation. April 20, 2023. Jim Graham: Committee Chair.

J. Kalt. 2023. Sea Level Rise in the Humboldt Bay Area. Presentation to Friends of the Dunes' Coastal Naturalist Training. May 3, 2023.

Ludka, B.C., Guza, R.T, O'Reilly, W.C., Borsa, A.A. "Wave-driven changes in beach sand levels." Moss Landing Marine Labs Seminar. August 25, 2022. Link.

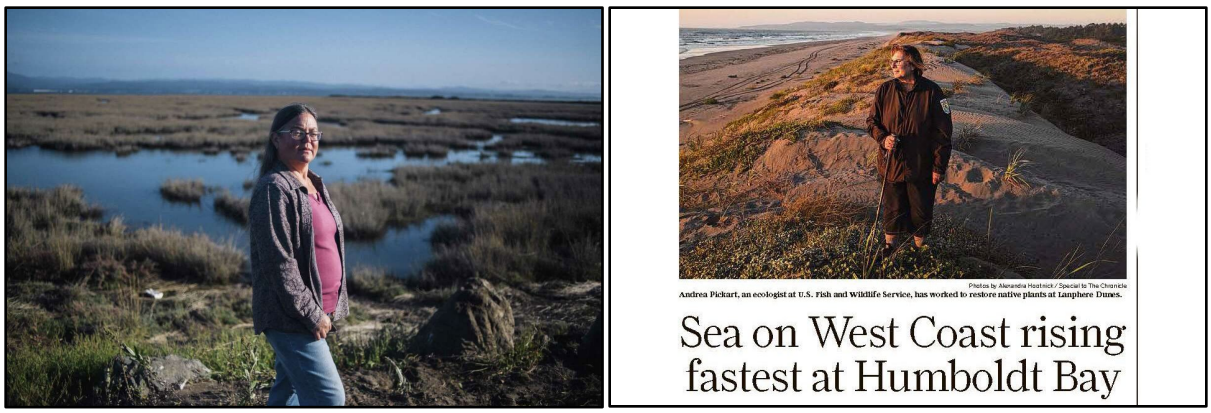
Ludka, B.C., Guza, R.T, O'Reilly, W.C., Borsa, A.A. "Wave-driven changes in beach sand levels." Cal Poly Humboldt Math Colloquium. September 1, 2022.

SLRI in the Media

SLRI-related work was extensively featured in the media over the past year including in local and state-wide venues. Below is a sample of some of the media.

(1) Duggan, T. 2022. "Here's where sea levels are rising fastest in California. Homes, a nuclear facility and part of Highway 101 are all at risk" San Francisco Chronicle. October 1, 2022.

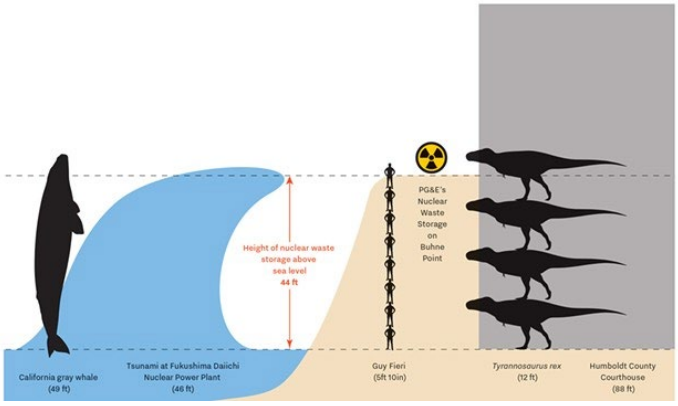
- This article on the cover of the Chronicle provides an overview of the SLR issue in Humboldt Bay with an aim to communicate it to a wider audience. It includes interviews and photographs with SLRI members Jen Kalt (Humboldt Baykeeper), Andrea Pickart (USFWS), and Clancy De Smet (D1 Caltrans).



Source: San Francisco Chronicle

(2) The 44 Feet Project, led by Jennifer Marlow, along with issues related to the ISFSI was the subject of numerous media reports over the past year. The project was the cover story of the North Coast Journal. The story incorporated a creative visual (shown below) that shows the distance of the ISFSI from sea-level when compared to a variety of objects: a gray whale, T-rexes, and local Humboldt celebrity Guy Fieri.

- Boyce Upholt, "Spent nuclear fuel sits on a crumbling California coastline. So what to do?," *California Sea Grant News*, July 12, 2023.
- Ryan Burns, "Not Adequately Prepared': Civil Grand Jury Says Humboldt County Must Improve Its Disaster Planning" Lost Coast Outpost. Jun 20, 2023.
- Michelle Loxton, How Diablo Canyon's likely delayed decommissioning will be extremely costly and comes with risks, KCLU, Nov. 25, 2022 (interview with PG&E Community Advisory Board Member, Mike Manetas, and Jennifer Marlow of the 44 Feet project).
- Alec Brown, "Reconciling Nuclear Safety and Climate Resilience," EcoNews Vol. 52, No. 10 – November 2022 by EcoNews - Issuu
- Tara Duggan, "Here's where sea levels are rising fastest in California. Homes, a nuclear facility and part of Highway 101 are all at risk," *San Francisco Chronicle*, Oct. 1, 2022.
- J.A. Savage, "44 Feet," *North Coast Journal*, Sept. 15, 2022.
- EcoNews Report Podcast, "The Future of Humboldt's Nuclear Waste Site," Jan. 1, 2022.
- J.A. Savage, "The Atomic Priesthood, Giant Rutabagas and What's Next for Humboldt's Decommissioned Nuke Plant," *North Coast Journal,* Dec. 16, 2021.
- J.A. Savage, "PG&E Reactor Officially Decommissioned, Nuclear Waste Not", *North Coast Journal*, Nov. 18, 2021
- J.A. Savage, "Dancing on the Hum Nuke's Grave is Strictly Prohibited," *North Coast Journal*, Nov. 04, 2021
- Isabella Vanderheiden, "PG&E completes decommissioning process, ends nuclear facility license", *Times-Standard*, Oct. 30, 2021



Source: North Coast Journal

(2) The Reclaiming Mouralherwaqh project was the subject of many media pieces over the past year. Some of the media outputs included:

- Wiyot Tribe and Cal Poly Humboldt. 2022. "Reclaiming Mouralherwaqh" August 19, 2022.
- Ocean Protection Council. 2022. "Wiyot Tribe Celebrates the Return of Coastal Land" August 22, 2022.
- Jennifer Savage. 2022. "Wiyot Tribe Reclaims Mouralherwaqh" North Coast Journal. August 20, 2022.
- McGeary, S. 2022. "Reclaiming Mouralherwaqh: Wiyot Tribe Acquires Culturally Significant Forest Land Near King Salmon" Lost Coast Outpost. August 19, 2022.
- Businesswire. 2022. " Wiyot Tribe Celebrates the Return of Coastal Land: 46 acres acquired in partnership with the Ocean Protection Council" Businesswire. August 22, 2022.
- KMUD Podcast, 2022. "Dishgamu Humboldt - Taking Land Back for Real"
- Econews Podcast, 2022. "Wiyot Tribe Celebrates the Return of Coastal Forest & Wetlands"

Source: North Coast Journal

(3) Ocean Protection Council. 2021. Prop 68 Climate Resilience Miniseries Episode 12: Wiyot Climate Change Adaptation Plan. Video.
This video posted in 2021, was updated in July of 2023. It provides an overview of the Wiyot Tribe's Prop 68 project. It features SLRI members and Wiyot Tribe employees Adam Canter and Hilanea Wilkinson.

(4) Humboldt, The Magazine of Cal Poly Humboldt "As Sea Levels Rise, So Does Research to Address It" Fall 2022.
This article highlights the role Cal Poly Humboldt has played in research and planning for SLR in the Humboldt Bay area. It also describes the SLRI recent award and involvement with the Cascadia Coastlines and People Hub and NSF project.

(5) Pickart, A. "Native Plants Combat Effects of Climate Change" North Coast Environmental Center. July 26, 2022.
This article describes work and findings related to the Humboldt Coastal Resiliency Project led by Andrea Pickart.

(6) Matson, J. "Humboldt Bay gets glimpse at future sea level rise" Eureka Times-Standard. December 23, 2022.
This article describes outcomes from December King tides in Humboldt and incorporates comments from SLRI member Jen Kalt.

(7) Humboldt Baykeeper SLR news and and information
Humboldt Baykeeper, led by SLRI member Jen Kalt, includes a section of their website dedicated to SLR news and info. It is a great resource for the latest news and developments related to SLR in our region.

Events

(1) King Tide Viewing

On January 21, 2023, the SLRI hosted a King Tide viewing event around Humboldt Bay. The goal was to observe and photograph water levels during the highest tides of the year -- often a preview of what could come with increased sea-level rise. Friends and members of the SLRI scattered to observe different sites around the bay and then came together for lunch at Cafe Marina.

King Tide Viewing near Elk River Restoration Site. Photograph: L. Richmond

(2) Staging of a Play and Community Talk-Back Related to Locally Stored Nuclear Waste:

On August 14, 2022, Jen Marlow, Alec Brown, and Craig Benson of the SLRI hosted a community discussion following a staging of “The Children” a play by Lucy Kirkwood (and Directed by Craign Benson) that deals with themes related to coastal hazards and nuclear waste. The talk-back discussion after the Sunday matinee was hosted by Redwood Curtain Theater to engage the audience in a conversation about the increasing vulnerability of the spent nuclear fuel stored locally on Buhne Point.

Source: 44 Feet Project

Students

Student Research Assistants: Two undergraduate research assistants supported the SLRI over the 2022-2023 AY. Amelia Vergel De Dios and Alexandra Toyofuku. They helped organize and coordinate meetings, update website and document repositories, assist with development of a publication, and more. We are grateful for their contributions.

SLRI Assistants Amelia and Alexandra at the Mouralherwaqh Return Ceremony, Photo: Kellie Brown

Graduate Students: Five graduate students were active in the SLRI, including developing and conducting research projects relevant to SLR. Students include: ESM: Nayre Herrera, Alyssa Suarez, Alec Brown, Maddie McNerthney; Geology: Christina Bewley

Capstone Projects: The ESM Planning and Policy and Environmental Resources Engineering Majors each included senior capstone projects related to sea-level rise. The ESM capstone projects were overseen by SLRI faculty member Yvonne Everett and the ERE by SLRI faculty Jo Archibald.

Exploring Opportunities and Constraints Related to Restoring Tidal Inundation to Mad River Slough Hydrologic Unit. ESM Planning & Policy Capstone Project Spring 2023
Authors: Walker Branson, Kylie Speth, Alexandra Toyofuku, Donovan Wakeman, Dana Keeler-Wolf, Danika Zikas

This project looks at the hypothetical scenario of examining the costs and opportunities related to restoring tidal inundation to Mad River Slough Hydrologic Unit. This project was conducted in coordination with the Wiyot Tribe, and could help to inform future Tribal land acquisition. This low-lying diked former tideland on northern Humboldt Bay is highly susceptible to SLR-related flooding, and creates a unique potential opportunity for Tribal acquisition and restoration. These students identified current land owners, researched potential land ownership strategies, and examined the regulatory frameworks guiding actions within the project area. They also conducted interviews with members from a variety of local agencies, and examined the environmental implications of restoring tidal inundation to agricultural lands.

Survey Report to Identify Research Priorities Regarding Sea Level Rise Adaptation around Wigi (Humboldt Bay). ESM Planning & Policy Capstone Project Spring 2023
Authors: Darian Acosta, Vanessa Odom, Jymanii Williams
This project focused on identifying research priorities related to SLR through a survey and a series of round-table discussions. They also worked to identify and collate SLR-related projects

and reports that have already been completed. These findings help establish knowledge about past SLR-related projects around the Bay and help to inform future research and projects for the Institute.

Sea Level Rise Analysis: High-Importance Access Road Protection. ERE Capstone Project. Fall 2022.
Authors: Max Alvin, Taylor Goodwyn, Karly Johnson, Pedro Valverde
ERE students worked to develop design alternatives to protect against SLR impact to the 101 Highway just south of Orick, CA.The team considered the flood risks posed by a 25-year SLR projection combined with a 100-year flood from Redwood Creek. The four designs developed and considered were a constructed rock berm, estuary restoration, raising the roadway, and highway retreat. The final suggested design was to restore the historic estuary and raise the road by four feet in this location. Students ran a hydraulic model to evaluate the water velocities during the 100-year flow through the proposed design.

Big Lagoon Sea Level Rise. ERE Capstone Project. Fall 2022.
Authors: Kyra Cohen, Malia Seeley, Dustin Helliwell, Albert Wolff
The student team developed and considered four alternative designs to protect highway 101 near Big Lagoon. The designs considered changes to the highway along its existing path, as well as a bypass option further inland. The final design recommended by the team is to construct three bridges that would raise the road elevation by 30 feet in areas of highest flood risk.

Mouralherwaqh Ecocultural Restoration Summer Program:
Daniel Lipe (SLRI and ESM) and Zack Erikson (Wiyot Tribe NR Department) led a summer program for Native students related to ecocultural restoration planning for Mouralherwaqh - a site recently acquired by the Wiyot Tribe. Five students from Cal Poly Humboldt and College of the Redwoods plus Wiyot Tribe staff and interns were involved in the project and helped to conduct forest, vegetation, wetlands, and cultural plant assessments. They also learned about SLR risk in Wigi and at the site.

Current Participation

*Adam	Canter	Wiyot Natural Resources Director, and co-chair of the Cal Poly Humboldt SLRI
*Laurie	Richmond	Professor of Environmental Science & Management, Cal Poly Humboldt, California Sea Grant Extension Specialist, and co-chair of the Cal Poly Humboldt SLRI
*Kristen	Orth-Gordinier	GHD, and secretary of Cal Poly Humboldt SLRI
*Aldaron	Laird	OLLI Sea Level Rise Special Interest Group, and co-founder of Cal Poly Humboldt SLRI
Megan	Acevedo	County of Humboldt
Marissa	Adams	Coastal Ecosystems Institute of Northern California
Jeff	Anderson	Principal Engineer, Northern Hydrology
*Josephine	Archibald	Assistant Professor of Environmental Resources Engineering, Cal Poly Humboldt
Craig	Benson	Cal Poly Humboldt
*Christina	Bewley	Cal Poly Humboldt student, local climate change scientist
Alexander	Brown	Graduate student, Cal Poly Humboldt
Eileen	Cashman	Professor of Environmental Resources Engineering, Cal Poly Humboldt
Joice	Chang	Associate Professor and Program Leader of the Department of Politics, Cal Poly Humboldt
*Sherry	Constancio	California Department of Water Resources
*Clancy	De Smet	D1 Caltrans - Climate Change Adaptation Branch
Yvonne	Everett	Cal Poly Humboldt
Joel	Gerwein	California State Coastal Conservancy
*Jim	Graham	Associate Professor of Geospatial Science, Cal Poly Humboldt
*Nayre	Herrera	Graduate student, Cal Poly Humboldt
*Rob	Holmlund	Humboldt Bay Harbor District
Bente	Jansen	California Coastal Commission
*Jennifer	Kalt	Humboldt Baykeeper
Melissa	Kraemer	California Coastal Commission
*Lonyx	Landry	INRSEP+ & ‘Governor’ of Humboldt County
Amber	Leavitt	California Coastal Commission
*Daniel	Lipe	Assistant Professor of Environmental Science & Management, Cal Poly Humboldt
*Bonnie	Ludka	Assistant Professor of Engineering, Cal Poly Humboldt
José	Marín Jarrín	Assistant Professor of Fisheries Biology, Cal Poly Humboldt
*Jennifer	Marlow	Assistant Professor of Environmental Law, Cal Poly Humboldt
Bill	Matsubu	Environmental Programs Director, Blue Lake Rancheria

Lorna	McFarlane	Caltrans
*Madeline	McNerthney	Graduate student, Cal Poly Humboldt Studying saltmarsh retreat due to SLR
Katerina	Oskarsson	Humboldt Area Foundation
*Jason R.	Patton	Dept. of Geology, Cal Poly Humboldt; California Geological Survey
*Andrea	Pickart	US Fish and Wildlife Service
Elizabeth	Pope	North Coast Regional Water Quality Control Board
James	Ray	California Department of Fish and Wildlife
Nick	Salgado-Stanley	Student, Cal Poly Humboldt
*Douglas	Saucedo	Humboldt Bay Harbor, Recreation, and Conservation District
Thomas	Saunders	Trinidad Rancheria
Frank	Shaughnessy	Professor Emeritus of Botany, Department of Biological Sciences, Cal Poly Humboldt
Matt	St. John	North Coast Regional Water Quality Control Board
Alyssa	Suarez	Graduate Student in the Environmental Science and Management Program, Cal Poly Humboldt
Ron	Sundberg	Trinidad Rancheria
Sandrine	Thompson	
*Alexandra	Toyofuku	Blue Lake Rancheria
*Amelia	Vergel de Dios	Undergraduate student, Cal Poly Humboldt, and student research assistant for SLRI
Adam	Wagschal	
Sarah	Wickman	Planwest Partners
Hilanea	Wilkinson	Wiyot Tribal Member; Technician at Wiyot Natural Resources Department
Fanny	Yang	California State Coastal Conservancy
Awbrey	Yost	California Coastal Commission

* *Indicates voting member*