

YALE INSTITUTE OF SACRED MUSIC PRESENTS

A CONCERT & SYMPOSIUM
BY THE COASTAL CONSERVATORY

Liminal:
Coastal Science
in Sacred Music

FEBRUARY 21, 2025
7:30 PM
SUDLER RECITAL HALL
NEW HAVEN



ABOUT THE EVENT

Integrating eco-acoustic performance with intellectual exchange across science and ethics, the Coastal Conservatory creates immersive ways of listening to coastal change. In this concert, EcoSono Ensemble will perform music made with data produced by the Virginia Coast Reserve Long-term Ecological Research project about sea level rise, oyster reef and seagrass restoration, and shorebird extinction. In symposial reflections, scholars and scientists will consider how music made from sonified data and with ecological relations may be heard as a new sacred music of the environment. Co-directed by faculty from music, environmental sciences, and religious studies from the University of Virginia, the Conservatory has been recognized by the Mellon Foundation, NSF, and NPR for its integrative way into relations by which coasts are being transformed. This event includes Yale students and faculty in live performance and scholarly conversation.

Please silence all mobile devices.

The use of photographic, recording, or electronic equipment during the performance is prohibited.

Your courtesy is appreciated.

LIMINAL: COASTAL SCIENCE IN SACRED MUSIC

A CONCERT & SYMPOSIUM BY THE COASTAL CONSERVATORY

Coastal Conservatory:

Matthew Burtner *Music/Ecoacoustics*

Willis Jenkins *Religious Studies/Environmental Ethics*

Karen McGlathery *Environmental Science/Ecology*

EcoSono Ensemble:

Lisa Edwards-Burrs *voice*

I-Jen Fang *percussion*

Naima Burrs *violin*

Kelly Sulick *flute*

Kevin Davis *cello*

Yale Musicians:

Keeley Brookes *violin*

Nate Strothkamp *violin*

SOUNDSCAPES OF RESTORATION

Barrier Island Soundscape

Dreams of Seagrasses

Oyster Communion

COUNTERPOINT | DIALOGUE

Os Schmitz *Yale School of the Environment*

Mary Evelyn Tucker *Yale Divinity School & School of the Environment*

INHUMAN COMPOSITION

Crab Flutes

The Metered Tide / Vaporous Clouds Condense / The Metered Tide Refrain

On the Strangest Sea

REFLECTIONS \ CONVERSATION

***Oyster Communion* (2022) by Matthew Burtner**

The complex range of crackles and pitches of oyster reefs on the Virginia shores offers clues to the health of these ecosystems. Snapping shrimp make the high, crackling sounds, while fish make lower sounds; the oysters themselves emit low crackling sounds as they open and close to filter food particles out of the water. The lowest sounds, made by waves and currents moving over the reef, tell us about its structure. On the oyster reef, we hear all this activity combined into one bustling soundscape. The field recording was made using a stereo hydrophone technique to create a highly spatialized and dimensional impression of this unique underwater environment. The field recording is set with an ensemble of dead oyster shells played by the ensemble as percussion instruments. The shells are struck and rubbed together to articulate their resonance. Performed in counterpoint with the field recording we hear across generations of oysters, the living animals and the shells left by the deceased. Over this oyster ensemble a singer sings:

We commune in lagoons and in estuaries,
Our soft bodies pulling from the sea,
Filtering toxins, absorbing wave break.
A reef is a shell for the coast.

We commune in lagoons and in estuaries,
Our soft bodies turning carbon from ocean into shells,
Sequestration as protection.
Shells hold atmosphere.

We commune among you.
Listen to our generations.
We slow erosion, strengthen the land, and clean the air.
We nourish life.
Listen to our generations.
A shell is a song.

***Dreams of Seagrasses* (2022) by Matthew Burtner**

Dreams of Seagrasses is a sonification and music composition exploring the photosynthesis and respiration of the seagrasses: their cycle of producing oxygen and consuming carbon dioxide across the day as a result of daylight and other environmental factors. The piece overlays this sonification with another sound created from analysis data of the chemical makeup of the seagrasses themselves. The metabolism was measured every hour for a period of two months; consequently, we hear the cycles of day and night across 24-hour periods and grouped into weekly harmonic cycles. The chemical data were collected across a period of seven years. The sonification allows a listener to gain a sense of the complexity of the system across years, months, days, hours, and seconds. The seagrass meadows create a habitat for the plants and animals that thrive in the protection and food they offer. In addition to restoring a rich ecosystem, seagrass beds also help attenuate forces of erosion.

Their roots act as anchors in the sand, and they protect the shore from storms by lessening the force of wave action before it reaches land. Globally, seagrasses also help mitigate the effects of climate change by absorbing carbon dioxide gas which would otherwise contribute to global warming as a greenhouse gas in our atmosphere. “In their underwater beds, swaying in the waves, what do the seagrasses dream about? Do they dream of flowers?”

***Crab Flutes* (2022) by Matthew Burtner**

Crab Flutes is music based on the domestic life of crabs. The fiddler crabs (*Uca pugnax*) create uniquely shaped tunnel homes in the mud on the banks of Virginia’s Eastern Shore. Each burrow is different, depending on the body size and digging techniques of the crab, and the conditions of the mud. These small habitats are called “flutes”; and like the musical instrument, they resonate at a specific frequency when air is blown across the opening. By placing a tiny microphone inside these crab flutes, we can listen to the sounds of the world (mostly the wind and sea) resonating inside the little cavern. Listen carefully and you can also hear the crab moving around inside. This music features a field recording made inside one of the crab flutes playing throughout. The harmony, melody, and rhythm of the composed music were derived from the crab’s habitat. The music is composed in counterpoint with this unique domicile, an expression of the crab’s body, effort, temperament, personality, and perhaps even imagination. The resonant frequencies of this particular burrow, for example, center around the notes C, B \flat , D \flat , E \flat and F, and a resonant filter built around these frequencies is used to create the electronics. These resonances also suggested a tonality of F Minor and B \flat Minor. The movements of the crab within the domicile determined the tempo and phrasing of the melody. Overall, the piece has an intimate and domestic feel, safe and relaxing. Crab burrows are important for the health of the coastal bank on the Virginia coast. The crabs’ tunnels oxygenate the mud banks while simultaneously excising sulfides and thus these tunnels may help increase the density of the tall grasses which in turn mitigate erosion of the mud bank.

***The Metered Tide* by Chris Chafe and Greg Niemeyer**

Created in the Summer of 2019 by Chris Chafe (composer) and Greg Niemeyer (videographer), this version of *The Metered Tide* was commissioned by the Coastal Conservatory for the EcoSono Ensemble in 2021. Greg Niemeyer suggested a location test for a sonification music video at Crissy Field, Golden Gate National Recreation Area, at the upper tip of San Francisco next door to the southern end of the Golden Gate Bridge. The sonified data set features 100 years of tidal records acquired by the gauge on the shore. The original version featured Chafe improvising on celletto (an electronic cello designed by Chafe in 1988) with the sonification audio; in this version, members of EcoSono Ensemble individually improvise with the celletto and sonification version, creating seven tracks. In post-production, Chafe’s software through which the audio mix is generated automatically follows the original tidal data. The sonification signal was thus the conductor and the

mixer, with the human musicians responding to it and being layered by it. The output we hear on this version is a mixed compilation of the seven tracks, in which the cuts are determined by the tidal data.

***Vaporous Clouds Condense* by Matthew Burtner**

Vaporous Clouds Condense is one of the songs from Burtner's climate change opera, *Auskalaq* (2010). In the opera, layers of eco-music—called Windprints, Iceprints, and Cloudprints—build up around a story, and then songs are sung over those layers. The section of the story told just before *Vaporous Clouds Condense* helps understand the context:

Below you, the snow and ice. Around you, the wind. And above you, a gray mat of cloud-cover presses down. It is a place of layers, of coexisting dimensions of change. Imagine yourself ... between the clouds and the snow, part vapor and part ice, a human motion set between the slippage of scales of time. The vaporous clouds condense across the sky surface in an unbounded drift, while the snow and ice landscape also continually changes, but more slowly, drifting with the wind, a slow-motion ocean of ice...cresting, breaking. While overhead the clouds drift".

Outside of the context of the opera, the piece evokes the role of atmosphere in the hydrologic cycle, and it calls polar systems into a broader dialog of coastal futures.

***On the Strangest Sea (2023)* by Kristin Hauge**

On the Strangest Sea is a sonification and composition designed to represent data and to create music inspired by the saltmarsh sparrow. The species is under threat of extinction due to several factors, including human development and sea level rise. A projection of population decline of female saltmarsh sparrows reveals that by the year 2050, the species is predicted to have gone extinct. The changing population is represented through changes in the music's textural density, while a regularly occurring pulse indicates the passage of time. Representing the birds, individual pre-recorded piano tracks each comprise a different set of pitches from one overarching collection. The music is composed to capture the quality of these birds, who are quiet and shy. Much of what they do is left to the imagination, especially if you're not a scientist observing them. Hauge recorded the tracks on piano, and the ensemble performs the temporal pulse live. Paper: <https://onlinelibrary.wiley.com/doi/abs/10.1111/gcb.13519>

Chris Chafe is a composer, improviser, and cellist, developing much of his music alongside computer-based research. He is Director of Stanford University's Center for Computer Research in Music and Acoustics (CCRMA). In 2019, he was International Visiting Research Scholar at the Peter Wall Institute for Advanced Studies at the University of British Columbia, Visiting Professor at the Politecnico di Torino, and Edgard-Varèse Guest Professor at the Technical University of Berlin. At IRCAM (Paris) and The Banff

Centre (Alberta), he has pursued methods for digital synthesis, music performance, and real-time internet collaboration. Recent work includes the *Earth Symphony*, the *Brain Stethoscope* project (Gnosisong), *PolarTide* for the 2013 Venice Biennale, *Tomato Quintet* for the transLife:media Festival at the National Art Museum of China, and *Sun Shot* played by the horns of large ships in the port of St. Johns, Newfoundland.

Kristin Hauge is a Ph.D. student in the Composition and Computer Technologies (CCT) Program at the University of Virginia. She received her undergraduate degree in 2018 from Princeton University, where she majored in music with a focus on composition. She pursues interdisciplinary projects that incorporate acoustic and electronic media. Through her work, she explores many facets of musical expression, including the relationship between music and nature (with a particular focus on birdsong, motion capture, and soundscapes), recording and production techniques, synthesizers and electric string instruments, and immersive audiovisual experiences such as interactive websites and installations.

Coastal Conservatory

The Coastal Conservatory integrates arts and humanities into the investigation of coastal change. Working with scientists at the Virginia Coast Reserve, an NSF-supported Long-Term Ecological Research site, the Conservatory aims to deepen understanding and stimulate imagination by opening ways to listen to the dynamics reshaping coasts. The Conservatory is a member of the Humanities for Environment Observatories and was started with a Mellon Foundation Grant through the Institute for the Humanities and Global Cultures, the Center for Global Inquiry and Innovation, and the Environmental Institute at UVA.

Listening is a form of inquiry that can immerse hearers in a living environment and connect people across boundaries. The Conservatory organizes collaborative inquiry around three ways of listening:

1. to environmental sound through field recordings and designed listening stations
2. to the sciences of coastal change, by sonifying data, composing with it, and creating public events in which audiences can interact with research
3. to one another, across disciplines and cultures, as we seek to understand coastal futures from multiple ways of knowing

Matthew Burtner (www.matthewburtner.com) is an Alaskan-born composer, sound artist, and eco-acoustician whose work explores embodiment, ecology, polytemporality, and noise. A leading practitioner of climate change music and ecoacoustic sound art, he serves as Eleanor Shea Professor of Music in the Composition and Computer Technologies (CCT) program at the University of Virginia. He co-directs UVA's Coastal Future

Conservatory (<http://www.coastalconservatory.org>) and is founder and director of the nonprofit organization EcoSono (www.ecosono.org). His music has been performed in concerts around the world and featured by organizations such as NASA, PBS NewsHour, the American Geophysical Union (AGU), the BBC, the U.S. State Department under President Obama, and National Geographic. His work has won prizes such as the IDEA Award for the climate-change opera *Auksalaq*, an Australian IMPACT Award for *THAW* with Legs on the Wall, an EMMY Award for *Composing Music with Snow and Glaciers* for Alaska PBS, and an NEA Art Works Award for *The Ceiling Floats Away* with poet Rita Dove.

Willis Jenkins is John Allen Hollingsworth Professor of Ethics and Chair of the Department of Religious Studies at the University of Virginia. He is author of two award-winning books: *Ecologies of Grace*, which won a Templeton Award, and *The Future of Ethics*, which won an American Academy of Religion Award for Excellence. He is co-editor of several books, including the *Routledge Handbook of Religion and Ecology*, and many essays along intersections of religion, ethics, and environmental humanities. Jenkins co-directs the Coastal Conservatory.

Karen McGlathery is Sherrell J. Aston Professor of Environmental Science and director of UVA's Environmental Institute, a hub of environmental resilience and sustainability research that connects faculty, students, and citizens to create solutions for a more equitable, resilient, and sustainable future. McGlathery also serves as lead PI of both the Virginia Coast Reserve Long-Term Ecological Research Project and the Eastern Shore of Virginia Climate Equity Project. Her research group focuses on climate change impacts on coastal ecosystems and communities, and nature-based solutions for climate resilience, including "blue carbon" sequestration. She collaborates with regional stakeholders to co-produce coastal adaptation and resilience strategies and serves on the Virginia Governor's Technical Advisory Committee for Coastal Resilience.

EcoSono Ensemble

EcoSono Ensemble (www.ecosono.org) pursues commonalities between innovative musical creation and ecological sustainability. Through musical production in collaboration with science, EcoSono defines a unique methodology for environmentalism and the arts. *National Geographic* called EcoSono's production, *Auksalaq*, "a significant cultural event that marries science as the brain, art as the heart and culture as the soul in our search for awareness and sustainability." EcoSono has performed concerts from Alaska to Tasmania and venues in between. The EcoSono Ensemble performs ecoacoustics music, a science-and-technology-mediated form of environmental sound art. The group gave its debut performance for the 2012 premiere of the *Auksalaq* climate change opera. Since then, EcoSono Ensemble has performed in Alaska, Washington DC, Ohio, Colorado, Texas, Virginia, Canada, California, Australia, and Tasmania.

Lisa Edwards-Burrs received degrees in Vocal Performance from Virginia Commonwealth University in Richmond, Virginia, (B.M. and M.M.) and The Catholic University of America in Washington, D.C. (D.M.A.). An accomplished lyric-coloratura soprano, her performances in recital, oratorio, and chamber music are extensive. Internationally, she represented the United States as an Artistic Ambassador, touring several countries in South America for five weeks presenting concerts, lectures, and master classes. Her performances of the works of African-American composers and other contemporary works have received critical acclaim. She is Associate Professor of Music at Longwood University, Virginia.

Kelly Sulick teaches at the University of Virginia and serves as Principal Flute in the Charlottesville Symphony. She earned her Doctorate of Musical Arts from the Peabody Conservatory, her Master of Music degree in Flute Performance from the University of Southern California, and a Bachelor of Music degree in Flute Performance and a Bachelor of Arts degree in English Language and Literature from the University of Michigan, where she graduated with highest honors and was named a James B. Angell Scholar for her academic achievements. A champion of new music, she has commissioned and recorded dozens of works for solo flute and flute with electronics, and has premiered several additional works for solo flute and chamber ensemble. She can be heard on the Centaur, Equilibrium, Other Minds, Naxos, and Ravello record labels, including on William Bolcom's *Songs of Innocence and of Experience* under Leonard Slatkin, a Naxos release that received four Grammy awards including Best Classical Album. Her album *Duo* with pianist John Mayhood, which features twentieth- and twenty-first century American works for flute and piano, was released on Centaur Records in 2022.

Naima Burrs, D.M.A., is a violinist and conductor from Richmond, Virginia. She studied at the University of Northern Iowa, where she earned a Master of Music degree in violin performance. She is the Director of Orchestral Activities at Virginia State University in Petersburg, Virginia, and the conductor of the University Symphony Orchestra at the University of Richmond. Burrs has also served on the faculty at Longwood University (Farmville, VA), and Hampden-Sydney College (Hampden-Sydney, VA). In January 2022, she was appointed Music Director of the Petersburg Symphony Orchestra and completed her tenure in 2024 after two exciting seasons. She earned a Doctor of Musical Arts (D.M.A.) degree in instrumental conducting from The Catholic University of America in Washington, D.C.

Kevin Davis is a composer, improviser, and cellist. Originally from Appalachian Tennessee, he has at various times been based out of Memphis, Chicago, New York, and Istanbul, where he has played in and composed for a large variety of musical situations across a wide spectrum of contemporary music. He has recorded and performed in the United States, Europe, and the Middle East. He has degrees in music composition from the University of Memphis (B.M.) and the Centre for Advanced Musical Studies (MIAM) in Istanbul,

Turkey (M.A.). He completed the Ph.D. in Composition and Computer Technologies at the University of Virginia.

I-Jen Fang, described as an “intrepid percussionist” by *Fanfare* magazine, has a career as a soloist, chamber musician, orchestral player, and teacher. She joined the faculty of the Music Department at the University of Virginia in 2005 and serves as the Principal Timpanist and Percussionist for the Charlottesville Symphony. She has performed as a soloist in Taiwan, U.S., Austria, France, Hungary, Poland, Romania, and South Africa and with artists such as Keiko Abe, William Cahn, Christopher Deane, Mark Ford, Ed Smith, Ki Midiyanto, Muryanto, Nyoman Wenton, Attacca Percussion Group, EcoSono Ensemble, Cantata Profana, and Da Capo Chamber Players. She is a founding member of the Piedmont Duo, which explores the sonic possibilities of viola and percussion. She has appeared in the Staunton Music Festival, Charlottesville Chamber Music Festival, Wintergreen Festival, DrumFest (Poland), SEAMUS, PASIC, and PAS Day of Percussion. Fang is an Innovative Percussion, Sabian, and Marimba One artist.

Yale Interlocutors





Oswald Schmitz is the Oastler Professor of Population and Community Ecology in the Yale School of the Environment. He studies the linkage between two important components of natural systems: biodiversity and ecosystem services. These issues are examined using field experimentation guided by formal mathematical theory of species interactions. His book *The New Ecology: Rethinking a Science for the Anthropocene* encapsulates much of his thinking about biodiversity and ecosystems and, heavily inspired by the writings of Aldo Leopold, makes ecological science accessible to a broader readership.

Mary Evelyn Tucker is co-founder and co-director with John Grim of the Yale Forum on Religion and Ecology. Tucker’s concern for the growing environmental crisis led her to organize a series of ten conferences on World Religions and Ecology at Harvard (1995–1998) which led to a foundational ten-volume book series. After these conferences she and Grim founded the Forum on Religion and Ecology. They wrote *Ecology and Religion* (Island Press, 2014) and with Willis Jenkins they edited the *Routledge Handbook on Religion and Ecology* (2016). They also are series advisors for the *Ecology and Justice Series* at Orbis Books and have created six online courses in “Religions and Ecology: Restoring the Earth Community.”

Yale Musicians

Originally from Winthrop, WA, **Keeley Brooks** is a senior at Yale University, majoring in music and studying violin with Wendy Sharp. She is currently working on her thesis, an oral history on violin pedagogue Dorothy DeLay that will be housed as a public archive at Yale's Oral History of American Music. In addition to playing in the ensemble, Brooks has loved exploring various administrative roles in the Yale Symphony Orchestra from Head Librarian to co-Social Chair to President for the 2024–25 school year. This past summer, she took her first steps into composition while working for the Forest Products Laboratory in Madison, where she wrote a piece that incorporates field recordings from a prescribed burn.

Nate Strothkamp is a junior at Yale University, majoring in American Studies with an Education Studies certificate. He studies violin with Wendy Sharp, plays in a string quartet, and leads the Yale Symphony Orchestra as co-concertmaster. Strothkamp's academic and musical interests are intertwined, with a recent focus on exploring how music can be mobilized in service of the environment and how American music and literature reflect how humans relate to nonhuman nature. Strothkamp works at Music Haven, and as a Teaching Artist at the Yale School of Music's Music in Schools Initiative.

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