Environmental Humanities Conservatory: Listening for Coastal Futures

Collaborating with the "coastal futures" focus of the Resilience Institute, our lab engages arts and humanities with scientific research on coastal systems under the theme "listening for coastal futures." Working with the Long-Term Ecological Research (LTER) project at UVA's Coastal Research Center (ABCRC), which conducts research on dynamics of change in coastal ecology, this lab creates experimental lines of arts and humanities inquiry in a complementary Environmental Humanities Conservatory.

How might cultures listen to environmental change? (What does it mean to listen?) How might listening practices inform the way societies design environmental futures? With those questions, the Conservatory works alongside research science with ecoacoustics, anthropology, literature, ethics, and history in order to explore skills of knowing and being that can interpret and respond to meanings of anthropogenic environmental change. Moving from research science through ecoacoustic practices to humanistic inquiry into global change, the Conservatory cultivates integrative understanding, discovering and engaging the cultural stresses that impede formations of responsibility. A crucial element in the Conservatory's way of integrating site-based inquiry with responsibility for planetary futures is cross-hemisphere reflection on coastal futures with key Global South partners.

The Environmental Humanities Conservatory is a laboratory for concentrated environmental listening; a refuge for thought and creation beyond language; and a conservation research effort conducted through humanistic study. Like a music conservatory, our Lab will experiment, make, measure, analyze and perform. Like a greenhouse conservatory creates an optimal environment for plants, our Lab will cultivate an environment conducive to interdisciplinary scholarship on cultural dimensions of environmental change.

The Conservatory model offers three critical interventions. By emphasizing the immersive and integrative sense of hearing, we propose to remodel the existing "environmental humanities observatory" concept as a "conservatory." By cultivating forms of humanistic inquiry and artistic practice alongside ecological research on coastal change, we will elaborate cultural dimensions of the work at UVA's coastal LTER site. By situating our experiments within the first generation of research of UVA's pan-university Resilience Institute, the Conservatory will explore possibilities for the humanities within the broad mission of the Institute.

Basically, the Conservatory opens a unique way of inquiring into what it means to "conserve" in changing environments. Concentrated listening offers affective practice for engaging researchers and their publics on how to "conserve" and, in engagement with LTER restoration projects, to begin thinking about criteria for "composing" well with a changing environment.

1. Conceptual Parameters, Proof of Concept, Outside Funding, & Curriculum

This lab proposal coordinates with Resilience Institute, which calls for regionally centered research on grand challenges of coupled human/environmental systems, and seeks to integrate research from science, engineering, medicine, architecture, and the humanities. Integrating the humanities, however, remains inchoate because, despite the emergence of the environmental humanities field and despite calls from NSF for research on coupled human-environmental systems, it remains challenging for research teams to meaningfully integrate humanities and arts into science-based research. One reason for that difficulty is that arts & humanities approaches tend to proliferate perspectives and to render framing concepts contingent by historicizing and criticizing them. This Conservatory works with those tendencies as strengths, experimentally developing roles for the humanities and arts in the Resilience Institute by focusing on practices for integrating alternative knowledges into regionally centered research on a global coastal change.

The Conservatory advances two key models for integrating environmental humanities and environmental sciences. First, it reorients the model of environmental humanities *observatories*, which was developed in 2013 from a Mellon-funded initiative of the Consortium of Humanities Centers & Institutes (CHCI) that employs humanistic tools of inquiry to investigate global anthropogenic environmental change in five locations of observations. The "observatory" metaphor, writes cofounder Joni Adamson, "was chosen to quicken the imagination of humanists being called upon to think outside the limitations of traditional humanities research protocols, such as the single-authored monograph or narrowly disciplinary essay, and to engage in more collaborative, transdisciplinary or digital projects and research across all the disciplines required to understand both social and natural systems" (Adamson 2017, 8). Retaining that located, collaborative, and transdisciplinary focus on anthropogenic environmental change, the conservatory metaphor pivots from ocular to aural metaphors of knowledge. Our eyes, directed frontwards, as on other hunter animals, help us parse distinctions between things, and to isolate sources from the background. We acquire and consume with our eyes. By starting from the omnidirectional and immersive sense of hearing, the Conservatory emphasizes the contemplative and holistic dimension of sonic perception. If we consume the world through ocularcentric observation, perhaps we preserve it through aurality. Our Conservatory pursues augmented aurality as a mode of integrative contextualization of self and environment, enfleshing interpreters in an environment vibrating with sound.

Second, we advance the model of Long-Term Ecological *Reflections* developed as a humanities-oriented companion to NSF projects of Long-Term Ecological Research. NSF encourages all LTER sites to engage humanities and arts, but among the very few which have managed to begin efforts in this area, only one (Andrews Forest of Oregon State) has implemented Long-Term Ecological Reflections. The Andrews Forest archives ongoing interpretive responses to its research location along with conventional scientific data, aiming for artists and humanists to create interpretive work in the same site as research observation. Yet transdisciplinary practices remain elusive, as its PI, Michael Nelson, explained in his 2017 lecture at UVA and in the essay "Arts and humanities inquiry in the Long-Term

Ecological Research Network: empathy, relationships, and interdisciplinary collaborations" (Goralnik et al, 2016). The Conservatory includes site-based humanities work adjunctive to science, but it also takes step toward integration by organizing collaborative inquiry around shared listening practices.

We further develop these site-based advances through engagement with key partners working on coastal change with arts and humanities from Global South perspectives. By working from the epistemic affordances of aural knowledge and by seeking integrative collaborations with scientists, the Conservatory opens space for non-dominant ways of knowing about environmental change. It therefore not only connects regional research on coastal change with global research, it invites Global South knowledges to reframe and reorient the significance of that research. In particular we propose to collaborate, through conferences and residencies, with specific institutional partners in the Arctic and in Australia who are developing humanistic perspectives on coastal change. Both centrally include Indigenous knowledges.

Proof of Concept

We developed proof of concept for the Conservatory and its two-step practice toward integrating environmental knowing in a multi-day Listening Lab excursion in October 2017 supported by the Global Religion Lab. The director of the LTER and of the Resilience Institute (McGlathery) and the chair of EVSC (Pace), along with the directors of Global Religion Lab (Schaeffer and Halvorson-Taylor), participated in eco-acoustic listening practices at ABCRC research site designed by Burtner and collaborative inquiry led by Jenkins. The pilot exercise was in fact so generative that the LTER director plans to incorporate its exercises into the training of all graduate researchers at the ABCRC, while the GRLab directors came away planning to develop affective, site-based inquiry into their own future research projects. Our listening lab will be featured in the GRLab podcasts; the first of their "keywords in religion" will now be "listening."

Co-sponshorships & External Funding Prospects

This lab has already received initial commitments of co-sponsorship from UVA partners. It is supported by the Environmental Resilience Institute and LTER program (which can materially contribute boats, coastal equipment, and staff time). It is supported by the Music Department (equipment and lab space) and the Institute for Practical Ethics (conference cosponsorship). The pilot "listening lab" undertaken to develop this proposal was funded by the Global Religion Lab, which is interested in cosponsoring and collaborating with one or more of the Conservatory's global partners. Further possible cosponsorship may be possible with the "Sanctuary" project developed by Jenkins, Schaeffer, and Halvorson-Taylor, for which it has received preliminary funding from Global Programs of Distinction initiative.

Burtner is part of a team that recently received an NSF Navigating the New Arctic grant for *Bridging Science, Art and Community in the New Arctic*. By drawing together an interdisciplinary team of Arctic researchers, the project imagines a new research network that explores the role of artistic exhibition and expression as a part of the scientific investigation. Further, through a partnership between the research university and the community the workshop will bridge Arctic communities to scientific and artistic methodology. Art and music are key components of this convergent approach in that these disciplines activate a bridge between scientific observation and community engagement. Through its Arctic engagement, the Conservatory will interface with activities funded by this grant.

Moreover, NSF program directors involved in the *Bridging Science, Art and Community in the New Arctic* grant have further encouraged the Conservatory to apply for NSF funding through the EAGER Early Exploratory Grant program, a fund directed at experimental projects that could lead to benefits for science. The Environmental Humanities Conservatory symposia, workshops and conferences, proposed over the next two years build collaborations and research trajectories that will support a proposal for significant NSF funding.

Curricular Development

EcoAcoustics, MUSI 3400 explores the intersection between ecology and music. The class examines the acoustic characteristics of the natural environment, analyzing human-environmental interaction through measurements and observations of the sounding world. Students learn and deploy specialized audio recording equipment and techniques, and work in a laboratory context to analyze and create original musical works using the collected sounds and data. Students employ analysis software to examine the spectral and temporal characteristics of sounds in fine detail, and they use editing, processing and arranging software to compose original ecoacoustic compositions.

Sonic Thought and Action for Global Environmentalism (STAGE) is a project sponsored through the Center for Global Inquiry and Innovation (CGI2), intersecting with the EcoAcoustics MUSI 3400 class and with the Music PhD program in Composition and Computer Technologies (CCT). Student and faculty researchers collaborate through the Ecoacosutic STAGE to address topics of regional or global importance. Through the Environmental Humanities Conservatory, we will organize a PhD seminar using the methodology of the EcoAcoustics STAGE. This work could also feed into the Global Religions Lab Podcast project discussed above. This new seminar will also build on Matthew Burtner's previous graduate seminars on MUSI 7547 "Musical Materials of Activism" and MUSI 7543 "Computer Sound Generation and Spatial Processing".

In the second year of the Conservatory, Jenkins will lead an intensive seminar on Environmental Humanities, open to PhD students from all departments.

Through the major-level undergraduate course in Ecoacoustics, and through the PhD seminar, we will bring students of different levels into the Conservatory, where they

will collaborate with students across the humanities and with the interdisciplinary faculty researchers.

2. Research projects nested under the Lab and their key research questions

In a first phase of the Conservatory, on which this two-year lab focuses, we organize inquiry around listening. This will happen through several simultaneous projects focused on the Eastern Shore research site, across which we collaboratively develop critical reflection on fundamental questions about coastal futures and environmental change.

- Concentrated eco-acoustic listening practices are developed for students and research scientists in the specific locations of their experiments.
    - Key questions: What can listening contribute to scientific observation and understanding? How might we augment listening to hear phenomena happening outside normal scale of hearing (below physiological threshold, or over temporal periods that exceed usual perception)?
    - These practices will include building listening instruments to augment observations at key research sites and involve key researchers, as identified by McGlathery (EVSC) and Pace (EVSC).
    - Matthew Reidenbach (EVSC), who works on LTER oyster-bed and sea-grass restoration projects is interested in sensory biology: how organisms respond to sound. He will explore sound as a way to measure biological activity and possibly to develop sound-based proxies for reef health.
    - We will explore possibility of offering eco-acoustic practices to local stakeholders in Eastern Shore, as a way of increasing public understanding of the coastal change research
    - We will develop and deploy audio sensor networks in order to monitor the long-term ecological soundscape at the LTER.

- Historical and literary research illuminates the pasts of coastal change along the Eastern Shore.
    - Key research questions: To what histories should future-oriented coastal resilience projects be accountable? How can history and literature listen to the meanings of coastal change?
    - Andrew Kahrl (History & Woodson AAAS), who is a historian of the politics of coastal management with special focus on dynamics of race and exclusion, intends to turn his research to the Eastern Shore. What is the political history of a place now known as longest expanse of wild sea shore on the East Coast? Kahrl proposes archival and oral history research.

  - Charlotte Rogers (Spanish & IHGC Fellow) researches the way tropics have been imagined. Her new book project focuses on the tracelines of trauma, following cultural responses to hurricanes along a geographical arc that traces the path of slave ships. Hurricanes and slavery are a major determinative factor in the coast of the Eastern Shore.

- Collaborative Reflection Seminars, focused in two full-team trips to the ABCRC, develop inquiry across the projects in order to explore fundamental questions.
  - Key research questions: What are cultural possibilities of "listening to science"? In what ways can we listen to environmental change? What relations of memory, justice, and responsibility should inform research on coastal futures?
  - These seminars will be informed by contributions from our external residents, who investigate coastal change in Arctic, Australian, and Maori contexts

- Conservatory Conferences with Global Partners
  - Conferences in each year of the funding feature arts-based responses to coastal change from partners in the Arctic, Australia, and Maoriland (each with significant engagements with Indigenous peoples). The rationale for these events is to allow responses from Global South partners to inflect our site-specific research on coastal futures
  - First-year conference will be at UVa. Second-year conference will be held in Alaska, in collaboration with Anchorage Museum, The University of Alaska, Alaska Pacific University and the Alaska Design Forum. The conference will explore coastal futures research between the Arctic and Virginia in partnership with UVArctic's NSF *Bridging Communities* grant.

In subsequent phases of the Conservatory, for which we intend to seek external funding, we anticipate organizing inquiry around "restoring." Arising from the LTER's oyster bed and sea-grass restoration projects, we then ask how "listening" (in the broad integrated sense developed in the first phase) informs "composing" - intentionally designing with changing environments. Several key partners stand ready to collaborate with us in this phase, including a network of leading restoration ecologists that seeks deeper engagement with arts and humanities in developing principles for restoration practice. Additionally, The Nature Conservancy, which owns most of the coastal land on which LTER is conducted, has recently, in light of Anthropocene pressures and criticisms of conservation, realigned its mission under a new (contested) slogan "nature by design." Through a next phase of cross-hemisphere collaboration, we will ask: how might listening practices inform ecological

restoration and design in a time of anthropogenic ecological change? That question leads to the grand challenge behind all resilience research: how should humans compose planetary futures?

3. Proposed membership of the Lab

Primary Investigators

Matthew Burtner is Professor of Composition and Computer Technologies (CCT), and Chair of the Department of Music. A composer and ecoacoustic sound artist, he creates music exploring human/nature interaction, embodiment and noise. As a 2017/2018 Mellon Indigenous Arts Fellow at UVA, and director of environmental music non-profit organization, EcoSono, Matthew studies climate change music through various frames of human imagination and expression.

Willis Jenkins is Professor of Religion, Ethics, & Environment in the College and Co-Director of the Institute for Practical Ethics. A scholar of environmental ethics with two award-winning books on intersections of religion and ecology, his research arises from where environmental change exerts cultural pressure on normative systems. Jenkins to UVa in 2013 as a Mellon Fellow in Environmental Humanities, and has led various EH initiatives for faculty and graduate students.

UVA Core Collaborators

Karen McGlathery (EVSC / LTER/ Resilience Institute)

Michael Pace (EVSC / LTER)

Matt Reidenbach (EVSC / LTER)

Andrew Kahrl (History)

Charlotte Rogers (Spanish)

UVA Associate Collaborators

(Faculty who helped develop proposal, have expressed enthusiasm, and want to engage.)

Enrico Cesarotti (Italian)

David Germano (Contemplative Sciences Center)

Martien Halvorson-Taylor (RS/Global Religion Lab)

Jim Igoe (Anthropology)

Michelle Kisliuk (Music, indigenous art)

Mary Kuhn (English/ETP)

Kurtis Schaeffer (RS/Global Religion Lab)

Bill Sherman (Architecture)

Undergraduates participants

Students in Burtner's MUSI 3400 *Ecoacoustics*

Graduate students

Graduate coordinator works with project through 2-year duration

PhD students in a transdisciplinary Environmental Humanities seminar led by Willis

Students in a *Sonic Thought and Action for Global Environmentalism* (*STAGE)* seminar led by Burtner

4. Plan for research collaboration and programming over two years, including symposia, workshops and conferences

Year One

Initiate faculty research projects focused on the Eastern Shore research site

- Concentrated eco-acoustic listening practices are developed for students and research scientists in the specific locations of their experiments, including development and deploy audio sensor networks in order to monitor the long-term ecological soundscape at the LTER. (McGlathery, Pace, Reidenbach, Burtner)
- Historical and literary research focused on interpreting the pasts of coastal change along the Eastern Shore. (Kahrl, Rogers)
- In-progress research posted on website

Conduct on-site collaborative reflection seminar with research team at the ABCRC.

- Explore cross-project and fundamental questions.

Lead one undergraduate class trip to ABCRC

- MUSI 3400 *Ecoacoustics*

Arts-focused Conservatory conference on coastal change

- Featuring global partners from Arctic and from Maori lands

Year Two

Faculty research projects continue.

- Website products completed
- Culminate in contributions to collaborative volume

On-site collaborative reflection seminar at ABCRC

- Culminating reflections on global and fundamental questions for volume
- Next steps for the Conservatory

Overnight graduate seminar in Environmental Humanities at ABCRC

- Intensive EH seminar open to grads of all disciplines, introducing the field and reflecting on how the Conservatory advances its possibilities

Conservatory Conference at Global Partner Site

- In collaboration with the Anchorage Museum, The University of Alaska, Alaska Pacific University and the Alaska Design Forum. The conference will explore coastal futures research between the Arctic and Virginia
- Partnership with UVArctic and its NSF *Bridging Communities* grant
- Possible collaboration with "Sanctuary" GPoD project

5. Scope for digital and technological innovation

In support of the eco-acoustic listening practices the Conservatory will develop at ABCRC, we will build digital listening instruments to augment observations at research sites managed by McGlathery, Pace, and Reidenbach. We will develop and deploy audio sensor

networks in order to monitor the long-term ecological soundscape at the LTER, and then make sound data available to public on the Conservatory's website.

Ecoacoustics involves the use of technology to sonify natural systems. The goal of such work can be for scientific inquiry or musical creation. Computational algorithms coupled with a variety of sensors enables the sonification of environmental data. New developments in microphone technology enable the measurement of vibration in the natural environment through various media (air, water, earth, etc.). By combining these techniques, ecoacoustics creates an interface between music and the landscape. Through such methods, ecoacoustic music can embed patterns of change directly into the fabric of the music.

In addition to developing instruments for Reidenbach's research on sensory biology, through collaboration with the LTER we will develop an ecoacoustic sensor network to monitor sea grasses across long periods of time. We will design an outdoor microphone array coupled with a network broadcaster to transmit audio data from the sea grasses collected above and below the water, continuously. These new instruments will provide helpful insight into the behavior of sea grasses through days, weeks and months.

The data itself will be used in at least three ways. It will be enlightening for the public to be able to access these sounds and to listen to the behavior of the sea grasses during different times of the day and season. It will offer another data point for scientists studying the productivity of sea grass respiration, as the audio signal can be collated with other measurements such as light, temperature and chemical analysis. The long term samples will also allow composers to understand the sea grasses as expressive sonic agents, as musicians in an ensemble that may also include humans.

6. A statement indicating approval from Chairs/Directors/Deans

This proposal has approval and support of the Chair of Religious Studies (Kurtis Schaeffer), and was initiated in consultation with the Director of the Resilience Institute (Karen McGlathery), Director of IHGC (Debjani Ganguly), and the AD for Humanities and Arts (Francesca Fiorani).

We have demonstrated broad support for this initiative through the engagement of faculty across the College from the sciences, arts and humanities. We have also tested our approach with successful outcomes for the humanities, arts and sciences faculty involved.

7. CVs of the Lab Leaders

[attached separately]

8. Proposed Budget

Year One (80k)

One multi-day team seminar at the ABCRC = $4000

One multi-day undergraduate class trip to ABCRC = $5,000

UVA colloquium with global collaborators = $22,000

Materials: $10,000 (building listening instruments for use at ABCRC)

Graduate research coordinator = $3000 ($20 per hour for 150hrs)

PI Summer salary (in lieu of course replacements) $6,000 x 2 = $12,000

Research funds for UVA lab participants = $15,000

PI Travel to conference to present on Conservatory model = $5,000

Web support = $4,000

Year Two (70k)

One multi-day team seminar at the ABCRC = $3000

Graduate seminar at ABCRC = $3000

Conference held at global partner site with UVa collaborators = $25,000

Materials: $2,000 (maintenance and improvements on listening instruments)

PI Summer salary (in lieu of course replacements) $6,000 x 2 = $12,000

Graduate research coordinator = $3000 ($20 per hour for 150hrs)

Research funds for UVA lab participants = $15,000

Subvention for volume with UVa press - $6,000

Web support = $1,000

External Residencies (50k)

Dr. Huib Schippers, Director & Curator of Smithsonian Folkways, Smithsonian Institution, Smithsonian Center for Folklife and Cultural Heritage

Schippers has a long, diverse and profound history of engagement with music, education and training in various cultures. Trained as a professional sitar player, he proceeded with (partially overlapping) careers in performance, teaching, research, journalism, the record trade, arts policy, and project management. He founded the World Music School in Amsterdam (1990-1996), worked at conservatoires in Amsterdam and Rotterdam (1998-2003), and was the driving force behind the World Music & Dance Centre in Rotterdam (2001-2006). Before joining the Smithsonian in 2016, he was Director of Queensland

Conservatorium and its innovative Research Centre at Griffith University in Brisbane, Australia. Key publications include Facing the music: Shaping music education from a global perspective (OUP, 2010).

Dr. Leah Barclay, President, Australian Forum for Acoustic Ecology, Director, Biosphere Soundscapes

Barclay creates complex sonic environments that draw attention to changing climates and fragile ecosystems. These works are realized through immersive live performances, interactive installations and virtual reality experiences drawing on environmental field recordings, live streaming audio and spatial sound diffusion. Her work has been commissioned, performed and exhibited to wide acclaim internationally by organizations including the Smithsonian Museum, UNESCO, Ear to the Earth, Streaming Museum, Al Gore's Climate Reality, and the IUCN. Barclay leads several large-scale research projects including Biosphere Soundscapes, an interdisciplinary venture exploring the changing soundscapes of UNESCO Biosphere Reserves and River Listening, which examines the creative possibilities of aquatic ecoacoustics in collaboration with the Australian Rivers Institute. The design of these interdisciplinary projects are responsive to the needs of the collaborating communities and involve the development of new technologies ranging from remote sensing devices for the rainforest canopy to hydrophone recording arrays in freshwater and marine ecosystems. She is president of the Australian Forum for Acoustic Ecology, the vice-president of the World Forum of Acoustic Ecology and serves on the board of a range of arts and environmental organizations. She is currently a postdoctoral research fellow at the Queensland Conservatorium Research Centre where she is leading a portfolio of research in acoustic ecology and climate change.

Biosphere Soundscapes (http://www.biospheresoundscapes.org) works in partnerships with multiple organizations and institutions across Australia, Europe, the USA, Mexico, Peru, Indonesia, India and Cambodia to develop and deliver socially engaged interdisciplinary research projects in collaboration with the communities of UNESCO biosphere reserves. Biosphere reserves are sites recognized under UNESCO's Man and the Biosphere Program (MAB) to promote innovative approaches to sustainable development. There are currently 669 biosphere reserves in 120 countries comprising terrestrial, marine and coastal ecosystems. Each biosphere reserve is designed and managed in a different way, but all seek to reconcile the conservation of biological and cultural diversity. They differ from world heritage sites in that they encourage active community participation and are ideal locations to test and demonstrate innovative approaches to ecosystem monitoring and sustainable development.

Biosphere Soundscapes draws on the inherently interdisciplinary nature of sound to explore cultural and biological diversity through accessible audio recording technologies, community cultural development and environmental engagement with local and global communities. Biosphere Soundscapes sits at the intersection of art and science, with the recordings providing valuable scientific data for biodiversity analysis and infinite source

material for creative works that bring awareness to these environments. This project is designed as a platform for artists, scientists and global communities to collaborate and expose the creative and scientific possibilities of sound and acoustic ecology to a global audiences.

***WAI*: Mina Ripia, Maaka McGregor, Tuari Dawson,** Mauri musical ensemble from New Zealand

WAI is a Maori band from New Zealand creating music from the environment, Maori traditions and electronics. In the music of WAI, Te Reo (the Māori language) with its eloquence, natural rhythm, flow and percussiveness and Poi rhythms are woven together with electronics. WAI formed in 1999 and released their debut album (100%) in 2000. The sound of WAI was heralded nationally and internationally as "groundbreaking" and as "a new form of music to emerge from the Pacific Rim". Their second album won accolades including best Maori album at the Tui NZ Music awards, and was nominated for two BBC World music awards. The band's latest release, *ORA*, has been described as "truly exceptional" (Songlines) and "…this beautiful and truly innovative album speaks for itself." (Sublime) The BBC world service radio show 'World of Music' listed *ORA* at #5 on their list of top 10 world music albums.

Dr. William W. Fitzhugh, Director Arctic Studies Center, Smithsonian Natural History Museum

Fitzhugh is an anthropologist specializing in circumpolar archaeology, ethnology and environmental studies. As director of the Arctic Studies Center and Curator in the Department of Anthropology, NMNH, he has spent more than thirty years studying and publishing on arctic peoples and cultures in northern Canada, Alaska, Siberia and Scandinavia. His archaeological and environmental research has focused upon the prehistory and paleoecology of northeastern North America, and broader aspects of his research feature the evolution of northern maritime adaptations, circumpolar culture contacts, cross-cultural studies and acculturation processes in the North, especially concerning Native-European contacts. Recent research efforts have been directed at investigations into the problem of the western penetration of Maritime Archaic, Paleoeskimo and early Inuit cultures along the Lower North Shore of Quebec, and to associate this culture history more closely with Labrador and Newfoundland. Current interests in the origins of reindeer herding have led him to conduct research in Mongolia, where he is investigating reindeer herding in southern Siberia along the forest-steppe border, as well as investigating possible connections between deer-stones and Scythian art to the ancient art of East Asia and the Bering Sea Eskimos.

As curator of the National Museum of Natural History's arctic collections, Fitzhugh has produced four international exhibitions, Inua: Spirit World of the Bering Sea Eskimos; Crossroads of Continents: Native Cultures of Siberia and Alaska; Ainu: Spirit of a Northern

People; and Vikings: The North Atlantic Saga. His public and educational activities include the production of films, including the NOVA specials, Mysteries of the Lost Red Paint People, Norse America and several other Viking films. He served as Chairman of the Smithsonian's Department of Anthropology from 1975-80, is an Advisor to the Arctic Research Commission, represents the Smithsonian and arctic social science in various inter-agency councils, serves on the Smithsonian Science Commission and holds various other administrative and advisory posts.