School: School of Art

Researcher: Stephen Vaughan

Project Title: *Zassho-Cascadia*

UOA: 32: Art and Design: History, Practice and Theory

Research Timeline

Date	Rationale of research activities and decisions undertaken
2009-10	**Research trip to Japan** Photographs for the series *A Catfish Sleeps* Supported by Pavilion as part of the New Photography commissions project. These were the first photographs in a long-term (10-year) project that considered histories of earthquake and geological phenomena at sites across Japan. A small number of selected photographs from this first series were exhibited at Djanogly Gallery in 2010 and at the European Geosciences Union Assembly, Vienna in 2012. These outputs were included in the previous REF submission.
2011	**Research trip to Japan** Photographs for the series *Tohoku* Photographs made at the time of the 2011 Great Tohoku Earthquake. I returned to Japan on 8 March 2011 to continue my research into sites of historical earthquakes and tsunamis (including the sites of a tsunami in 1700 that was generated by the last Cascadia earthquake in NW America). The M9.0 Great East Japan Earthquake happened 3 days after, on 11 March 2011. I subsequently made photographs of the disaster at Otsuchi and Kuwagasaki (sites where the arrival of the tsunami from the last Cascadia Earthquake had been recorded in the Morioka-han Zassho texts in January 1700). A small number of selected photographs from this series were exhibited at the European Geosciences Union, Vienna, in 2012. This output was included in the previous REF submission.

2014

Research trip to Japan

• Photographs for the series *Chikyu*

Photographic research facilitated by the **Japan Agency for Marine-Earth Science and Technology** (JAMSTEC), the **Center for Deep-Earth Exploration** (CDEX), and the **International Ocean Discovery Program** (IODP). On completion of Health and Safety and Helicopter Crash Training, I was given unprecedented access to RS Chikyu – the world's largest, deep-ocean, scientific drilling ship – during the *Nankai Trough Seismogenic Zone Experiment* (NanTroSEIZE).

NanTroSEIZE is a decade-long, world-leading, scientific mission to drill deep into the earth's crust at the subduction boundary between two tectonic plates south of Japan. The aim of the expedition was to retrieve core samples from the location of past and future megathrust earthquakes on the Nankai Trough that will increase our understanding of the earth's tectonic mechanisms. During this expedition, Chikyu reached a new world record, drilling to a depth of more than 3000m beneath the sea floor.

I was also given access to photograph the Kochi Core Repository (Kochi University) that contains more than 150km of core samples (including samples from the fault that caused the 2011 Great East Japan Earthquake). These samples are equivalent to 200 million years of geological time.

• Photographs for the series *Tohoku*

During this research trip, I also returned to make more photographs at Otsuchi and Kuwagasaki and the sites of the 2011 tsunami.

Photographs for the series *A Catfish Sleeps*

New photographs in Fuji City, Shizuoka, Shimizu and Miho. These places are located in the area where the Suruga Trench (the NE end of the Nankai-Tokai Trough) meets land. It is an area that is threatened by the probability of a future Nankai-Tokai earthquake and tsunami. Miho is also one of the places that recorded the arrival of the tsunami in 1700 that was generated by the Cascadia Earthquake in NW America.

2014

VAUGHAN – Public Lecture
'Seismic histories and rupture probabilities: photographic perspectives on Japanese earthquakes', at *Exploring Environmental Photography*, 1-3 October 2014, Institute of Art History, Bern University.

2016

Research trip to Japan

• Photographs for the series *A Catfish Sleeps*

New photographs of the collection of Namazu-e ('Catfish' woodblock prints) held at the Earthquake Research Institute, Tokyo University. The Catfish represents the threat of earthquakes in Japanese mythology. Namazu-e were produced prolifically in the aftermath of the Great Ansei Earthquakes in 1854-55, often as satirical or politically critical representations. My research was facilitated by

Ueda Kazue, a retired Japanese earthquake research expert who was responsible for compiling the comprehensive 21-volume catalogue of earthquake and tsunami history from the early 7th century to the present day.

• Photographs for the series *Zassho*

New photographs of the *Morioka-han Zassho* – a book of local records from 1700, held at the Morioka Museum of History and Culture, Iwate. The Zashho contains written testimonies of a tsunami that arrived in Otsuchi and Kuwagasaki on the north-east coast of Japan on the night of 26 January 1700. The tsunami is now known to have been generated on the opposite side of the Pacific Ocean by the last magnitude 9.0 Cascadia Earthquake in NW America.

As well as photographing the Zassho book, I also made photographs of early 18th century maps of Otsuchi and Kuwagasaki (produced close to the time of the 1700 tsunami).

My research in Morioka was facilitated by curators at the Morioka Museum of History and Culture, Ueda Kazue (retired earthquake expert from the Earthquake Research Institute, Tokyo University) who discovered and translated descriptions of the 1700 tsunami in the Zassho texts and Musumi-Rokkaku Satoko, who guided the translation and transliteration of the Zassho texts in 'The Orphan Tsunami', (Atwater, B.F., Musumi-Rokkaku, S., Satake, K., Tsuji, Y., Ueda, K., and Yamaguchi, D.K., 2015, The orphan tsunami of 1700—Japanese clues to a parent earthquake in North America, 2nd ed.: Seattle, University of Washington Press, U.S. Geological Survey Professional Paper 1707, 135 p)

• Photographs for the series *Tohoku*

During this research trip, I also returned again to make more photographs at Otsuchi and Kuwagasaki and the sites of the 2011 tsunami.

2016

Research trip to NW America

Photographs for the series *Cascadia*

A series of photographs made in Willapa Bay, Washington on a field trip with Professor Brian Atwater (Dept of Earth and Space Sciences, University of Washington and USGS). Atwater is a central figure in the research that established the certain risk of future magnitude 9.0+ Cascadia earthquakes in NW America. He guided me (by canoe) to sites that were of great significance in his groundbreaking research. He dug away a section of the riverbank on the Niawiakum River to reveal tsunami deposits from the 1700 Cascadia Tsunami. He then took me to the site of Palix 782 – the remains of a giant red cedar tree in a grove of 'ghost forest' trees on the South Fork Palix River. Palix 782 was a 'witness-victim' of the 1700 Cascadia earthquake and tsunami. Dendrochronology samples from the roots of this tree revealed that it (and other

areas of forest along the west coast) died in the winter of 1699-1700, corresponding with the Japanese Zassho texts that recorded the tsunami on the opposite side of the Pacific Ocean. I photographed dendrochronology samples from Palix 782 that were used to establish the date-evidence of the Cascadia earthquake. Atwater also guided me to Teal Clough, an area of old-growth forest in Willapa Bay, to photograph giant red cedar trees that were 'witness-survivors' of the 1700 earthquake. Finally, I made photographs of Atwater's field notebooks from the time when he first recorded his observations of the Cascadia Tsunami in the stratigraphy of the Niawiakum River.

Photographs for the series *Taholah*

I was given permission by the Quinault Indian Tribe to photograph their coastal village, Taholah, on the mouth of the Quinault River. The Quinault tribe are planning to relocate their village to higher ground in anticipation of a future Cascadia Earthquake and tsunami.

Photographs for the series *Cascadia Rising*

On June 7-10, 2016, more than 20,000 people across local, state, federal, tribal, Department of Defence and non-governmental entities participated in the Cascadia Rising 2016 Exercise, the Pacific Northwest's largest multi-state functional exercise to rehearse the response to a future magnitude 9.0+ Cascadia Earthquake and tsunami. I was given access to the National Guard's Cascadia Rising exercise on Vashon Island in Puget Sound near Seattle. This involved producing a series of documentary photographs of medivac training with US Army military helicopters, the establishment of communications and logistics facilities and the interaction between emergency volunteers and the local fire service.

2017

Research trip to NW America

Photographs for the series *Cascadia*

Further field research with Professor Brian Atwater (University of Washington and USGS), producing a series of photographs of a 'Ghost Forest' of old-growth red cedar and sitka spruce on the Copalis River on Washington coast. The trees are 'witness-victims' of the 1700 Cascadia earthquake and tsunami. The ground that they rest on sank by a metre when the earthquake happened, submerging their roots in saltwater. The trees provided dendrochronology samples that correspond with the Japanese Zassho texts describing the arrival of the tsunami on the opposite side of the Pacific Ocean. This evidence was used by scientists and earthquake historians (Atwater et al) to establish the certainty of a magnitude 9.0 megathrust Cascadia earthquake at 9.00pm on 26 January 1700.

Photographs for the series *Cascadia*

Architecture, infrastructure and landscape studies of the city of Seattle, which will be catastrophically affected by a future Cascadia Earthquake.

Photographs in the predicted tsunami-inundation zones at Aberdeen, Grays Harbor and Hoquiam in Washington.

	Photographs at SATSOP Nuclear Facility – abandoned when our understanding of the threat of a future Cascadia Earthquake was established by scientists. Photographs for the series *Taholah* Further photographic documentation of the old village at Taholah and new photographs of forest clearance on higher ground where the new village will be built in anticipation of a future Cascadia Earthquake and tsunami.
July 2017	Public Talk: 'Curating seismic histories through photographic practice: shared histories of mega-thrust earthquakes in Japan and NW America'. Part of the conference *Curating the Future*, Centro Studi e Archivio della Comunicazione (CSAC), University of Parma, GALA Network Annual Meeting.
June 2018	Public talk: 'A Catfish Sleeps and Tohoku: Seismic Histories and Rupture Probabilities in Japan and NW America'. At *Marine Transgressions*, a 2-day Environmental Humanities conference, collaboration between the Environmental Research Centres at Bath Spa University and University of Bristol, June 2018.
2019	**Research trip to America** Photographs for the series *Taholah* Photographs of a stern paddle held at the Quinault Museum in Taholah. The paddle was made in the 1930s and features an illustration of 'Thunderbird and Whale' and text on the reverse. The story of Thunderbird and Whale features in native-American oral histories in the Pacific NW and is associated with the occurrence of earthquake and tsunami. Photographs for the series *Cascadia* Further architectural studies in the city of Seattle and in Portland – both at risk of seismic damage in the event of a future Cascadia Earthquake. Photographs for the series Loowit Field research at Mount St Helens National Volcanic Monument. Expedition inside the restricted area of the crater of Mount St Helens volcano. A series of photographs in the Loowit Canyon inside the crater and at the terminus of crater glacier. Research facilitated by the Mount St Helens Institute.
2019-20	Collaboration with Lewis Chaplin (Loose Joints Publishing) to design a book concept that would accommodate the multiple strands of photographic research that I had undertaken in Japan and America. The book will contain photographs from the following series: – A Catfish Sleeps (2009-2016) – Tohoku (2011 and 2014-16) – Chikyu (2014) – Zassho (2016)

	– Cascadia (2016-19) – Taholah (2016-19) – Loowit/Mount St Helens (2019-20)
2020	Contributions to the book invited from photography writer Eugenie Shinkle (University of Westminster) and Harold J Tobin (Professor of Earth and Space Science at University of Washington, Chief Scientist for the Nankai Trough Seismogenic Zone Experiment).
Nov 2020	Production and publication of the book postponed by Loose Joints until Nov 2021 because of the impact of the Covid-19 pandemic.