**ØY Festival – Stage Three: Space Station ØY**

**Brief:**

Space Station ØY  
  
We are searching for artists, thinkers, writers, engineers, scientists, makers, performers, sound creators and film makers to re-imagine islanders as future pioneers of far and distant planets.  
  
Islanders become islonauts, archipelagos become constellations.  
  
Traditionally Island people have been valued as pioneers, at the forefront of exploration and colonization of new worlds.  
Who better to be at the frontier of space exploration, individuals who can turn their hands to anything, farmers, engineers,  
fisherman,architects, inventive and resourceful with finite means. With the foundations and skills for living in small communities, often distant from civilisation. having chosen the path of self determination.  
  
Could islands be the model for future colonization of distant/new worlds

Submission:

The Deep Space Light

**The Deep Sea Light** places the listener beneath the waves, submerged into the world of Scotland’s marine mammals. It is a surround sound audio experience combining [convolved recording](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\The%20Deep%20Sea%20Light%20Compositional%20Methods.docx) techniques, [hydrophonic recordings](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\The%20Deep%20Sea%20Light%20Compositional%20Methods.docx), [bio music](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\The%20Deep%20Sea%20Light%20Compositional%20Methods.docx), traditional composition, [Gaelic song](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\Traditional%20Songs\105p093-Thomson.pdf); supported with photography, moving image and landscape art. It transports people’s imaginations to the edge and beyond of our marine world, providing a unique insight into the human relationship with the marine environment and our impact upon it.

The installation includes a bespoke surround sound experience and a touch-sensitive multi-media display.

The project involves the following partners:

Nick Turner – Musician/Producer/Engineer

Mary Ann Kennedy - Musician

Dr. Ben Wilson – Marine Biologist, Scottish Association for Marine Science (SAMS)

Capt. Phil Day- Northern Lighthouse Board (NLB)

Cathie Boyd – Theatre Cryptic

Anna Raven – Expressionist Artist

Phase One of the project involved close collaboration with the NLB and SAMS to build a [surround sound array](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\Technical%20Details\Equipment%20List.xlsx) for the convolved and ambient recording of Ardnamurchan Lighthouse along with a hydrophonic array for [Sanna Bay](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\Sanna%20Bay.pdf). Collection of Marine and ambient recordings and creating the convolved reverbs for the sound design. All accompanied by video, drone-film and photography.

Phase Two involved recording of the [seal/mermaid songs](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\Traditional%20Songs\Seal%20Songs%20and%20Mermaid%20Legends%20and%20other%20Trad%20Sources.docx) with Mary Ann Kennedy and the writing and production of the music and Bio-music along with the editing and recording of the Lighthouse Keepers [spoken word](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\Lighthouse%20Interviews%20and%20stories).

Once assimilated this body of work provided the inspiration for artist Anna Raven’s responses.

Scotland’s coastal and marine environments define her borders and much of her culture, but the sea remains for many people an unknown quantity, an unfixed, uncontrolled environment, often to be wary of and not to be engaged with. **The Deep Sea Light** aims to reconnect audiences with this fundamental and help them appreciate our impact on this unique environment.

The Lighthouse represents a portal - a way of looking at our marine world, not only in terms of heritage but also as an outlook to the future. Using sound as a universal medium we aim to create an emotional response in the audience, thereby encouraging further exploration of the world above and below the water-line.

There are four discrete experiences; [Harbour Seal](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\Aquatic%20Mammals\The%20Deep%20Sea%20Light%20-%20Aquatic%20Mammals%20Introduction.docx), [Minke Whale](file:///C:\Users\Nick\Uploaded\Documents\Deep%20Sea%20Light%20Documents\Short%20Introduction%20with%20supporting%20dox\Supporting%20Dox\Aquatic%20Mammals\The%20Deep%20Sea%20Light%20-%20Aquatic%20Mammals%20Web%20Resources.docx), Harbour Porpoise and Sea Otter. Each lasting a little over fifteen minutes, they aim to convey the different aural environments that these splendid creatures inhabit.

From an artistic perspective, the aim is to explore the exciting possibilities presented by bio music and convolved reverb in creating sound environments relevant to both subject and site in a way that stimulates audiences’ imaginations and helps make an emotional connection with a sense of place. We encourage interaction with the project by e.g. creating specific convolved reverbs that will be made widely available through existing audio databases, allowing audiences to create their own ‘lighthouse world’. The performance will also be available in conventional stereo audio.

We also interact with elements of traditional music and song rooted in the subject matter and environment, highlighting the contemporary relevance of songs composed by people with a deep understanding of the marine-coastal world and how to co-exist in harmony with it.

**The Deep Sea Light**

**Compositional Methods**

**Biomusic** is a form of experimental music which deals with sounds created or performed by non-humans. The definition is also sometimes extended to included sounds made by humans in a directly biological way.

Biomusic can be divided into two basic categories: music that is created solely by the synthetic animal (or in some cases plant), and music which is based upon synthetic animal noises but which is arranged by a human composer. Some forms of music use recorded sounds of nature as part of the music, for example New Age music uses the nature sounds as backgrounds for various musical soundscapes, and ambient music sometimes uses nature sounds modified with reverbs and delay units to make spacey versions of the nature sounds as part of the ambience.

The music for the project will be a combination of ambient in situ recordings enhanced with the scientific data provided below. This provides each lighthouses musical bed which will be manipulated by the more traditional compositions from the musicians.

**Variables Values**

Tide Expression

Current (Direction and Speed) Dynamics

Water Depths Melody

Light Sequence Tempo

Definitions:

Tide Data drawn from the National Oceanography Centre, Liverpool. NTSLF Format. Yearly figures for surface elevation minus residual provide a range of values expressed on a musical scale from Pianississimo to Fortississimo.

The Integrated Ocean Observing System (IOOS) includes an array of moored and drifting buoys that measure SST and near-surface currents throughout the world’s oceans. The speed and direction data is transcribed to provide a dynamic (volume) map for each musical piece

Water depths throughout the effective range of the lighthouse provide the note data for each piece.

Light sequence data is available for each lighthouse and provides the tempo for each piece. The range of sequence tempos for the lighthouses is mapped against a bpm range of between 80 and 160 to provide a tempo for the piece.

**Convolution Reverb**

In audio signal processing, convolution reverb is a process used for digitally simulating the reverberation of a physical or virtual space. It is based on the mathematical convolution operation, and uses a pre-recorded audio sample of the impulse response of the space being modelled. To apply the reverberation effect, the impulse-response recording is first stored in a digital signal-processing system. This is then convolved with the incoming audio signal to be processed. The process of convolution multiplies each sample of the audio to be processed (reverberated) with the samples in the impulse response file.

Real space simulation**:** The primary goal of a convolution reverb is to sample real spaces, in order to simulate the acoustics of the sampled space. A straightforward and simple mono example of capturing an impulse response would be to set up a microphone in a concert hall and to place the microphone in the centre of the auditorium. Next, produce a very brief pulse (often an electric spark) of sound, and record everything that the microphone picks up, which includes both the original sound and the response of the room to it. The recorded take would then be cleanly edited and loaded into the convolution processor. This convolution can be applied as part of a signal processing chain.

**Hydrophonics**

Just as microphones are used to listen to sound in air, devices called hydrophones are used to listen to sound underwater. Microphones convert sound in air into electrical signals. The electrical signals can then be amplified, recorded, played back over loudspeakers, and transmitted over telephone lines. The electrical signals can also be used to measure the characteristics of the sound, such as amplitude and frequency. Similarly, hydrophones convert sound in water into electrical signals that can be amplified, recorded, played back over loudspeakers, and used to measure the characteristics of the sound. Hydrophones listen to sound, but do not transmit any sound.

Humans were listening to underwater sounds with air tubes as early as 1490, when Leonardo da Vinci wrote about it. It wasn't until the mid to late 1800's that the technology was developed to convert acoustic signals into electrical signals, however. This technology advanced enough that by World War II, British, French, and American scientists were using echo-ranging to locate icebergs and submarines. The ability to locate submarines was invaluable against the German U-Boats.

Most hydrophones are made from a piezoelectric material. This material has a special property that allows it to produce small electrical signals when squeezed, that is, when it is exposed to pressure changes. Because sound is a pressure wave, it can be detected by a piezoelectric element. Under the pressure of a sound wave, the piezoelectric element flexes and gives off electrical signals. These electrical signals can be recorded and later analysed with computer programs to determine the properties of the sound wave, including amplitude a Some hydrophones, called omnidirectional hydrophones, record sounds from all directions with equal sensitivity.

Other hydrophones, called directional hydrophones, have a higher sensitivity to signals from a particular direction. Directional receivers are most often constructed using a number of omnidirectional hydrophones combined in what is called an array. Directional hydrophones are typically used in systems for locating and tracking objects and frequency.

Hydrophones are specially designed for underwater use. They are normally encased in a rubber boot to provide protection from seawater. Hydrophones can be mounted in several different ways. They can be attached to a boat, towed, or placed in a fixed position underwater.

**Mouth of the Night**

The night begins at twilight and takes the audience through the night to dawn by way of songs, stars and science. The simple backdrop of a starcloth and individual lights allows the audience (joining in) and performers to create the appropriate setting for each point on the journey to morning – suns, moons, stars and other heavenly bodies. The music and surround-sound soundscape incorporates, amongst other things, the Celtic world’s familiarity with sun, moon and stars (and the parallel with early Celtic Christianity), alongside traditional songs and music associated with the night sky, and new music and song inspired by the night sky and ancient and contemporary astronomy. It celebrates existing songs and music already connected to the night sky, and sets a backdrop for a new soundscape and original compositions inspired by the stars.

We will take you from dusk to dawn through some of the best-known totems of Highland life – the stars – nevertheless not well-known by their Gaelic names and stories. ‘Mouth of the Night to First Light’ will connect some of the oldest elements of Gaelic history with the newest aspects of space and science, celebrating the modern world in which young Gaels exist today.

**Space Station**

To produce their baseline, the team had to

make trade

-

offs between differ

ent aspects of

the mission. Every single aspect of the mission

requires

equipment and supplies, and

the

greater the mass transported to the

lunar

surface

, the more expensive the mission

becomes

. To keep the mission within budget,

the team had to make tough

choices

on

which

goals the mission

should

focus

on

.

The team also had to choose a site for the

mission. Not all parts of the Lunar south pole

are inhabitable

—

the deepest recesses of some

craters are bathed in perpetual darkness, and

even

in

more clement

sites

,

a variety of factors

make establishing a foothold for humanity

challenging. For example, some areas of the

lunar surface

are too steep to land safely on, or

can go for days without catching site of Earth

—

making communications challenging.

Missio

n Analyst Carlos Moreno described the

difficulty of choosing a landing site. “

We settled

on a site

at the lunar South pole

between

Shackleton and the prominent Connecting

Ridge.

”

“

We chose this site due to its great combination

of illumination, accessibil

ity, and the resources

we expect to find there. It’s close to a perfect

site!

”

The team also set out to use as many lunar

materials in their mission as possible. “

We

want to start using the resources we find out in

space,

”

explained Systems E

ngineer

Gabrie

le

Bigi. “

It means we don’

t have to take so much

with us, which saves mass and money.

”

After considering these problems

, the team

unveiled their preliminary design to a panel of

experts at a presentation at the

Institut für

Raumfahrtsysteme

at the University of

Stuttgart, Germany.

Their concept details a system of transport

vehicles and a human

-

rated lunar habitat. The

concept also detailed the infrastructure needed

to support continued operations, such as a

landing pad and a communications

relay to

keep in contact with Earth. Over the next three

days the team will revise their proposal and

produce a detailed feasibility study of this

ambitious mission.

As part of the baseline concept

presented

today,

the

team

also

christened their project

. T

hey

chose

SELENE

—

the Scientific

Expedition to

the Lunar Environment for Near

-

Earth

Exploration

—

after the Greek Goddess of the

Moon. The name follows a long tradition of

names with mythological inspiration

—

most

notably t

he last mission to leave human

f

ootprints on the Moon, NASA’s Apollo

missions.

As human space endeavors turn once again to

the Moon, mission such as SELENE may

prove vital stepping stones in crewed

exploration of the Solar System.

Updates

on

the progress of this ambitious lunar mission,

and the challenges the team

will

have to

overcome, will

follow in the coming days.