DOWN STREAM [APPALACHIA]
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THESIS
Master of Fine Arts in Creative Technologies
School of Visual Arts, Virginia Tech

2019
DOWN STREAM [APPALACHIA]
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Thesis submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Master of Fine Arts

in

Creative Technologies, School of Visual Art

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December 5, 2019
Blacksburg, VA

Keywords: art, technology, digital media, sculpture, installation, digital fabrication, projection mapping, spatial audio, underwater video, ecology, threatened and endangered species, appalachia

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Abstract

Down Stream [Appalachia] is an immersive, interactive art installation that addresses themes of ecological preservation, conservation, and connectedness—illuminating the precarity of imperiled freshwater species in the Appalachian region. The exhibition is composed of reflective, refractive sculptures and underwater video footage, surrounded by fully-immersive spatial audio. Both the audio and visual elements react to audience presence and proximity. Species highlighted are the Candy Darter (*Etheostoma osburni*); the Cumberlandian Combshell (*Epioblasma brevidens*) and other freshwater mussels; and the Eastern Hellbender Salamander (*Cryptobranchus alleganiensis alleganiensis*). This paper examines the context and content of this installation, its progression and influences, and themes of ecology and the environment in the Southeast United States.
Abstract for the General Public
There are endangered species right here in the mountains of Virginia, and hardly anyone knows about them. *Down Stream [Appalachia]* is an immersive, interactive art installation that attempts to raise awareness and allow people to connect to these animals that otherwise go unseen. This paper examines the context, content, and themes of the installation.
Acknowledgements

There is absolutely no way I could have accomplished this alone.

Thank you to everyone who helped make it possible.

It is only through collaboration and community that we are able to make our best work.

Dr. Jess Jones
Dr. Bill Hopkins
Katie McBaine
Dr. Paul Angermeier
Jordy Groffen
Becca O’Brien

Rachel Weaver
Zach Duer
Sam Blanchard

Tanner Upthegrove
George Hardebeck

Institute for Creativity, Arts, and Technology
Moss Arts Center staff

Carter Eggleston
Tacie Jones
Jonas Hauptman

and my amazing, supportive wife, Christina Franusich, without whose love, patience, understanding, and inspiration I would be lost.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT FOR THE GENERAL PUBLIC</td>
<td>iv</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>v</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Appalachia in Crisis</td>
<td>3</td>
</tr>
<tr>
<td>Art &amp; Ecology</td>
<td>6</td>
</tr>
<tr>
<td>Personal Progression</td>
<td>10</td>
</tr>
<tr>
<td>The Work</td>
<td>15</td>
</tr>
<tr>
<td>Overview</td>
<td>15</td>
</tr>
<tr>
<td>The Experience</td>
<td>15</td>
</tr>
<tr>
<td>Visuals</td>
<td>16</td>
</tr>
<tr>
<td>Audio</td>
<td>17</td>
</tr>
<tr>
<td>Interactivity</td>
<td>18</td>
</tr>
<tr>
<td>Form</td>
<td>19</td>
</tr>
<tr>
<td>Reflection &amp; Going Forward</td>
<td>21</td>
</tr>
<tr>
<td>INSTALLATION IMAGES</td>
<td>22</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>26</td>
</tr>
</tbody>
</table>
By realizing we are a part of nature, even if we live abstracted, decontextualized lives in major cities, we can gather a holistic sense of purpose in our lives that would otherwise be relegated to distraction, delusion, and distempered life.”

JOHN K. GRANDE

Introduction
What do we picture when we think of the ‘natural world’? Some may think of nature as vast, untouched wilderness in remote corners of the globe, free from the hand of man. Others may conceive of it as the flora and fauna that surround us every day as we go about our lives. Here in Western society, indications point to us generally considering ourselves as separate from the natural world. Even our dictionary definitions of the word, ‘nature’, refer to it as “as opposed to humans or human creations.” It is a sign of progress—of accomplishment—that we have managed to rise up among the inhabitants of earth, create civilization and leave our wild existence behind us. We have built cities and governments, eradicated diseases, and invented machines to take us to the moon and beyond. But for all the amazing achievements of humanity, our self-centered way of thinking about the world has blinded us. It has given us the permission to regard the natural world as something to be exploited, something outside of ourselves that is merely a resource.

We forget that the planet is a shared ecosystem, and that our fates are entwined. Having a global perspective of nature gives us some context for our place in it, but perhaps even more importantly we must recognize and connect to the abundant life happening in
our backyards. The natural world doesn’t stop where civilization begins, and the impacts of our industrial society are felt most directly by the plants and animals nearest to us. It is essential that we be more aware of our immediate zoological surroundings and learn to lead lives more connected to nature. We must constantly fight to shed the disassociation from the natural world that modern civilization feeds us.

I consider myself an ecologically and environmentally-minded person. Connecting to the outdoors has been a part of my life since I was a small child when my parents would take my sister and me on camping and backpacking trips in the Sierra Mountains in California. Those times instilled in me an appreciation for, awareness of, and connection to my natural surroundings. As an adult, I strive to be aware of issues surrounding ecology and the environment and do my best to live my life accordingly. It is an important part of how I see myself. As such, when I read an article in the Roanoke Times about a small fish in southwest Virginia that had just received federal endangered species status, I did a double-take. The Candy Darter (*Etheostoma osburni*) is a beautifully-colorful fish that is only found in a handful of streams in the New River and Kanawha River watersheds in Virginia and West Virginia—about as local to the New River Valley and Virginia Tech as you can get. This revelation raised so many questions for me: How had I never heard of this animal before, especially since it is in danger of disappearing altogether? What other imperiled species in our region was I blissfully unaware of? How can I as an artist help?

Roanoke Times, November 20, 2018
We seem to forget that we are indebted in every respect to an ecosystem in which we are just one of many links. Our forgetfulness leads to indifference.”

LAURA MUDDE
Yes, naturally. How art saves the world (2013)

Appalachia in Crisis
We tend to think of the forests of Appalachia in a monolithic sense—a giant green wall that we drive past on the highway—neglecting to consider the wealth and diversity of life that lives below the endless canopy, and under the surface of our multitudinous waterways. The Southeast United States, of which the Appalachian region of Virginia is a part, is one of the most aquatically biodiverse regions in the world, containing 62% of U.S. fish species, 91% of U.S. mussel species, and more crayfish, amphibians, and aquatic reptiles than anywhere else in the country. This region is also heavily populated, and the impacts of civilization are taking a heavy toll on the myriad of freshwater ecosystems in the Southeast. Here in Appalachia, we are a part of an unseen ecological catastrophe that is happening all around us—what the Center for Biological Diversity has named “The Southeast Freshwater Extinction Crisis”. Many of the species that call one of the most biodiverse regions in the world home are experiencing population declines at alarming rates. This crisis has gone on largely unnoticed by most people, hidden away under the flowing surface of our rivers, streams, and lakes. However, groups
of scientists and activists are working hard to both aid in the recovery of threatened species, and raise awareness of the impacts that could be contributing to the extinction crisis.

As I worked to learn more about threatened and endangered animals in our region, I was able to make contact with three groups of researchers in the Department of Fish and Wildlife Conservation at Virginia Tech, each dedicated to studying a different imperiled species:

» Dr. Paul Angermeier and Ph.D. candidate Katie McBaine are studying populations of Candy Darters in Virginia, which have declined by half since 1932. Affected not only by common factors such as habitat loss and pollution, recently the brightly-striped Candy Darter faces the unique threat of their subspecies’ DNA being diluted away as they compete and interbreed with their more genetically dominant cousins, the Variegate Darter.10 Once geographically separated, Variegate Darters have somehow been introduced into Candy Darter populations. McBaine stated that this is possibly a result of the Variegate Darter being used as live bait by trout fishermen, and that educating anglers about such unforeseen impacts is a continuing challenge for fish and wildlife conservationists as they work to protect threatened fish populations.

» Dr. Bill Hopkins and his team are researching Eastern Hellbender Salamanders (Cryptobranchus alleganiensis alleganiensis), and working to restore rocky Hellbender habitat lost due to siltation, with hopes of spurring population regrowth. With nicknames including mud cat, walking catfish, Allegany alligator, snot-otter, water dog, and mud devil, these giant salamanders prefer clean, clear rivers and streams, and are a bellwether species—indicating
good water quality when they are present⁵. Human land use is a major factor negatively affecting Hellbenders, and conservationists are working to mitigate impacts on streams and rivers as they flow through different land uses⁹.

Dr. Jess Jones is working with multiple partners to propagate, restore, and monitor freshwater mussel populations in the Clinch and Powell Rivers in Virginia and Tennessee. Freshwater mussels such as the critically endangered Cumberlandian Combshell (*Epioblasma brevidens*) are able to filter sediment and contaminants from water, and are vital to the health of the waterways they inhabit. Mussel populations have been seriously impacted by water quality and human-related activities over the past 50 years³. Since the fall of 2016, Scientists have also noticed a new mass die-off of freshwater mussels, and are still working to establish a root cause¹⁴.

All three groups were interested in collaborating on my project, allowing me to come along on research field trips, and graciously assisting me in gathering footage of their respective subject animals. I was humbled by their generosity, and promised myself that as an artist I would be able to do justice to these scientists’ amazing efforts and help shed light on the precarity of these imperiled species.
Eco art stands out from the din of environmental warnings, policies, and campaigns because its content is enriched by artistic imagination and its strategies are emboldened by artistic license.”

ANDREW BROWN
Art & ecology now (2014)

Art & Ecology
From the sweeping 19th century landscape paintings of Bierstadt, Cole, and Church, to the prolific bird paintings of John J. Audobon, nature, ecology, and the environment have long been favorite subjects for artists. Even 20th century pop artists have taken on issues of ecological awareness as subject matter. Andy Warhol’s *Endangered Species* (1983) is a series of ten color screenprints of well-known endangered animals from around the world. The series is a very 1980’s, arms-length idea of conservation, showing charismatic mega-fauna—large animal species with symbolic value or widespread popular appeal⁹, such as the Siberian tiger, giant panda, and African elephant—in Warhol’s distinct bright and stylized aesthetic. While the work almost surely raised awareness for endangered species, given Warhol’s fame, it perpetuates humankind’s disconnect with the natural world. These animals live in faraway places, and are seen as something to be saved. Their plight is not directly felt. In my research to discover how artists are breaking out of old paradigms
of Eco Art, and to find inspiration and context for Down Stream [Appalachia], I found multiple contemporary artists who have attempted to allow the viewer to connect more when addressing issues of ecological and environmental awareness. Whether through site-specific works that take the message to the source, or immersive gallery installations that give audiences the chance to be closer to the content, it seems there is a very healthy conversation happening in modern art surrounding the threatened natural world.

Doug Aitken’s *Underwater Pavilions (2016)* is an underwater sculptural installation created in partnership with Parley for the Oceans, an organization that brings together creators, thinkers, and public leaders to create projects which raise awareness of issues that impact our oceans. Carefully designed, constructed and installed, the work was created to engage the underwater ecosystem, and allow divers to observe ocean life in a new context. One could imagine feeling very connected to the ocean ecosystem while experiencing these sculptures, but due to their location (underwater) the reach was rather limited.

Artist and climate change activist David Buckland traveled far and wide to make his *Ice Texts (2005-2009)* series, in which he projected provocative statements onto the faces of melting glaciers. The images of the glowing words on walls of ice present an interesting juxtaposition of the technological and the natural, and invite the viewer to question whether we are doing enough to mitigate climate change. Like Aitken’s *Underwater Pavilions*, Buckland’s *Ice Texts* are able to raise awareness of environmental issues, but very few people were able to experience them.
in person. Not many people ever get to travel to Antarctica, nor have glaciers in their backyard.

Janine Randerson’s installation, Cascade (2009), contains visualized scientific data and video about birds and mammals affected by climate change, projected onto suspended round screens. Viewers could walk around and through the screens, and even lie down underneath them. In contrast to Aitken and Buckland’s pieces discussed here, viewers were able to be physically present with Cascade. And although viewers may have more potential to connect with work they can actually stand next to, the content in Randerson’s piece is still rather abstracted, allowing the viewer to remain emotionally distant.

Icelandic artist Rúrí’s Water Vocal – Endangered III (2015) centers around four waterfalls with plans for damming by the government. The immersive, audio-visual installation consists of large projections of video from each of the waterfalls, with spatialized audio recordings from the sites. Viewers are engrossed in the sights and sounds of these local waterways, getting as close as you can get to experiencing them without actually being there in person. The work also acts as a sort of archive of the waterfalls, preserving them digitally for people to experience if and when they eventually disappear.
Even these few examples illustrate how artists can play a unique and powerful role in raising awareness of ecological and environmental issues. As I stand on their shoulders and mold my own practice, I hope to contribute significantly to the conversation that the artists who came before me have started—both in methodology, and in how audiences experience and connect with Eco Art.
Unlike the scientist, who must follow established scientific methods, the artist is free to question and redefine anything or everything at any stage...they can offer tools for reflection, discussion, awareness and action that lead to new ways of thinking about and being in the world.”

ANDREW BROWN
Art & ecology now (2014)

Personal Progression
Ecology and the environment as a subject for my artwork has been a thread throughout the progression of my MFA work. While not the main focus of every piece, I keep finding myself returning to the natural world for inspiration. From technical exercises undertaken to learn new skills, to examinations and themes of light and materiality, the works discussed here have built upon each other to substantially inform my practice, and have each contributed in some way to how I approached the thesis project.

At the outset of my MFA journey, I leaned heavily on the things I knew—design, photography, and video—and made work utilizing those skills. Water Runs Dry (2017) was my first foray into moving image around local ecology. It is a short documentary giving a glimpse into the life cycles of Mountain Lake, in Giles County, Virginia. Mountain Lake is one of only two natural lakes in Virginia, and goes through cycles of filling and draining based on its unique geological properties and varying rainfall amounts. When the water is low, as it has been for the past decade or so, a verdant meadow grows where the earth has been revealed. Water Runs Dry is a both a personal

Water Runs Dry (2017)
reflection on a place I have visited often, and a witness to the contrast of the draining lake and the lush ecosystem that has appeared in its place.

Expanding on and away from pure moving image work, *Wired + Wild (2017)*—a collaboration with MFA colleagues, Jasmine Edison and Carter Eggleston—was an initial exploration into both installation work and material, and more abstract representations of ecological motifs. Situated amongst a grove of leafless, winter trees, the outdoor installation consisted of projection-mapped scrim material with visual content created by myself and Eggleston, and spatialized sound produced by Edison. Viewers could walk around and through the piece, allowing their shadows to alter the result of the layered projections, and hopefully fostering a connection to the work.

Inspired in part by the way the projections spilled onto the trees in *Wired + Wild,* *Ghosts (2018)* brought the outdoors inside, and was my earliest attempt at creating a loss of sense of place. Two series of light-painted timelapse images of leafless trees are projected towards each other, through layers of hanging scrim material, surrounded by spatialized music that I composed. As in *Wired + Wild,* the viewer walks through and around the projected images, becoming a part of the work as they move.

My investigation of the materiality of light went deeper in the creation of my first new-media sculpture, *Next (2018).* Composed of a projector, side-emitting fiber optics, and mirrors suspended in a steel frame, a custom-coded script mindlessly clicks through recommended videos on YouTube—constantly changing, and based solely on YouTube’s algorithms. Portions of the projected image illuminate the fiber-optic,
traveling through a tangled network of glowing strands to form the readable, four-letter word at the opposite end. While not centered around ecology, Next is a commentary on the use of technology in contemporary culture, and an attempt to make the audience question their own interactions with the world.

As I continued to add complexity to my work, I began to have questions about the nature and impact of interactive art—especially surrounding technology-based interaction. Suspension (2018), an exploration of light, material, and sound, was my first experimentation with dynamic interactivity. Two projectors emitted slowly-moving blocks of color onto three columns constructed of monofilament fibers and steel, turning the two-dimensional projections into surreal, three-dimensional volumes of light. Two Microsoft Kinects were used to allow viewers to interact with the installation, creating abstracted versions of themselves projected onto the sculptural forms and altering the spatialized audio consisting of ambient vocal music. In hindsight, I consider the technical, material, and aesthetic aspects of Suspension a success, but the interaction component was too direct, and lacked the element of exploration that I was hoping to achieve.

Progressing into work on Down Stream [Appalachia] proper, I became interested in finding different ways of looking at the content I was creating, and the experience of creating that content. Two tangential studies emerged as part of the thesis body of work.

As an endeavor to make a local connection to the content of the thesis, Down Stream [01] used parts of the video and audio elements gathered for the thesis to create a site-specific installation at Burruss Hall, the iconic central administration building on Virginia Tech’s campus. Video
from three small, battery-powered projectors was mapped onto individual stones in the wall of Burruss’ tunnel. As with most structures on campus, Burruss Hall is constructed of “Hokie stone,” a type of locally quarried limestone. Limestone is created through aquatic processes, and it is likely that the ancestors of the three species shown are somewhere in the stone, along with substance from the ancient waterways in the New River watershed. The projected images transformed the lifeless material of the stone, imbuing it with energy and vitality. Ambient recorded audio from each of the three rivers in the thesis reverberated in the tunnel where the work was installed, immersing the viewer in sound.

In parallel to Down Stream [01], but as a more personal examination of our ability to connect to the natural world, I performed the traditional Appalachian hymn, “Down in the River to Pray” while standing in Big Stony Creek—home to one of the few remaining populations of Candy Darters, and the creek in which I filmed them for this project. Down Stream [02] is an edit of the documentation of this act, leaving only the parts surrounding the actual performance—the negative space. The resulting video is an awkward view of the tension and release of the moments before and after; an intimate witness of footage that would normally not be shown; a peek behind the curtain and an intervention into my usually private process.

Reflecting on my MFA journey, I see clearly how each step has led me to where I am now. I find my work standing at the formal intersections of installation and technology as I explore materiality through new-media sculpture, projected video, interactivity, and sound—probing and ques-
tioning the ways in which we perceive our world, specifically around ideas of digitality vs. physicality. I am especially interested in how the moving image can become inextricably linked to space, time, and form. As the culmination of my MFA progression, *Down Stream [Appalachia]* integrates all these ideas, and exemplifies the direction in which I envision my work heading.
In contact with the native forms of the earth, one’s senses are slowly energized and awakened, combining and recombining in ever-shifting patterns ... their rhythms and forms are composed of layers upon layers of earlier rhythms, and in engaging them our senses are led into an inexhaustible depth that echoes that of our own flesh.”

DAVID ABRAM
*The spell of the sensuous: Perception and language in a more-than-human world* (1996)

The Work

OVERVIEW

Installed inside The Cube in the Moss Arts Center at Virginia Tech, *Down Stream [Appalachia]* is composed of three sculptural forms, each made from stacked acrylic and mirrored surfaces, projected on from within to create glowing objects that appear to float in the darkness, surrounded by spatialized sound consisting of music and field recorded audio. Each object contains video footage of a different imperiled animal native to southwest Virginia: The Candy Darter, the Eastern Hellbender salamander, and freshwater mussels.

THE EXPERIENCE

Upon entering the installation, the viewer is plunged into near darkness and submerged in swirling sound, with only the glow from the three forms to guide them, acting as beacons in the void. A disorienting loss of sense of place requires the viewer to focus on the glimmering forms, begging them to draw closer to the objects, and subsequently the threatened and endangered animals contained therein. The glowing forms could be likened to pools of water, precious gems, or shards of amber preserving these animals for a hypothetical future where they...
may not exist. As each object is approached, rippling underwater footage fades away to reveal the animals in their natural habitats, illuminating these rarely seen and imperiled species. Simultaneously, the immersive audio reacts to the presence of the viewer, swelling and unfolding new threads of the composition. The reactions are compounded as more people gather, rising to a nearly smothering blanket of sound.

VISUALS
It is another world inside the rivers and streams of Appalachia. The constantly rippling water fractures the sunlight, washing the riverbed in shifting, shimmering patterns. Life teems below the surface. Snails crawl to and fro, myriad small fish dart by, plants sway in the current. In capturing the footage of the three species highlighted in Down Stream [Appalachia], I hoped for the images to give the viewer the sense that they were there—transporting them to the river with the animal; giving them a rare glimpse of the underwater ecosystems in our mountain waterways.

The video content was all captured by me between June and October 2019, gathered on field trips with researchers from Virginia Tech (mentioned previously) who agreed to allow me to accompany them on trips to their research sites. This collaboration was vital to the completion of the work, which would not have been possible without their knowledge, generosity of time, and willingness to assist me in finding and documenting these rare animals. Not only would I
have never been able to see these species in person, but in observing the researchers at their work I gained an ever deeper appreciation of the dedication they have to learning about and helping these animals regain a foothold in their compromised ecosystems.

The technical aspects of capturing underwater footage proved to be challenging. I have extensive experience in videography, but this project was my first attempt at serious underwater video capture. In order to get the footage needed, I acquired various specialized equipment, including a wetsuit, snorkel mask, waterproof action camera, and an underwater housing for my main camera. On top of quickly learning the finer points of shooting video underwater, I also had to contend with the fact that the water was always moving, and in unpredictable ways, making it difficult to record stable footage. Fortunately, stabilizing clips during the editing process is simpler now than it ever has been, allowing me to salvage otherwise shaky video.

In the installation, all the visual content was controlled on a central, high-performance computer running TouchDesigner. Three full HD (1080p) video feeds were sent via Network Device Interface (NDI) over a gigabit wired network, where a smaller PC in each of the forms was set to receive one feed and display it on a projector. Playing and processing the video from a central location reduced processing loads on the PCs connected to the projectors and ensured stable synchronization of all interaction components.

**AUDIO**

The audio elements of *Down Stream [Appalachia]* are comprised of both music, and field-recorded underwater sounds. The music is centered on the recording of my on-site performance of “Down in the River to Pray,” around which three additional vocal parts were composed and
performed—one for each of the objects/animals in the work. Special attention was paid to the interplay of the three original tracks with the traditional song, and each was written to reflect characteristics of their respective animal. The four vocal tracks were then stretched and processed in multiple ways using PaulStretch—open source software for extreme stretching of audio. These processed parts were then edited and layered in Reaper—digital audio workstation (DAW) software. The field-recorded underwater audio was filtered in a handful of ways, and slowed to half speed, giving it presence and weight. The result is a low pulsing and rumbling, an erratic heartbeat that sonically anchors the work.

In the installation, the audio was played back and spatialized on The Cube’s high-density loudspeaker array (HDLA) via a pipeline through Max/MSP developed by Tanner Upthegrove at the Institute for Creativity, Arts, and Technology at Virginia Tech. The main piece of music revolves slowly around the space—swirling steadily and deliberately—encircling the viewer, simultaneously comforting and disorienting, while the other tracks are fixed in place as they fade in out with viewer presence.

INTERACTIVITY AND CONNECTION
My goal in designing the system of interaction of Down Stream [Appalachia] was to engage the audience with time-based and crowd-based interaction that would only be apparent once the viewer had spent some time with the piece and explored multiple aspects of it. Using the depth camera from a Microsoft Kinect mounted high above the center of the installation, I created areas of influence around each of the three sculptural pieces. In the depth image, users appear as white forms against a black background, making it viable to use pixel value as data to control interaction. The areas of influence were achieved by feeding the black
and white image from the Kinect into Touch-Designer, where the image was cropped in multiple ways and each crop was analyzed for changes in RGB pixel values. This data was then processed and given a certain set of criteria that would then alter the audio (via Open Sound Control messages) and visual (via NDI feeds) components of the installation. Each of the elements that were designed to change as part of viewer interaction would fade in and out with audience presence around the sculptures. This subtle, timed fading was intended to alter and augment the installation without a ‘this, then that’ type of interaction, and emphasize our neglected connection to the animals.

**FORM**
The angular geometry of the acrylic blocks was inspired by the nature of the material and its light-reacting properties, and ideas of a futuristic archive that could preserve these animals—an analog to chunks of amber entombing ancient species for eons. Laser cut and fused together, the smooth layers of acrylic reflect and refract the light projected through it, an evocation of water, creating a sense of depth and dimension—augmented by the mirrored shelf on which the acrylic blocks sit.

Each acrylic block weighs approximately 40lbs, and so required substantial support underneath. That, coupled with the space to house both a computer and projector, and the need to disassemble for future storage and shipping, created a complex design and fabrication problem. After much thinking, sketching, and digital iteration, I arrived at the solution that is implemented in the final forms. The outsides of the lower portions of each
form were painted matte black to allow them to virtually disappear in low light, and to create the illusion that the illuminated acrylic is floating in the darkness.

Due to the asymmetry, design requirements, and unique angles of each form, the physical components were produced through digital fabrication methods. Nearly all pieces were designed in computer aided design (CAD) software on the computer, then taken through computer aided machining (CAM) steps via both computer numerical controlled (CNC) laser cutting and routing.
“Artists are in a unique position to effect such environmental changes because they can synthesize new ideas and communicate connections between many disciplines...Art changes the way people look at reality.”

BARBARA C. MATILSKY
Fragile ecologies: Contemporary artists interpretations and solutions (1992)

Reflection & Going Forward
The process of creating Down Stream [Appalachia] was incredibly illuminating for me, allowing me to experience these imperiled animals in person and connect with them in a way I did not think possible when I first conceived of the project. Although I consider the project a success, and though the anecdotal comments I received from viewers were overwhelmingly positive, I hope that even a fraction of that feeling was conveyed to everyone who was able to experience the installation. I learned so much through this work, not only about myself and my practice, but also about how collaboration can make a project exponentially better. I am forever grateful to the scientists who assisted me, and hope that Down Stream [Appalachia] does their dedicated research justice.

I would like to use my momentum to expand upon the work started here. One plan is to create site-specific versions of the illuminated forms; portable variations built to withstand being outdoors, and then installed directly in the waterways as a way to bring the project full-circle. In addition to continuing my explorations of materiality and light, I also plan to dig deeper into issues of ecology and the environment in general as I refine and evolve my artistic practice—Down Stream [Appalachia] is just the beginning.
INSTALLATION IMAGES
References


