A House, A Home, A Habitat

The Importance of Keystone Species Portrayed Through Scientific and Imaginative Illustration

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Art 493, SMP 1

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Artist Statement

Nature works
Nature is like a machine
Each plant and animal a tool
In some way
To live or to die
At the bottom or the top
Each plant, animal, being, has a purpose
To keep the ecosystem, habitat, home, running efficiently

If one thing goes, the home can fall into disarray
Become a mess
No longer work

There is a delicate balance
A perfect balance
If one thing changes, the machine can break
Nature is like a machine
Nature works

A House, A Home, A Habitat shows both scientific and imaginative illustrations of keystone species to portray their importance within their habitats. A keystone species is a plant or animal that is important in keeping their entire ecosystem balanced. These species are important to many other species within their habitats, and if they were to disappear, the habitat would dramatically change. The scientific illustrations in this series are meant to evoke an artist naturalist observational illustration style, to provide accurate information of what these species look like. While the imaginative illustrations are meant to equate these species to appliances in and around a home, that keep the home running smoothly and efficiently. For this project, I have done research on various keystone species and the ecological services that they provide, and then relayed this information through the scientific and imaginative illustrations. It has always been important to me that I do my part to care for the environment. This includes environmental advocacy, so the purpose of this project is to educate people on the importance of keystone species, and to advocate for their conservation.

Introduction: A Home in Nature

Throughout my life, two of my biggest passions have been animals and the outdoors. As a child, me, my brothers and our neighborhood friends would spend all day outside. Spending in the woods at the nearby park, bushwhacking through the trees and thorn bushes, and go swimming in the creek-looking for crawfish. On many weekends, our parents would take us hiking at Sugarloaf Mountain or Seneca Creek. I remember coming home from these hikes, or days spent outside, and writing little books, fact or fiction, about these places and the animals that I saw there. I would write information books about squirrels, or come up with stories about the secret lives that these animals lived when people weren't around.

Since I was young, I have always felt a special connection to animals and nature. Wild and domesticated animals alike, I always feel that there is a shared understanding and respect between us. And when I am out in nature, surrounded by plants or mountains or water, I can truly feel their energy and power. It has always been important to me to be the best environmental steward that I can, and to treat our Earth well and hopefully inspire others to as well. These feelings and connections that I have with animals and the environment play a very big and important role in almost all of my art.

There are many artists with environmental focuses that have inspired me, but two of my biggest inspirations are Beatrix Potter and John James Audubon. Beatrix Potter is most famously known for her children's books such as, *The Tale of Peter Rabbit* or *The Tale of Ms. Tiggy-Winkle*. Her books are filled with whimsical stories and drawings of woodland animals and their adventures. In addition to these drawings, Potter also did many scientific illustrations of mushrooms, flowers, bugs, and animals. She grew up on a farm in England and was often outside where she, "both observed and dissected animals in order to discover their precise physiognomy and anatomy. Her early passion for scientific investigation became integral to her method as an illustrator" (Victoria and Albert Museum). Potter's technique of observing and studying plants and animals as she drew them proved to be successful in her creating whimsical personified drawings of animals, that still hold truth in what these animals actually look like. The, "balance of the spirit-world and scientific knowledge, of imagination and reality is evident throughout her

illustrations and story books, where an exacting observation of the natural world provides the foundation for anthropomorphic fantasy" (Nationaltrust.org).

The other artist that has greatly inspired me, John James Audubon, is most famous for his series of illustrations, *Birds of America*. Audubon was an American artist naturalist who studied many different birds, and then painted and drew them in their habitats, and surrounded by plants they would be seen with in the wild. Audubon would often work first in graphite, and then turn these into watercolors, however he also used many other mediums such as pastels and even collage (The American Institute for Conservation). Audubon was observing and painting these birds during a time when they were not known by most people, and the idea of wildlife conservation barely existed. By Audubon painting these birds and showing them in books and exhibitions, many people were able to learn about many different species that they never knew about. Simply bringing awareness to people about different species or aspects of the natural world that they do not know about is an important first step in conservation efforts.

For my project, I am focusing on Keystone species, because they are extremely important components of their habitats that keep them balanced and running efficiently. Promoting and actively conserving these species is an important step in conserving the entirety of their habitats, and thus biodiversity, which is so important to our planet. Many people are still unaware of what keystone species are and why they are so important, so I hope to do what artists like John James Audubon and Beatrix Potter have done, and bring awareness to these species through art, both scientific and imaginative.

Interview One

1. What was your first memorable art experience and how is it relevant to what you are doing now?

-Going to Gustav Klimt's house. I had never seen art in that style before, it was really inspiring to me. It allowed me to discover the kind of art that I like to do. I've also been drawing animals and writing books about them since I was a really little kid, so that was important too.

2. Who is your favorite artist and why?

-One of them is James Audubon. He made these really beautiful scientific and creative drawings of plants and animals that brought a lot of awareness to these species for the first time.

3. What inspires you? What are some of the sources, both within art and outside of art that you turn to?

-I'm inspired by plants, animals, the natural environment. Within art, I look at a lot of artist naturalist type art. Outside, I look at plants and animals. As well as environmental research.

4. What draws you to the medium and materials you work in?

-Well, I like to draw. And I really like stippling techniques and fine lines so I really like to use black ink pens for that reason. And I like using colored pencils because I like how I can blend the colors with them.

5. What, in your mind, makes a work of art successful?

-Something that I want to look at for a little while. Something that's visually pleasing. Something that makes me think about things.

6. What motivates you to make art?

-A few different things. It's very relaxing and introspective. I think I can learn about myself from making art. And also bringing awareness to people about plants and animals.

7. How is your art a response to the world you live in?

-Well, I find a lot of meaning and comfort and a very deep connection in nature and with plants and animals. That definitely influences my environmental themes. And also the way that the environment, and plants and animals are being treated, I feel like I have to care for them. Part of the way I care for them is by drawing them. When I draw them I'm also doing research on them and learning about them.

8. How do you think art connects with other disciplines? What disciplines (if any)modes your artwork connect with?

-Art connects to the environmental studies and science discipline. Because it's all about the natural world and why certain species of plants and animals are so important to the environment. So it's scientific research combined with art. This is what my art connects with.

9. How important is self-expression to your art making? In what way does self enter your artwork?

-Obviously self expression is important in art because that's what art is. It enters my art because I have my certain style and the things that I'm passionate about come through in my artwork. I like to work in two styles, creative and scientific. This is a reflection of my personality.

10. Do you have a mission? What do you consider to be your purpose for creating art?

-My purpose for creating art is to have a creative outlet and to learn more about myself and also create environmental art so that people can learn more about certain environmental issues because I think them looking at my drawings might spark an interest in people who might not have the urge to find out about these issues on their own by reading or something.

Interview Two

1. Mia, your artist naturalist works focuses on keystone species. Why have you chosen to focus on the specific species that you have?

-I am planning to draw as many keystone species as I can in the span of my SMP. But I've drawn the ones I have because I either came up with ideas for their imaginative "storybook" type drawings first, or just because I was excited to draw that species.

2. Your drawings are pairs of scientific and "children's book-esque" styles. Why is it important to portray the keystone species in this manner?

-I've always loved looking at scientific illustrations of plants and animals, as well as ones that are in children's books, like the ones written by Beatrix Potter. I think it's important to have both because they're both informative, but in different ways. The scientific drawings are more straightforward, and trying to copy the species as accurately as possible, while the imaginative ones explain what the species do, in a creative and story-like manner.

3. You've mentioned James Audubon as a source artist. Why do you think his work is important?

-Audubon would go out and observe birds and their habitats and then draw them in a way that was really beautiful, but also really informative. When his works were shown, the public was able to see them and learn about certain species that they knew nothing about. I think this was an important beginning step in creating a wider appreciation of wildlife, which can lead to conservation.

4. Which of your drawings, in your eyes, are the most/least successful? Why?

-I think the scientific drawings are all very successful because they are as accurate as I could get them, and I think they all look very neat, which is how scientific drawings usually look. I also think the fig tree in the refrigerator and the prairie dog in the sink are successful, because they explain why those species are important really well and their composition is good. I think the drawing with the grizzly bear and the bees could use improvement to make it look less flat.

5. You've chosen the home as the setting where your "children's book-esque" work takes place. Why is this the case? What about a home is fitting for these keystone species?

-I started doing stream of thought writing to come up with some ideas and I started thinking about how plants and animals are like tools and appliances that each have some kind of function in their ecosystem, which is their home. I think equating these species to different tools and appliances is kind of funny, but also a more clear and understandable way for people who may not know about them, to understand why they are so important.

6. More involving the home: Is your placement of each species in a room in the house arbitrary? For example, why is the prarie dog crawling through a pipe in the bathroom sink?

-No, it's not arbitrary, they each are placed where they are in relation to what their ecosystem functions are. Prairie dogs are keystone species partly because the tunnels they dig create irrigation in their habitats. So I put it in a sink pipe, because they both direct the flow of water. Fig trees are keystone species because they provide fruit all year round, so that it why it is coming out of a refrigerator.

7. What is the best way to display your work? Have you thought about creating a book for your drawings?

-Yes, I've thought about creating a scientific type book and something that looks like a children's book. I think that's something I'll save for next semester tho. I think this semester I will display them in Frames on the wall.

8. You've utilized collage twice now, in your work. Will you continue this? Why is it important to used mixed media and not just draw everything?

-Yes I think I will continue to use some collage, but not in everything. I think the mixed media can be really interesting and add some textures that would be hard to draw.

Mid-Semester Critique Reflection

Tuesday's mid-semester critique was a beneficial experience to talk about the strengths and weaknesses of my work so far, and how I can improve or push my work for the rest of the semester. One of the strengths of my work that was discussed was the combination of the keystone species with the home appliances. Using these appliances gave a clear narrative and explanation of what these species do to benefit their habitats. Professor Scheer stated that the drawing of the fig tree growing out of the refrigerator was "funky" and that she would really remember that one. However, the discussion of these strengths also lead to some weaknesses, and ways that I could improve. This part of the discussion was focused largely around the drawing of the Grizzly bear and bees with the seed spreader. The seed spreader and grass are collaged photographs, rather than drawings. Professor Scheer felt that the collaged grass flattened the image, and that the photograph of the seed spreader lacked character, and that it would have more if I drew it. Professor Cai felt that the seed spreader became the main focus, rather than the bear and the bees. They both suggested that I draw the seed spreader, and see what it looks like compared to the photograph. I agree that this is a good idea, so that I can decide which I like better, because I also agree that the drawings have more character. However, I disagree with the statement about the collaged grass flattening the image, as I felt that it gave it depth. Lisa said to really think about the balance of when I should draw objects, and when I should collage with photos. I agree that this will be beneficial rather than just quickly deciding to use a photo. One of the reasons that I decided to use a photo of the seed spreader, was because I was worried it might look bad if I drew it, but I think that I should push myself to at least try to draw more objects and see how they turn out, rather than worrying that it might not look good, and not trying it at all.

Another strength of my works that was discussed, is that I am creating both scientific and imaginative drawings of the different species. Professor Scheer and the group liked that I am using different styles to show the importance of these species. Currently, some of the scientific drawings do not have imaginative pairs, but everyone seemed to think that they should all have a pair, so that it makes more sense and creates a narrative, rather than just having random scientific illustrations that are not equated to a home appliance. I agree with this, and it is my plan to make a pair for each one, but I have not thought of how I could pair them all yet. I do think that this will make my project much stronger, so I will push myself to create the pairs. Professor Scheer also suggested that when I am creating the drawings, I should imagine making the page of the hypothetical books that these scientific and children's book style drawings would go in. Such as, information text and centering the drawings for the scientific ones.

I think the mid-semester critique was very successful. Based on what the group said, my ideas and intentions are coming through, and there are many things that I am doing well. I also received a lot of really useful feedback on how to improve and push my work.

Faculty Critiques Reflection

For my first faculty critique, I invited Professor Kohl and Professor Gurbisz to come see my work. Both of them are environmental studies professors, and professor Gurbisz also studied art in college, so I thought that I could gain some valuable feedback from them. At this point in the semester, I had not yet created an imaginative and scientific illustration for each species; certain ones only had one or the other. Knowing the intention and ideas behind my project, both professors said that the ones with both drawings were the most successful in really showing the intention. I had not yet made an imaginative drawing for a couple of the species because I could not think of household items to equate them to, but they suggested that if I do more research on these species I might be able to think of something. They felt that it is very important that I make both drawings for each species so that my project would be successful. I took their advice and did more research, and I was able to come up with ideas for the imaginative drawings. They also said that they liked the collaging, and that I should do more of this. I have gotten mixed feedback on the collaging, so I am still experimenting with collaging, and only drawing, to see which works the best. I am also going to try to collage with my own drawings, rather than printed photos, to see what effect this has.

Professor Kohl and Professor Gurbisz also said that I should make drawings that are much larger, and more lifesize. For example, they thought it would be interesting to draw the sink with the prairie dog, the size of a real sink. I think that this could be something interesting to explore next semester. They also gave a suggestion of something that I have also been considering for next semester, to make two books, one scientific and one like a children's book. They said that if I do this, I should incorporate writing with the drawings. Such as the scientific name, and facts about the animals in the scientific drawings, and some sort of creative text for the imaginative drawings.

For my second faculty critique, I invited Professor Muchnick, an environmental studies professor who focuses in humanities. Professor Muchnick encouraged me to think even more ecologically about the project and how I pair

the scientific and imaginative illustrations. For example, he said that he liked the idea of the fig tree in the refrigerator because it provides food, but since fig trees do not have a natural thermodynamic function, it might make more sense to have put it in a pantry instead. So paying attention even to small details like that are important. He also said that I could play more with visual equivalences more than functional ones. For example, I could expand on the scientific prairie dog illustration by drawing a crosshair view of a prairie dog colony, and then also expand on the imaginative one, by drawing a crosshair view of an entire neighborhood's plumbing pipe system.

Professor Muchnick also gave me some good suggestions for how I could possibly expand my project for next semester. He said that since I am illustrating common home appliances that are not hard to find, I could use real appliances and incorporate my drawings into them. He said that maintenance is always throwing away broken refrigerators, so I could get one of those and incorporate the fig tree drawing into that somehow. Or that I could find a real sink to mount onto the wall to use for the prairie dog drawing. I really like this suggestion and think that this could be a really interesting way to push my project.

All of the faculty critiques were very beneficial and I feel that I gained a lot of useful feedback. I am really excited to take this feedback and use it for the rest of this semester, and next semester, to push my project even further.

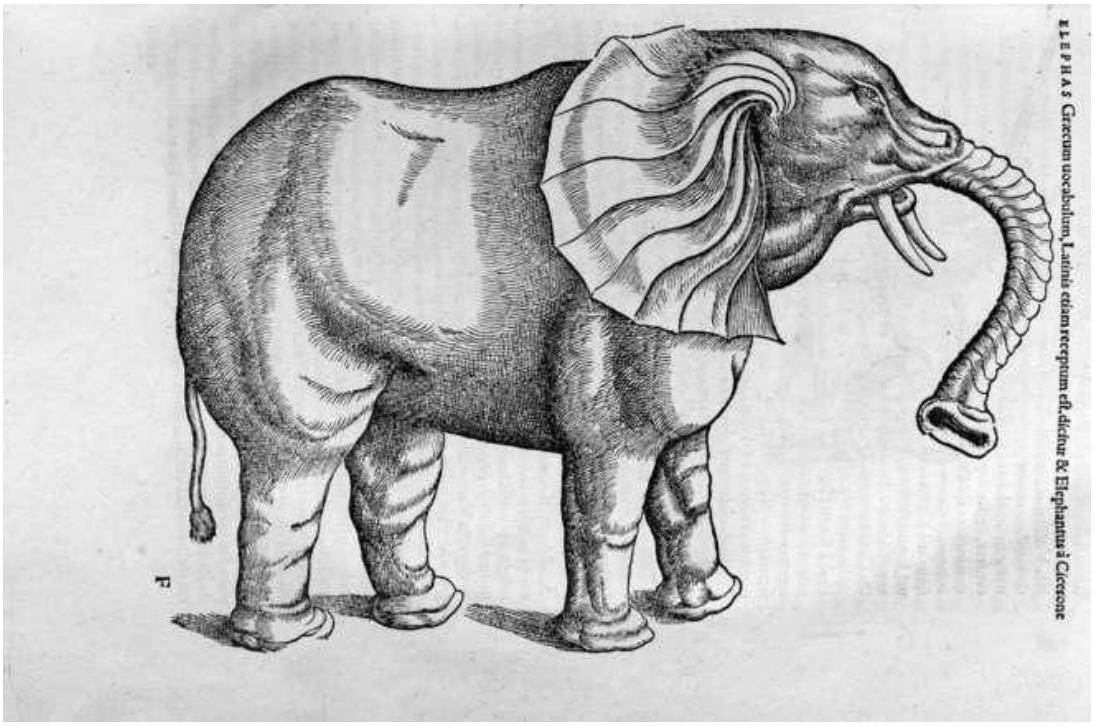
Critical and Visual Analysis

For my St. Mary's Project, I am focusing on keystone species and their importance in their ecosystems. I am depicting their importance in two different styles of illustration. One way that I am drawing these species is in a scientific illustration style. These illustrations are very straight forward and simply show the viewer what these species look like. The other way that I am drawing these species, is in a more imaginative style, where the species may be personified, or in a place that these species would not normally be. Specifically, in a home, or with a home appliance or object. Keystone species are like tools in their ecosystems that keep them running smoothly, much like these appliances or objects in a home, so I have paired each species with one that provides a similar service as them. Both the scientific and imaginative styles of plant and animal illustration have been used by many different artists and in many different periods. These illustrations have been a great influence to me as I create my own.

Scientific Illustration

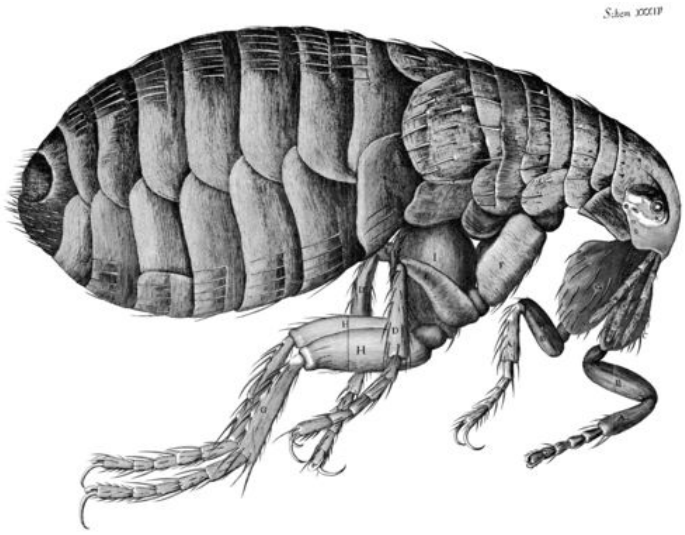
Although images of any plants or animals can be found in mere seconds with the internet today, I still feel that it is important that I create scientific illustrations of the keystone species. The concept of keystone species has only been around since the 1960's, when scientist Robert T. Paine removed them from their tidal pools and discovered that the entire ecosystem was negatively impacted when they were gone. Because this concept is still fairly new, many people are still unaware of what keystone species are and because of the mass extinction that the Earth is currently experiencing, it is extremely important now more than ever, that people learn about different species and their importance. Scientific illustration has been used for hundreds of years to discover and document information about different species before there were cameras, so I would like to use this more classic and older style of illustration, to educate people on a newer concept.

Since the beginning of human history people have been drawing plants and animals that they see. For example, the Chauvet Cave in France contains drawings of rhinoceroses, horses, and other animals, that are estimated to be 32,000 years old. However, in the 16th century, illustrating different plants and animals to gain knowledge about them, began to become more common with artists such as Conrad Gesner (britannica.com). Gesner was a Swiss naturalist who attempted to illustrate as many animals as he could in his 4,500 page book, *Historiae Animalium*. This book is considered to be the, "starting point of modern zoology" (macroevolution.net). Unless people actually saw these animals, the only other way to gain information on them, was by looking at illustrations. Because of this reason, many of the animals in this book, and other books of this time, were not completely accurate.



Elephant, Conrad Gesner, ca. 1550

Approximately 100 years later, scientific illustrations were becoming much more accurate with the invention and use of the microscope. In 1665, scientist Robert Hooke produced the book, *Micrographia*, which was a collection of his observations and illustrations of microscopic creatures, such as fleas and other insects (nsw.gov). These illustrations were so important at this time because there were no photos or videos, so the only way for scientists to share what they were discovering, was through writing and illustration (smithsonianmag.com). These discoveries and illustrations provided vast new information on different species, and thus pushed science even further.



Flea, Robert Hooke, 1665

Comparison To Scientific Illustration and Visual Analysis

For my project, I want to create scientific illustrations of each species to educate my audience on what these species look like with detailed drawings. I want these illustrations to look as accurate as possible, as if they were in a scientific book, however, I will also create tactful and deliberate compositions so that these illustrations are interesting and pleasing and draw the viewers in. In this manner, I will be making scientific illustrations more similar to artists such as John James Audubon, who made accurate illustrations of different species, but also made them interesting to look at by adding other details along with the species. While I do draw inspiration from artists like Conrad Gesner, I would like to create more accurate drawings than he did. For each drawing, I first conduct research on the species. I read scientific journals and articles on each different species so that I can learn about them and understand their importance. Then I look at many different images of these species so that I can gain an understanding of their shapes, colors, sizes, and other visual details. I then create a pencil sketch of the species first, and then color it in using colored pencils and black ink pens for outlines and stippling, a common technique used for shading in scientific illustrations.

For the scientific illustration of the fig, I wanted to create a classic botanical illustration. At first, I was planning to illustrate the entire tree, but I decided to do a branch with a fig to show more detail, and so that it would look less repetitive than the entire fig drawing in the imaginative version. The branch is drawn to depict the organic and curvilinear shapes of the fig branch and the fig itself. I have also drawn some sections of the leaves to show their other side to create movement, more detail, and a less flat illustration. On the branch, I have included two smaller figs that are still attached to the branch to show the different growth phases of figs. And to the right of the branch, I included a full fig, and a cross-hair of a fig to show what the inside looks like. Drawing the underside of the leaf, different growth phases and cross-hair details are all techniques used in classic botanical illustration. The fig branch was first colored with green, and then shaded over with brown to give the branch a woody effect. The leaves were drawn with light and dark shades of green. Dark green and black shading is added along the veins and certain sides of the leaf to give the effect of depth and indentations. The full fig to the bottom right was drawn with the same shades of green. However, the sides are darker and there is a light spot in the front to show the roundness of the fig. The cross-hair drawing of the fig is pink and yellow to depict the fruit inside of the fig. Organically shaped lines in the middle of the fig show the stringy and plump consistency of the fruit inside.

This illustration is of the Ochre Sea Star. The sea star is depicted here with California Mussels, which they eat. The sea star was drawn with organic shapes and curves, like a sea star naturally has. First it was colored with light orange, and then the darker orange was added around the sets of white dots that are outlined in black so that they stand out more against the orange. Black stipple was then added with ink pens to create darker areas, like at the ends of the limbs and in between them to create more roundness and volume. The mussels were drawn with black, gray, and brown to show their natural colors. Stipple was also added to the mussels to create roundness.

This next illustration is of a Green-backed Firecrown, a type of hummingbird found mostly in Argentina and Chile, that is a keystone species because it is a pollinator. I have drawn it here with a Fuschia plant because this is what they eat. Hummingbirds are almost always in motion, so I decided to draw the bird in action, rather than sitting on a branch, or in an unmoving position. I colored it with green, gray, black, and brown, as these are the natural colors of this type of hummingbird. The wings of these birds are somewhat transparent, so I colored them with a light gray and used stippling for shading. Fuschia flowers are naturally very vibrant pink and

purple and they hang down like how I have drawn them. To create the bright colors of this flower, I used magenta and purple colored pencils.

Children's Books Illustrations

For half of my drawings, I am creating imaginative illustrations of the keystone species. These illustrations consist of the species being either personified, or in a place that they would not normally be. The inspiration for these drawings and this style comes from the illustrations in children's books, specifically from the artists Beatrix Potter and Arnold Lobel. Beatrix Potter was the author and illustrator of books such as, *The Tale of Peter Rabbit* and *The Tale of Tom Kitten*. Beatrix Potter was passionate about wildlife and nature and she often dissected and studied various animals that she found around her home, which lead to her illustrations of animals being very accurate, although personified (Victoria and Albert Museum). Arnold Lobel was the author and illustrator of the famous children's books, *Frog and Toad*, in which these two animals go on different adventures together. Both of these authors would illustrate these animals in a relatively accurate way, but then add clothing to them, or put them in situations that animals would not be in. These books and drawings are where I have drawn inspiration for the imaginative illustrations, so for example, I have drawn a grizzly bear pushing a seed spreader, sea stars in a first aid kit, and a fig tree growing out of a refrigerator.

The Tale of Tom Kitten, Beatrix Potter, 1907

Frog and Toad Together, Arnold Lobel, 1972

Visual Analysis of Imaginative Illustrations

This illustration depicts a fig tree growing out of a refrigerator in a home. One reason that figs are keystone species is because they provide fruit to many different species, all year round. For this reason, I put them in a refrigerator, because refrigerators also hold food all year round. I drew a very common looking refrigerator so that it would look like what most people have in their homes. In the refrigerator I drew common things that are usually seen inside one, like a carton of milk, orange juice, ketchup, and mustard. Then I drew the fig tree taking up the rest of the refrigerator, and out of cracks on the top, as it continues to grow. I colored the leaves with different shades of green to give the leaves more depth. I colored the bottom of the drawing brown to look like a wood floor in a home, and the background light yellow, because this is a common color for people to paint their walls. I also added gray shading to show the shape and depth of the refrigerator.

Prairie dogs are keystone species for a couple different reasons, but one is because they dig tunnels for their burrows, which help to irrigate the land and divert the flow of water throughout the ecosystem. Because of this, I have drawn the prairie dog crawling through a sink pipe in a home. I drew a common looking white sink, that would look familiar to most people as something they have in their home. Then I drew the prairie dog crawling through the pipe. Behind the sink is an old fashioned wall paper which I found a photo of and collaged with the sink. At first, the wall had been colored with a light green but this was really boring. Someone suggested that I try using wallpaper instead and I was much more pleased with this. The old fashioned look of the wallpaper makes it feel more homey and personal and like something that you have experienced before in your home or the home of a family member.

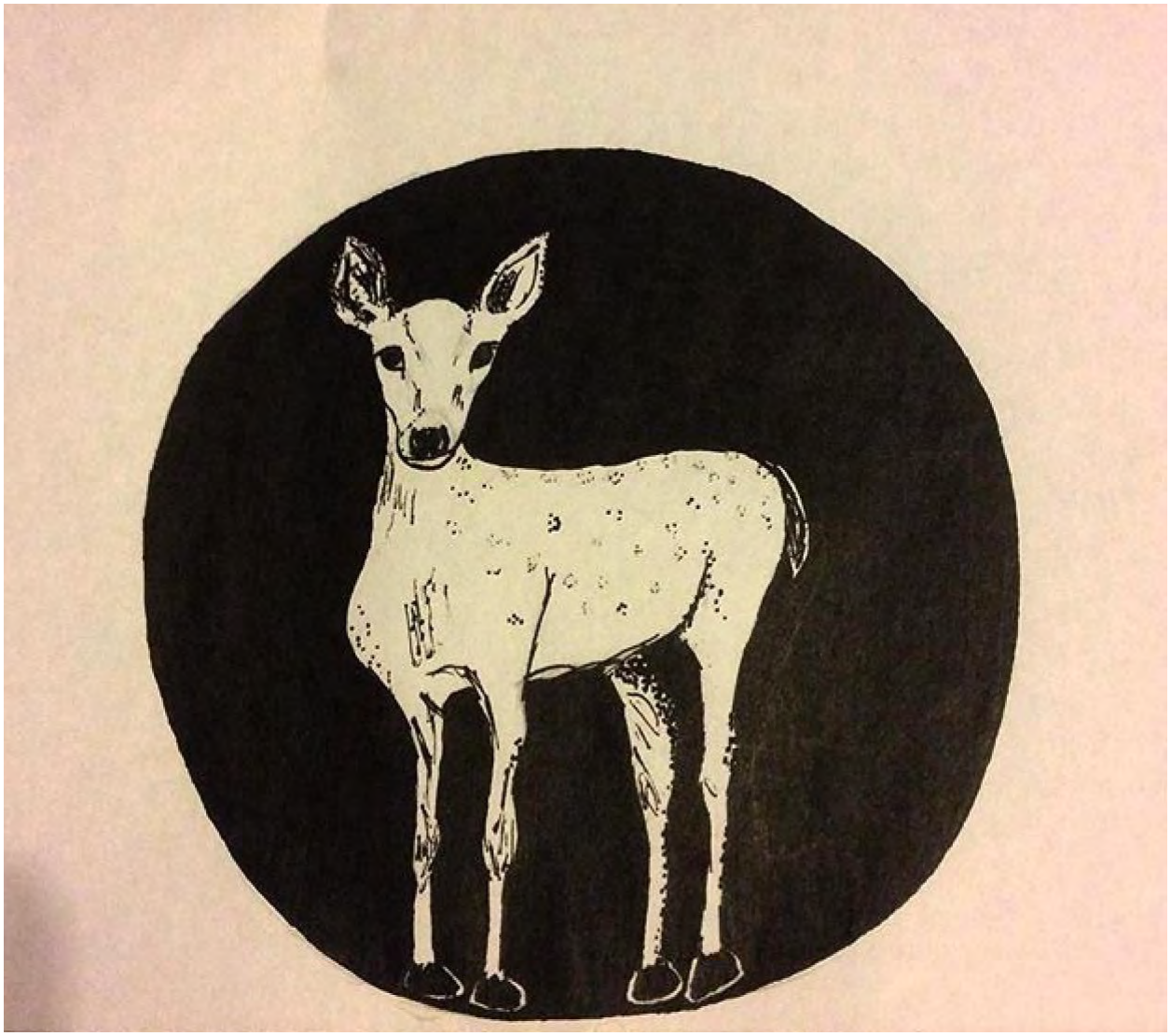

BAND-AID
A+D

This illustration is of the Ochre sea star in a first aid kit with first aid kit supplies. The Ochre sea star was the first species to be studied that allowed scientists to come up with the concept of keystone species. The sea stars are a keystone species because they eat a certain type of mussel, which in turn keeps the entire ecosystem healthy and balanced. When they were removed from their ecosystems, scientists discovered that the mussels became over populated and caused the biodiversity and health of the rest of the ecosystem to decline. Because the sea stars keep their ecosystem healthy, I drew them in a first aid kit, with common first aid kit supplies like gauze, band-aids, tweezers, scissors, a thermometer, and antibiotic ointment. I drew the first aid kit to be bright red with a white cross, which is a very familiar and common looking first aid kit. I kept the inside of the kit white so that the sea stars and supplies would be able to be seen better. For the first aid kit supplies, I colored them with colors that you would normally see these products in, such as red scissors, or beige gauze. I then drew the two Ochre sea stars similarly to how they are drawn in their scientific illustration, so that they look interesting and out of place in this first aid kit. Because the first aid kit is so bright, I left the background white. However, I included gray shading under the first aid kit to create a shadow. I also used gray and black on and in the first aid kit to create shadows so that there was more depth and less flatness to the objects.

Conclusion

For my SMP I have created scientific and imaginative illustrations of various different keystone species, to educate viewers about these different species, the ecosystem services they provide, and why it is important for us to care about their conservation. I use scientific illustration, a drawing method which has been used for hundreds of years by artist naturalists, to clearly show what these species look like. While the imaginative illustrations, similar to those used in children's books, will explain why each species is important in their habitat, in comparison to important objects and appliances in a home. I hope to teach viewers about these species in a unique and interesting way that makes them want to learn more.

Previous Artwork:




· Black · Eyed · Susan ·

Annotated Bibliography

1. National Geographic. (2017). *Keystone Species*.

This National Geographic article talks about zoologist Robert T. Paine, who came up with the term "keystone species" and did the first major research on them. This article also explains the different types of keystone species such as, nutrient vectors, keystone prey, keystone hosts, and keystone trophics. The article provides several examples and explanations for each type. This article was helpful as a beginning place for me to find basic information on different types of keystone species.

2. Thompson, J. (2017). *Community Ecology*. Encyclopedia Britannic.

This Encyclopedia Britannica article goes into great depth about community ecology by discussing the organization and functions of many different habitats and species within those habitats. This article only briefly talks about keystone species, but it has a lot of information on many other aspects of habitats and ecology that are important to know so as to have a better understanding of how ecosystems work. Having a better understanding of ecosystems as a whole will in turn be beneficial to me in understanding the ecosystems that certain keystone species are in, and knowing why they are so important.

3. "Projects." *Institute of Critical Zoologists*.

The Institute of Critical Zoologists is, "an interdisciplinary center dedicated to promoting critical zoological dialogue and research". This website consists of numerous projects, many involving photography, that are meant for research, education, conservation, and artistic purposes. Although these projects are quite different than mine, we do share an idea to learn about, and educate people about animals and conservation, through art. This website has been beneficial to me because I am able to see what other artists and scientists are doing to learn and talk about wild animals.

4. De la Rosa, G. (2017). *Between naturalism and fantasy: the art of Beatrix Potter*. National Trust.

This article discusses Beatrix Potter and how she would combine naturalism and realism to her fantastical children's books drawings. Beatrix Potter often studied and observed many plants and animals. She would do scientific illustrations to better understand the species, and then she would draw personified versions in her children's books. My artwork is very much influenced and inspired by the artwork of Beatrix Potter, so this article was very helpful to me in understanding her learning and drawing processes.

5. Nunez, M. and DeMarco, R. (2012). Keystone Species. In: *THE BERKSHIRE ENCYCLOPEDIA OF SUSTAINABILITY: ECOSYSTEM MANAGEMENT AND SUSTAINABILITY*. Berkshire Publishing Group.

This encyclopedia article goes into depth about several keystone species such as beavers, elephants, corals, sea stars, bears, hummingbirds, and briefly touches on a couple more. This article also talks about the effects that keystone species have on their habitats, problems with certain definitions of keystone species, and the future of keystone species conservation. The section about problems with certain definitions was useful to me because it made me realize that I need to make sure that different articles I read are accurate when they state what species are keystone species. Some sources may regard a species as a keystone species, when it should not be regarded as so, and this article allowed me to understand that is something I need to be aware of.

6. Conover, Denis. "Keystone Role of Beavers in a Restored Wetland (Ohio)." *Ecological Restoration*, vol. 29, no. 3, Sept. 2011. *Environment Complete*.

This journal article discusses the role of Beavers in ephemeral lakes in the Shaker Trace Restored Wetlands in Ohio. Denis Conover explains how the actions of the beavers benefits the ecosystem. Such as cutting down trees, which provides light to other vegetation, allowing it to grow more successfully, and churning the soil to expose seeds that were deeper in the earth, allowing them to also grow more successfully. The beavers also dug canals that provided water for aquatic organisms. This article was helpful because it focused only on beavers, which gave me a better understanding of the effect that they have in their habitats.

7. Light, Daniel S, et al. “Using Small Populations of Wolves for Ecosystem Restoration and Stewardship.” *Bioscience*, vol. 60, no. 2, Feb. 2010. *Environment Complete*.

This journal article talks about the roles that Timber wolves have as keystone species in their habitats. Timber wolves prey on ungulates, such as elk, which in turn keeps the entire ecosystem balanced by keeping elk populations down, which allows more plant growth. The article also talks about the “cascade” of negative impacts that happened when wolves were nearly completely extirpated from the Rocky Mountains. This article also suggests different and new approaches to policy and conservation efforts to keep Timber wolf populations healthy in the United States. This article was beneficial to me because it went into more depth about why wolves are so important, and it also explained the issues with past and current conservation and policy issues regarding wolves.

8. Potter, Beatrix. *Beatrix Potter - the Complete tales: The 23 Original Stories*. Penguin Publishers, 2006.

This book contains the 23 original children’s stories written and illustrated by Beatrix Potter. Beatrix Potter drew many different species of animals and plants, and then would personify the animals, having them wearing clothes, speaking and going on adventures. For my more imaginative drawings, I would like to base the drawing style somewhat off of Potter’s, so it is helpful for me to see how she illustrates animals doing things that animals do not actually do.

9. Defenders of Wildlife. (2017). *Basic Facts About Prairie Dogs*.

This Defenders of Wildlife article focuses on important facts about Prairie Dogs. The article gives information about their diet, behaviors, habitats, and why they are keystone species. It talks about how Prairie Dogs’ burrows provide habitats to many other species, how they are prey to many species, and how they aerate and fertilize the land so that more plants can grow. All of this information is helpful to me in better understanding the importance of Prairie Dogs in their habitats, and how I can portray them in my drawings to relay this information.

10. Fishman Snyder, R. (1993). Complexity in Creation: A Detailed Look at the Watercolors for The Birds of America. *The American Institute For Conservation*, 12.

This journal article talks about the different methods and materials used by John James Audubon in his series of paintings, *Birds of America*. The article says that Audubon would often first, go out and observe the birds and their habitats, and create graphite drawings. He would then use these graphite drawings as the bases for his famous watercolors. This article was beneficial to me, because it allowed me to learn the methods of an artist naturalist, and has inspired me to try these methods myself.

11. Audubon, John James. *The Birds of America*. 1838.

This book contains the many watercolor paintings by John James Audubon of the various types of birds that he saw in America. Audubon would observe and draw the birds, in their habitats and sometimes with their prey, such as fish. These drawings were used to learn about the many different bird species in America, as well as to teach the public about them. This series of paintings is beneficial to me because I am also creating scientific illustrations in hopes to educate people on different species, and advocate for their conservation.