

Monitoring the Hawaiian Monk Seal Population on Hawai'i Island

A REPORT SUBMITTED TO THE GRADUATE DIVISION
OF THE UNIVERSITY OF HAWAI'I AT HILO IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF
SCIENCE IN
TROPICAL CONSERVATION BIOLOGY AND ENVIRONMENTAL SCIENCE
PROFESSIONAL INTERNSHIP TRACK

By
Carmelita Infra Villalobos

Internship Committee:
Lauren Van Heukelem¹, Mentor
Lisa K. Canale, TCBES Professional Internship Program Coordinator²

¹ *Ke Kai Ola, The Marine Mammal Center, Kailua-Kona, Hawai'i 96740, USA*

² *Tropical Conservation Biology and Environmental Science Graduate Program, University of Hawai'i at Hilo, Hilo, Hawai'i 96720, USA*

Acknowledgements

I would like to thank my internship mentor, Lauren Van Heukelem for her dedication to my success as an intern for Ke Kai Ola. Lauren has not only taught me about Hawaiian monk seals but has shown me what a great leader looks like. I am truly grateful for the countless hours she put into training me and for the breadth of experiences she has provided me with. I would also like to thank Lisa Canale for her continued support of all of my endeavors and the 2019 TCBES cohort for their contagious positivity and encouragement throughout my graduate career.

Abstract

This internship focused on maintaining and supporting the growth of the Hawaiian monk seal population on Hawai‘i island. The Hawaiian monk seal (*Neomonachus schauinslandi*) is endemic to the Hawaiian Archipelago and is the only pinniped found in Hawaiian waters (The Marine Mammal Center 2021). Unfortunately, they were historically hunted to near extinction (Kenyon & Rice), causing them to be listed as “endangered” under the US Endangered Species Act in 1976 (Gerrodette & Gilmartin 1990; Gilmartin et al. 1993; Baker & Johanos 2003). Although numbers are increasing, current estimations put the population at 1,400 individuals (Baker & Johanos 2003). Anthropogenic factors including fisheries interactions, disease, and intentional killings have all continued to prevent the population from making a healthy comeback (Gerrodette & Gilmartin 1990; Baker & Johanos 2003; Baker et al. 2011). The purpose of my internship with Ke Kai Ola was to help protect the Hawaiian monk seal population on Hawai‘i island by monitoring the population and educating the public on their importance. Currently, only 10 Hawaiian monk seals are known to frequent Hawai‘i island but thanks to the support of the National Oceanic and Atmospheric Administration, whose partnership and approval makes the work of The Marine Mammal Center and Ke Kai Ola possible, the population has been slowly growing since the early 2000s. The work presented in this report describes the ways that Ke Kai Ola monitors the Hawaiian monk seal population on Hawai‘i island and educates the public on various subjects pertaining to the importance of their preservation.

Table of Contents

Acknowledgements	2
Abstract	3
List of Abbreviations, Figures, and Tables	5
Introduction	6
Background	6
Purpose of the Professional Internship Project	8
Learning Objectives	8
Graduate Student Learning Objectives	8
Professional Development Objectives	8
Professional Internship	9
Role	9
Responsibilities	9
Expectations of a Professional Internship Project	11
Meaningful and Challenging Work	11
Knowledge of the Agency Ecosystem	11
Outreach Experience	11
Timeline	12
Approach	12
Outcomes	17
Discussion	17
Conclusion	18
Literature Cited	20

List of Abbreviations

HMS.....	Hawaiian monk seal
IUCN.....	International Union for Conservation of Nature
KKO.....	Ke Kai Ola
MHI.....	Main Hawaiian Islands
NOAA.....	National Oceanic and Atmospheric Administration
NWHI.....	Northwestern Hawaiian Islands
SAZ.....	Seal Awareness Zone
TCBES.....	Tropical Conservation Biology and Environmental Science
TMMC.....	The Marine Mammal Center

List of Figures*

Figure 1. Tags used to identify Hawaiian monk seals	13
Figure 2. How to sex a male Hawaiian monk seal	13
Figure 3. How to sex a female Hawaiian monk seal	13
Figure 4. Example of a natural bleach mark on a Hawaiian monk seal	14
Figure 5. Example of a cookie cutter scar on a Hawaiian monk seal	14
Figure 6. Sign showing a seal awareness zone used by Ke Kai Ola	15

**All figure provided by The Marine Mammal Center*

List of Tables

Table 1. Timeline of milestones accomplished during internship	12
--	----

Introduction

Background

Hawaiian monk seals (*Neomonachus schauinslandi*) are endemic to the Hawaiian Archipelago and are the only pinniped associated with coral reef ecosystems (The Marine Mammal Center 2021). The occurrence of Hawaiian monk seals (HMS) along the 1,500-mile-long Hawaiian Island chain can be described as a metapopulation with smaller subpopulations found throughout each island (Baker & Johanos 2003; Antonelis et al. 2011; Baker et al. 2016). Most of the population appears in the Northwestern Hawaiian Islands (NWHI), but in recent years a growing population has migrated to the main Hawaiian Islands (MHI) (Baker & Johanos 2003; Antonelis et al. 2011; Baker et al. 2011). Today, there are approximately 1,400 individuals left, with only 300 being found in the MHI (Baker et al. 2020). Hunted to near extinction in the 1900s, HMSs continue to struggle to make a comeback due to human disturbance, resource and habitat competition, domesticated animals, and intentional killings (Gerrodette & Gilmartin 1990; Gilmartin et al. 1993; Baker & Johanos 2003; Baker et al. 2011), which is why conservation measures are needed to foster an environment where the population can successfully grow.

Although well documented in the NWHI, population monitoring and surveying of the HMS population in the MHI has only been done since the year 2000 (Baker et al. 2003), therefore, there is limited information about their normal abundance, range, and reproductive success. It is known, though, that between the 1950s-1970s population numbers rapidly declined, causing The Marine Mammal Protection Act to list HMSs as “depleted” in 1970 and “endangered” under the Endangered Species Act in 1976 (Antonelis et al. 2006; Weijerman et al. 2017), clearly suggesting the need for conservation efforts. In 1986, critical habitat for HMSs were defined in the NWHI and in 2000, waters from three to 50 nautical miles surrounding the NWHI were designated as the NWHI Coral Reef Ecosystem Reserve, which placed restrictions on human activities within that zone (Antonelis et al. 2006). Although on the policy level much has been done to encourage the growth of their population, HMSs are still fighting to make a comeback in Hawai‘i due to pressures from human disturbance, fisheries interactions, intentional killings, disease introduction, and marine debris.

Creating a conservation plan for HMSs is challenging not only because of the stressors they face but because they spend their time in both marine and terrestrial environments. Critical behaviors are done in both environments creating the need for conservation measures across both environments. Foraging, resting, cooling their body temperatures, playing, and mating all take place within the ocean (Antonelis et al. 2006), although most of their time is spent foraging on almost anything including fish, octopus, squid, eels, and crustaceans (Kenyon & Rice 1959). While on land, HMSs can be found mostly resting but they also give birth, nurse, making the terrestrial environment critical to the success of HMSs (Antonelis et al. 2006; Baker et al. 2020).

Monitoring seals in the terrestrial environment is a top priority because of the importance of the behaviors they engage in. Successful pupping is critical for the immediate growth of the HMS population throughout the Hawaiian Archipelago and can occur once a year, entirely on land. Female HMSs reach reproductive maturity around the age of five, reproducing for the first time between the ages of five and ten (Antonelis et al. 2006). At birth, pups will weigh around 25-30

pounds and have a black coat but will later molt to silver-gray near weaning (The Marine Mammal Center 2021). Hawaiian monk seal pups nurse for five to seven weeks, during which time their mothers do not actively forage or eat (Kenyon & Rice 1959). Once pups are weaned, they will weigh anywhere between 110-175 pounds (The Marine Mammal Center 2021). Mothers will then abandon their pup to forage, at which time the pup relies on fat reserves until they learn how to forage on their own (Antonelis et al. 2006). At this time, pups will undergo their first catastrophic molt which occurs once a year (Kenyan & Rice 1959). During this process, individuals shed their fur and top layer of skin which takes about 1-2 weeks depending on sex, age, and reproductive status (The Marine Mammal Center 2021). Hawaiian monk seals can often be found resting on beaches as well which allows them to be able to forage during the night.

Luckily, The Marine Mammal Center (TMMC) has been working to protect these animals and combat the stressors they are facing since 1975. To date, TMMC has rescued more than 24,000 marine mammals throughout the California coastline and the Hawaiian Island chain (The Marine Mammal Center 2021). The Marine Mammal Center is a trailblazer when it comes to ocean conservation because it has focused on marine mammal rescue, research, outreach, and veterinary medicine for decades. The ocean is in need of help because it is suffering from a multitude of anthropogenic threats including marine debris, overfishing, and rising ocean temperatures, each of which have threatened the livelihood of the organisms that call the ocean home, including HMSs. The main mission of TMMC is to advance global ocean conservation through rescue and rehabilitation, scientific research, and education to combat the negative effects of the changing ocean on marine life. All this work is possible because of the more than 1,300 volunteers that donate their time to responding to animals and conducting public outreach efforts to educate the public on conservation.

To extend the reach of their work, in July of 2014 TMMC opened a state-of-the-art hospital and visitor center on Hawai'i island. Named "Ke Kai Ola", or "the healing sea", this facility was built to help revive the HMS population and is the only facility in the world of its kind. Ke Kai Ola (KKO) is equipped with quarantine areas for new HMS patients, medical facilities for sick and injured HMSs, and rehabilitation areas for HMS pups. Of the approximately 1,400 HMS in the wild, it is estimated that nearly 30 percent are alive directly because of conservation efforts of NOAA and TMMC (The Marine Mammal Center 2021). Hawaiian monk seals all along the Hawaiian Archipelago that need care are sent to KKO for rehabilitation since it is the only facility built specifically with HMSs in mind. Since opening their doors in 2014, KKO has treated 35 HMS, approximately 2.5% of the population (The Marine Mammal Center 2021). The work of dedicated staff members and volunteers makes KKO a leader in animal care and an asset to the HMS population throughout the Hawaiian Archipelago.

In addition to animal care and rehabilitation, KKO has around 80 active outreach volunteers that dedicate their time to public outreach and education of the HMSs seven days a week, 365 days a year. Volunteers contribute to the organization by protecting HMSs from human interaction and bringing awareness to their presence and importance to Hawai'i. The Marine Mammal Center relies on the public, though, to report HMS sightings and operates a Hawaiian Monk Seal Hotline which takes calls every day regarding HMSs. The hotline provides a place for the community to engage with KKO and gives the public the opportunity to take responsibility for

the animals that they encounter. Overall, the goal of TMMC and KKO is to preserve and protect the HMS population by safeguarding their wellbeing, and educating the public about their ecology within the marine ecosystem.

Purpose of the Professional Internship Project

The purpose of my internship with TMMC was to assist in monitoring the HMS population on Hawai‘i island and to engage with the community to educate them on HMS conservation. In addition, I gained hands-on experience working in management and volunteer operations by operating the Hawaiian Monk Seal Response Hotline, organizing and mentoring volunteers, and improving and expanding training materials.

Learning Objectives

Graduate Student Learning Objectives

By working with TMMC, I learned a variety of effective public outreach skills. I utilized the experiences of my mentor to help guide my transition from graduate school to the professional world. Through the many connections that my mentor has, I learned how to work with a wide array of people, which has expanded my learning opportunities and exposure to different experiences. I also interacted with the other professionals at TMMC and saw how different areas of the organization fit together including teaching, public outreach, animal care, and research to convey TMMC’s mission. To add to this, I said “yes” to any other volunteer opportunities that came my way, to foster new connections with people that may be outside of my field.

I continually reached for goals that seemed unattainable and stepped out of my comfort zone to expand my wealth of knowledge. This included applying for jobs and volunteer opportunities in the Northwestern Hawaiian Islands in hopes of gaining more work experience with HMS and other endangered species. My connection with TMMC also provided me with the opportunity to practice my networking skills and allowed me to form connections with marine scientists working in Hawai‘i. Hopefully, this will give me the opportunity to apply what I have learned at TMMC to other projects and open the door to work full time at KKO or at their other facility in California.

Professional Development Objectives

The objectives of my partnership with TMMC include using my teaching experience to effectively relay information about HMS to the public while responding to seal sightings. By responding to as many reports as possible, I have had the opportunity to engage with a diverse array of people which has strengthen my communication skills. It has been beneficial to participate in both field work and education to learn the techniques that support successful conservation work while also learning to effectively communicate science, so that it is digestible and useful to a variety of audiences. Without communication, science would cease to exist; therefore, I have made it a priority in my internship. During the time I have spent at KKO, I have made a stronger foundation of trust between the community and TMMC which will encourage

the public to contact TMMC when they encounter a HMS. This will also encourage people to respect HMSs when volunteers and staff are not around to monitor them.

By working closely with the full-time staff at TMMC, I have become comfortable navigating the professional world and have gained the confidence in myself to be able to network with a breadth of professionals. Although I am not yet sure where I belong in the field of conservation, I have gained skills and formed relationships that have encouraged me to explore until I find what I am looking for. I have learned how to market myself and my skills while also identifying my weaknesses, so I am able to work to make these stronger.

Professional Internship

Role

My role at TMMC was “Hawaiian Monk Seal Conservation Response Intern”. I worked directly under Lauren Van Heukelem, Response and Operation Coordinator at Ke Kai Ola, to gain hands-on experience working in response and outreach. Throughout my 8 months with KKO, I had the opportunity to take on multiple opportunities which have provided me with a robust skill set. Although I started off simply monitoring beaches for HMSs with my mentor while beaches were closed during the COVID-19 shut down, I slowly started working volunteer response shifts on my own and conducting outreach as people returned to the beaches. I then made a HMS identification guide to aide response volunteers with HMS identification. I was able to learn how to handle the Hawaiian Monk Seal Hotline by fielding calls from the public and organizing volunteers to go out on response by working at a dispatcher. All these things prepared me to be comfortable training new volunteers for the response team.

Responsibilities

My responsibilities at TMMC fall into five main categories: response, outreach, identification, dispatch, and training. These categories can be thought of as steps and each step has prepared me to do the next one.

- i. **Response:** I was on the response schedule for one to two, four-hour shifts per week. In this role, I responded to HMS that were hauled out on beaches across Hawai‘i island. I would start by conducting a visual check of the HMS to make sure it looked healthy. I then identified the HMS by looking for tags or markers, such as bleach marks and scars that are unique to the individual. Depending on whether the HMS hauled out in an area close to human activity, I would set up a Seal Awareness Zone (SAZ), which designated a 50-foot perimeter around the individual for protection from human habituation and disturbance.
- ii. **Outreach:** After setting up the SAZ I would post up just outside of it and answer any questions that beach goers had about the individual within or HMSs in general. By doing this I ensured that beach patrons kept their distance so as not to disturb the

individual. This also allowed me to educate the public on HMSs, conservation, and the work being done by TMMC.

In addition to outreach in the field, I was able to help with putting together learning materials for the education department. Their goal is to teach students about what KKO does and how they do it. I assisted with a project that aimed to highlight the different departments within KKO. This including created miniature SAZs to show how we protect HMSs in the field, models of toys that the rehabilitation team uses to stimulate the HMSs being cared for, and crates that we use to transport HMS to and from KKO in. These props were used by the education lead in a zoom lesson given to middle schoolers in the area, further expanding the diversity of people the organization was able to reach.

- iii. **Identification:** After getting more familiar with the individual HMS on island by putting in response and outreach hours, I identified the most telling markers on each HMS (see “Monk Seal Identifiers” below). I used KKO’s Dropbox account to select the best pictures that showcased the most telling identifying markers unique to each of our 10 individuals on island. I then organized the pictures in a PowerPoint for volunteers to use to learn how to identify the individuals while out on response. I created two slides per individual, which pointed out the specific identifiers and where they can be found on the HMS. My mentor sent this out to all volunteers in the KKO volunteer network so that volunteers could print these out to have with them during response. The PowerPoint can be edited if individuals get new scars or marks.
- iv. **Dispatch:** At the 5 month mark I began training to be a dispatcher. Every Saturday, I had the response phone for the HMS hotline. Although I didn’t physically have the phone due to COVID-19 precautions, I was able to use the Google Voice app which forwarded calls to the response hotline directly to my personal phone. From 7:30 am until 6:30 pm, all HMS calls for Hawai‘i island were directed to me. I was responsible for organizing the volunteers on shift throughout the day and coordinating their response with the calls I received. Using the Google Voice app, I set up group texts with all the volunteers to coordinate their schedule for the day. This included sending them out on response, directing them to beaches to monitor, provided a direct line of communication between the public, myself, and volunteers, and making sure each volunteer ended their shift safely. Volunteers were able to send information to me regarding HMS whereabouts, health, and behaviors to be documented in the Dispatcher Data Sheet that we share with NOAA. Daily recaps were also provided to the on call staff member at the end of each shift.
- v. **Training:** Although I was dispatching on Saturdays, I continued to work response as well. This made me available to train new volunteers after being with KKO for only 6 months. Spending those months learning from my mentor, getting experience in the field, studying the field guides, and working dispatch allowed me to transition from mentor to mentee in a short period of time.

After new volunteers had their initial training with my mentor, I took them out on response so that they were able to shadow me in the field. I answered their questions about conducting outreach, discussed talking points to engage the public with, described tricks to identifying individuals, and talked through what to do in difficult or unusual situations. I also observed volunteers as they engaged with the public and would step in if they needed my assistance.

Expectations of a Professional Internship Project

Meaningful and Challenging Work

As mentioned above, I was tasked with making a comprehensive identification sheet for each HMS found on Hawai'i island. To be successful at this, I was expected to learn all the HMSs by their tag numbers, scars, and bleach marks by observing them in the field and studying the information provided to me by my mentor. I then sifted through hundreds of pictures of each individual to find the ones that best showed their identification markers. I created a guide that was visually appealing, accessible, and informative so that all current and future volunteers could be successful with HMS identification.

Knowledge of the Agency Ecosystem

For over a month, I shadowed my mentor at KKO to learn her responsibilities as the Response and Operations Coordinator. Since COVID-19 had shut down KKO, I was only able to see how she worked on her own and missed out on seeing how the full-time staff would have interacted with each other. I was able, though, to tour the facility and learn about everyone's individual roles. I became familiar with how outreach and education are closely connected and learned about the importance of having a full-time veterinarian on staff, even when there are no patients in the hospital. I became familiar with how data is collected and learned how to input daily sightings and important information into a database that NOAA manages, making sure to adhere to guidelines to keep data consistent throughout the entire organization's many locations.

Outreach Experience

Outreach was at the core of my internship. Every day, volunteers are out monitoring beaches for HMSs. While it is important to monitor and track the HMS population it also serves to gain the support of the public. By showing that we are out here caring for HMSs, we pique the interest of the public and show that HMSs are important to Hawai'i. The more people we interact with, the more HMS advocates we will have. If people have a positive and informative interaction with us, they will be more likely to call in when they see a HMS and help us spread the importance of HMS conservation when we are not around. I was expected to use most of my time conducting outreach that delivered HMS facts and the importance of the work being done by KKO to conserve the population.

Assessment Method to Evaluate Achievement

Achievement was measured by the amount of people I was able to interact with per shift. While a low number could be due to low beach attendance, the more people I was able to talk to the better. Our goal is to spread the importance of HMSs to the Hawaiian Islands to encourage people to care about their conservation and we can only achieve this by spreading our message. The more people I was able to talk to, the more people became aware of HMSs and the more likely they were to share the message with others.

Timeline

Table 1. Timeline of milestones accomplished during internship

Task	Month/Year completed
Training and Onboarding	08/2020
Shadowing Mentor	11/2020
PowerPoint of Identifiers	11/2020
Dispatcher Training	01/2021
Mentoring of New Trainees	04/2021

Approach

Strategies and Methods

Location

To be successful in my position at TMMC, I first had to learn the location of the beaches that the HMSs are frequently seen at. This required me to directly shadow Lauren during her day-to-day on Sundays and Mondays. We drove along the Kona Coast starting as South as Captain Cook, Hawai‘i and travelling north to Hawi, Hawai‘i. Although HMSs are not seen frequently as south and as north as the locations I just mentioned, HMS are sometimes spotted there, and I needed to be ready to respond to any location.

Since the HMS population is so sparse, it is critical to protect them in any way possible. This includes not sharing sensitive information to the public, such as where individuals are most frequently found. I will mention that there are a handful of beaches that individuals gravitate towards daily and where you can almost always find them. When we do not receive haul out calls from the public, we as volunteers and staff members go to these frequently visited beaches to survey for the individuals.

Hawaiian Monk Seal Identifiers

Once HMSs are found, it is important to gather as much information on them as possible. This requires being able to sex the HMS and identify unique markers that distinguish one individual from another.

- i. **Tags:** the most definite way to identify a HMS born on Hawai‘i island is to read the tag attached to their hind flippers (Fig 1). Tags for all HMS born on Hawai‘i island are orange and begin with a letter that signifies the year they were born, followed by two arbitrary numbers.



Figure 1. Identification tags on the hind flippers of a Hawaiian monk seal.

- ii. **Sex:** if the ventral side of a seal is visible you will be able to sex the seal. Males have an umbilicus and a penile opening and groove which looks like an exclamation point (Fig 2). Female also have an umbilicus surrounded by 4 nipples which give the appearance of a five of dice (Fig 3).



Figure 2. Ventral side of a male Hawaiian monk seal showing umbilicus and penile opening and groove.



Figure 3. Ventral side of a female Hawaiian monk seal showing umbilicus and 4 nipples.

- iii. **Bleach Marks:** HMSs can be born with spots that are naturally lighter than the rest of their fur (Fig 4). These spots look as if they have been bleached. If HMSs need to be temporarily marked before receiving a permanent tag, a temporary bleach mark may be applied by a TMMC staff member.



Figure 4. Circled in white, a natural bleach mark above the hind flippers of a Hawaiian monk seal.

- iv. **Scars:** many of the HMSs on Hawai‘i island have at least one cookie cutter shark bite (Fig 5) or pit scar on their bodies. It is not uncommon for seals to continually acquire these over their lifetime which is why body checks should be completed every time an individual is spotted. This goes for entanglement scars, hooks, amputations, and mobbing scars (a result of mating) which can all provide information on a seal’s health.



Figure 5. Three cookie cutter shark bites on the left dorsal side of a Hawaiian monk seal.

To save time when identifying HMSs, it is important to learn the tag numbers, sex, and scars of the individuals on Hawai‘i island. This requires studying the identifiers and going out into the field to learn them by seeing them in real life. Accurate information is critical when completing health assessment of HMSs so that data can be accurately recorded.

Vigilance

Hawaiian monk seals can be difficult to spot. Due to their dark coats, they easily blend in with the lava fields commonly found around the Hawaiian Islands. It is critical to be hyper-aware when completing beach surveys to not overlook resting HMSs and accidentally come too close to them. It helps to become familiar with beaches so that you can easily identify when something is there that does not belong. The Marine Mammal Center teaches that we should give HMSs at least 50 feet of space to prevent habituation and we do not want to compromise this by being unaware of our surroundings.

Seal Awareness Zones

When HMSs haul out on busy beaches, it is important to protect the individual by bringing awareness to their presence. Seal awareness zones are set up to accomplish this by providing a designated space for the HMSs to rest peacefully within with minimal disturbance (Fig 6). We try to give individuals a 50-foot perimeter on all sides to prevent human habituation which is the reduced response of animals to unwanted human behavior. This behavior includes physical contact, feeding, eye contact with the animal, etc.

To measure this space, I held my thumb up in front of my face, between myself and my line of vision to the HMS. I would then back up until the HMS was just covered by my thumb. This process gave me a rough estimate of 50 feet and showed me where I should set up my physical barrier. Signs that alert patrons of the HMS's presence, identify the individual's behavior, and provide the public with TMMC's contact information are placed around the HMS at the 50-foot mark and are connected to each other using ropes (Fig 6). The signs are made from wooden stakes and the ropes can be easily detached from the signs to reduce the chance of HMSs being injured by the equipment. After the SAZ is complete, I would sit outside of it to be easily accessible by the public for questions and conversation.



Figure 6. Sign used to indicate a seal awareness zone which shows what a zone may look like, provides information on the individual, and a number to contact The Marine Mammal Center by.

Outreach

Outreach is vital to the success of the conservation of HMSs. It is rare to see a HMS so many people are unaware that they are even here. Education and awareness are a few of our biggest goals as advocates for these animals so we try to extend our message with as many people as possible. The public is our biggest ally when it comes to protecting HMSs since we rely on them to report individual sightings, respect the animals, take care of the land, and spread our message when we are not there. It is our goal at TMMC to always have a positive interaction with the public so that people feel responsible for the wellbeing of the animals. Our volunteer force cannot be at all the beaches all the time, so we rely heavily on the public to be our eyes when we are not there.

It was important for me to be flexible in the delivery of our message because everyone responds to our message differently. Being asked to get up and move from your spot on the beach is not something we want to be told to do so instances like this challenged me to frame my messaging in a different way. Explaining why we are asking people to do something is more well received than simply ordering someone to do something. We never want to have a negative interaction with the public so if there was ever a time where people ignored our messaging or signs, we would explain that the SAZ was in place not only for the HMS but for human safety as well. If this did not deescalate the situation I would disengage and call the State of Hawai'i Department of Land and Natural Resources (DLNR) if the HMS was being harmed. It was my intention to have a positive experience with everyone I met so that they too would spread the positivity. As an intern with TMMC it was not my job to be a law enforcer but an ally to the HMSs. We have resources at our disposals to assist us with situations that we are not trained for. Caring for marine mammals is a team effort and recognizing when you can no longer help a situation is just as valuable as helping when you can.

Sometimes I would run into people who had a negative connotation surrounding HMSs, so it was important to find common ground with them and have a conversation with them rather than lecturing them. Message framing and listening to people before regurgitating information so that conversations are genuine and unique to the individual is a skill that I picked up while working response. This is an invaluable skill when working with the public and has made me a better science communicator.

Hawaiian Monk Seal Transport

During my time with KKO the facility only had two HMS patients, both of which were with us in April 2021. Although I was unable to help with animal care, I was given the opportunity to assist with their transport back to their home islands. After being fully rehabilitated, the individuals needed to be flown back to Oahu and Kauai. I assisted with loading the seals into their crates, lifting these crates into the KKO vehicles, and driving the individuals to the Ellison Onizuka Kona International Airport. There, we were met by the United States Coast Guard who loaded the individuals onto their aircraft which would take them back home. The HMSs were each met on their home island by NOAA staff and were released back on the beaches they were rescued from.

Outcomes

Deliverables

Updated Identifiers PowerPoint and PDF

The major deliverable for my project was a two slide per HMS PowerPoint that gave volunteers a comprehensive guide to identifying the individuals found on Hawai'i island. The PowerPoint gave volunteers the most up-to-date images of each HMS so that they have the best resources at their disposal when identifying individuals while out in the field. To make this deliverable, I sifted through two years' worth of HMS pictures. I went day-by-day in our Dropbox account to find the clearest pictures of each telling marker on each individual. This meant finding the best picture of each bleach mark, scar, and tag so that an appropriate snapshot of each individual could be created.

Once these pictures were selected, I arranged them in a way that brought attention to each bleach mark, scar, and tag so that they were very easily identified. This meant providing various pictures to show different angles and calling out marks by circling them and providing a small description beneath to tell exactly where to find them. Each HMS's pictures were accompanied by background of the individual including birth year, sex, frequently visited locations, and any other fun facts about them that could be shared with the public to strengthen outreach. The PowerPoint is a living document so once I am no longer working for TMMC, they will still have ability to update it with new pictures or add more HMSs to it as the population increases. The PowerPoint was shared with volunteers as a PDF so it can be easily downloaded and printed out to be carried with them while out on response to aid in identification or outreach if needed.

On days when I worked as a dispatcher, I used the Dispatcher Data Sheet to log daily HMS sightings. In this excel spreadsheet I would log which individual was identified along with who identified it, and when and where it was identified. This information is tracked by NOAA and used to track animal health, reproductive status and history, molting status, new scars, behaviors, etc. I was also able to identify if pictures of the HMSs were taken and was able to store those pictures in the Google Voice app for reference. Important pictures were pulled from there to be stored in the Dropbox account and potentially used in the Hawaiian Monk Seal Identifier PowerPoint.

Assessment of Quality

My mentor reviewed all content of the slides and provided three rounds of feedback before approving the PowerPoint and sending it out to volunteers. The PowerPoint can be edited as better pictures of the individuals are provided, new scars and marks appear on seals, or new HMS are born so that the quality and usefulness of the PowerPoint remains as time goes on. She also reviewed the Dispatcher Data Sheet to use to provide volunteers with a weekly recap of HMS sightings.

Discussion

Benefit to Mentor

My internship with KKO began during August of 2020 when beaches and parks were under COVID-19 lockdown. The number of volunteers that were allowed to go out on response was limited due to restrictions. Having me onboard during this time allowed an extra body to be out monitoring even while beaches were closed, and attendance was low. My status of intern allowed me to access beaches that were closed to the public to look for HMSs that would otherwise not be checked. This also took some of the pressure off of my mentor so that she did not have to go to every beach every day.

As I put more hours into beach surveys, I became more comfortable with maneuvering beaches and began to learn the common behaviors of some of our seals. This, along with additional training allowed me to take on the responsibility of answering the response phone on Saturdays which took this responsibility off KKO staff members. I was able to field calls, organize volunteers, and resolve any issues that came up regarding the seals or volunteers out in the field so that my mentor and other staff members could focus on other business that needed to be handled. This also allowed me to cover the phone on additional days when staff members were on vacation or when the hospital had patients that needed to be cared for.

Benefit to TMMC Volunteers

My training and hours spent out in the field allowed me to be able to create an identification guide for all ten HMSs on Hawai'i island. This gave volunteers access to the most recent photos of individuals while pointing out specific markers that make each HMS unique. Having access to this provided volunteers with a guide they are able to take with them into the field and use to aid in identification. This helped them to learn how to identify individuals which reduced the amount of time volunteers would spend identifying HMSs, giving them more time to set up SAZs, interact with the public, and survey more beaches. It also provided them with facts to share with the public that would hopefully spark interest in HMSs and encourage conservation efforts.

I was also able to help train new volunteers. Once volunteers received their main training from my mentor, they are required to shadow 3 shifts with current volunteers. I was added to the list of possible mentors and had volunteers sign up to go out on response with me. During this time, I was able to show them around beaches HMS are commonly found at, what to do when there is a HMS hauled out, how to set up a SAZ, and what to say in different instances while conducting outreach. Sharing my knowledge of the individuals and the different encounters I have had help to prepare new volunteers to be out on their own and make them feel comfortable being a part of TMMC family.

Conclusion

My experience working with TMMC and KKO has aided my journey in becoming a conservation professional. Ke Kai Ola provided me the opportunity to work with an endangered

species which taught me about the laws and regulations that protect them. This allowed me to learn how we as conservation professionals are allowed to act towards the animals and also what the public is allowed to do around them. It also gave me insight into the amount of collaboration it takes between different organizations, such as the State of Hawai'i DLNR, to enforce the laws and regulations required to keep the animals safe. I have gained experience in identifying animals and doing health assessments from a distance to keep the HMS and myself safe. I have seen how different parts of an organization work synergistically to accomplish their main goals and how valuable volunteers are to large scale operations.

I also learned about effective ways to engage with and educate the public. I learned to listen to people and let them lead our conversation so that I was able to provide them with the information that they wanted or that they would be most receptive to. No two people are the same which means that you have to be flexible with the way that you deliver content and strategic with what content you decide to share. I learned to be open minded when people are unreceptive to our mission by keeping in mind that it is not my job to enforce laws but to create positive experiences with individuals. This taught me to find common ground with people that may not share the same ideals as myself so that we could still have meaningful conversation and work to understand each other. Sharing the mission of TMMC with the public has made me a stronger science communicator by providing me with a diverse range of interactions with people of various ages and backgrounds and has built upon my experience delivering content in a short period of time.

Additionally, my internship has made me a better leader. Being given the responsibility of the response phone once a week showed me how to think on my feet when callers reported HMS or had questions regarding them. I also had the chance to organize the volunteers in response to these calls. I learned information about each volunteer, such as where they like to survey and how they interact with the public so to best serve their needs. This allowed me to send them to areas they enjoyed so that they were more likely to have positive experiences while out on response. I also learned how to use my own experiences to aid new volunteers in getting comfortable in their roles and how to create a relationship that encouraged asking of questions and for help when needed.

Overall, working with TMMC has solidified how much I enjoy being a part of an organization that conducts public outreach and education. Communication is such an important part of working in science and conservation and having this internship has strengthened my skills as a science communicator which is a marketable skill to have in this job market. I have learned that I enjoy holding responsibility and am good at being organized and have developed these skills thanks to this internship. I have had the opportunity to work with such a wide range of people that hold different skill sets and backgrounds and have learned that everyone can contribute to science if they are given the chance. Being open minded, passionate, and positive are all things I have learned from my mentor and TMMC that have made me a better scientist. Overall, my partnership with my mentor and TMMC have prepared me for my professional career after graduating from the TCBES program.

Literature Cited

- Antonelis GA, Baker JD, Johanos TC, Braun RC, Harting AL. 2006. Hawaiian monk seal: status and conservation issues. *Atoll Research Bulletin*: 75-102.
- Baker JD, Johanos TC. 2003. Abundance of the Hawaiian monk seal in the main Hawaiian Islands. *Biological Conservation* 116: 103-110.
- Baker JD, Harting AL, Wurth TA, Johanos TC. 2011. Dramatic shifts in Hawaiian monk seal distribution predicted from divergent regional trends. *Marine Mammal Science* 27: 78-93.
- Baker JD, Harting AL, Johanos TC, Littnan CL. 2016. Estimating Hawaiian monk seal range-wide abundance and associated uncertainty. *Endangered Species Research* 31: 317-324.
- Baker JD, Harting AL, Johanos TC, London JM, Barbieri MM, Littnan CL. 2020. Terrestrial habitat loss and the long-term viability of the French Frigate Shoals Hawaiian monk seal subpopulation.
- Gerrodette TIM, Gilmartin WG. 1990. Demographic consequences of changed pupping and hauling sites of the Hawaiian monk seal. *Conservation Biology* 4: 423-430.
- Gilmartin WG, Johanos TC, Eberhardt LL. 1993. Survival rates for the Hawaiian monk seal (*Monachus schauinslandi*). *Marine Mammal Science* 9: 407-420.
- Kenyon KW, Rice DW. 1959. Life history of the Hawaiian monk seal. *Pacific Science* 13: 215-252.
- Kittinger JN, Bambico TM, Watson TK, Glazier EW. 2012. Sociocultural significance of the endangered Hawaiian monk seal and the human dimensions of conservation planning. *Endangered Species Research* 17: 139-156.
- The Marine Mammal Center. Sausalito. Available from https://www.marinemammalcenter.org/animal-care/learn-about-marine-mammals/pinnipeds/hawaiian-monk-seal?gclid=EAIaIQobChMI2P3Wr6n18AIViuGzCh0GpgkyEAAYASAAEgI3mvD_BwE (accessed January 2021)
- Weijerman M, Robinson SJ, Parrish F, Polovina J, Littnan CL. 2017. Comparative application of trophic ecosystem models to evaluate drivers of endangered Hawaiian monk seal populations. *Marine Ecology Progress Series* 582: 215-229.