**SEAL SPOTTER**

**Development and launching an application tool for Post Release Monitoring:**

A collaboration between UCI students and the Pacific Marine Mammal Center.

Matassa, K¹; Donald, K¹; Truong, B²; Joseph, L²; Thorpe, L²; Marano, M²; Khaine, W².

¹University of California, Department of Informatics, Irvine; Software Engineering/Computer Science.

²Pacific Marine Mammal Center, 30121 Laguna Canyon Road, Laguna Beach 92651

Abstract: Post release monitoring of marine mammals released from rehabilitation centers is one of the top priorities of the California Marine Mammal Center. Post release monitoring is a key method by which the efficacy of rehabilitation efforts can be assessed and revised. Such monitoring may also provide an opportunity to recover individuals that are unable to re-adapt to the wild. In order to compare individual cases, standardization of data collection protocols for monitoring released animals may be helpful. Formal study of monitoring data and its dissemination to the strand network will aid in the assessment of marine mammal rehabilitation and release programs.

Since 2013, post release monitoring has higher priority due to the significant increase in numbers of rehabilitated animals treated as part of the California sea lion unusual mortality event. Through haphazard, non-standardized trial and error, the Pacific Marine Mammal Center (PMMC) has gained an immense data set of resighted animals with the help of PMMC volunteers and scientists. However, we must do better to gather more re-sighting in a format ensuring what has become one of the most important gadgets in our lives, smart phones. To this end, PMMC’s team collaborated with the engineering students of the UCI Department of Informatics for a period of 10 weeks to develop and launch the Seal Spotter App. This project allowed the students to align their theoretical learning in real world scenario as part of their curriculum, while allowing PMMC to develop new technology on a meager budget through the talent and ingenuity of students.

Methods: PMMC collaborated with professors within the Informatics Department at the University of California, Irvine, and submitted a proposal project that was later accepted as part of a pool of projects from which students could select. A team of 5 students opted to work on the project under the supervision of their professor. Each student in the team worked on different aspects of the project. PMMC staff met weekly with the students via web conferencing. Meetings focused on clarifying the objectives of the project, determining the flow of information to be collected, deciding upon an aesthetic layout of the application and adhering to a completion schedule for the deliverables. Communication and information was exchanged between meetings via email. Students presented their application at the conclusion of their course. Students continued providing expertise and guidance to effectively launch the app on both android and IOS platforms.

Objective for the seal spotter application:

• Ease of use
• Provide information that encourages compliance with NOAA marine mammal viewing guidelines.
• Collect basic, essential data on released animals.
• Be able to download information into a searchable database.
• Be able to work on both Android and IOS platforms.

Data collection: The standardized data collected during the reporting of an animal is immediately sorted and uploaded to the cloud service Amazon Web Services (AWS). AWS provides a searchable and editable database. Should someone misidentify the species of seal or number of the tag, these entries can be easily edited by the scientists at Pacific Marine Mammal Center. Results can be exported from AWS into an excel spreadsheet for further examination of the data.

Data collection: The standardized data collected during the reporting of an animal is immediately sorted and uploaded to the cloud service Amazon Web Services (AWS). AWS provides a searchable and editable database. Should someone misidentify the species of seal or number of the tag, these entries can be easily edited by the scientists at Pacific Marine Mammal Center. Results can be exported from AWS into an excel spreadsheet for further examination of the data.

Dissemination of Information: At this time, dissemination of data will be done manually by scientists at Pacific Marine Mammal Center. Animals reported via the Seal Spotter App will be included through their flipper tag and the original rehabilitation or research organization will be contacted and given the information. Furthermore, the data that has been collected will also be shared with the West Coast Stranding Coordinator for inclusion into the National Stranding Data base. It is our hope that the information will be used by both rescue/rehabilitation centers and NOAA to assess our current rehabilitation efforts and to fill in the gaps of knowledge pertaining to post release success and how seals use the marine environment.

Flow of the Application

To assure that federally mandated guidelines for viewing marine mammals are followed and clearly stated, this information was included on the first display, users would see upon opening the application. The sighting report repeats by requesting two photos, only one is required. Requested photos include a full body picture of the animal and a close up of the identification tag. Metadata on the GPS location in which the photo was taken is automatically attached from the picture files. After uploading a photo(s), the user is asked to identify the species with the assistance of example photos of marine mammals available to assist in the process. An ‘unknown’ option was included should the user be unsure. The user is then prompted to provide information on the location of the sighting, color and location of the tag on the animal, disposition and body condition of the animal and signs of entanglement or human interaction. Identification and life history information was included on a separate page the user could switch to, without losing their data, as an additional aid in determining the type of pinnipeds being reported.

Identification and life history information was included on a separate page the user could switch to, without losing their data, as an additional aid in determining the type of pinnipeds being reported.

Information included: distribution, appearance, migratory habits, mating season and diving abilities. This feature expanded the application’s use from simply a reporting tool to an educational tool as well.

Case Study: Finding Tuscit:

PMMC released a harbor seal, Tuscit, in late December with a satellite tag attached to her. This was on a Harbor seal that had already been through rehabilitation at another facility and released. She failed to return and was recaptured by PMMC, malnourished and showing injuries from a shark attack. After healing from her wounds and gaining weight, she was released at Irvine Cove in Laguna Beach. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla.

To assure that federally mandated guidelines for viewing marine mammals are followed and clearly stated, this information was included on the first display, users would see upon opening the application. The sighting report repeats by requesting two photos, only one is required. Requested photos include a full body picture of the animal and a close up of the identification tag. Metadata on the GPS location in which the photo was taken is automatically attached from the picture files. After uploading a photo(s), the user is asked to identify the species with the assistance of example photos of marine mammals available to assist in the process. An ‘unknown’ option was included should the user be unsure. The user is then prompted to provide information on the location of the sighting, color and location of the tag on the animal, disposition and body condition of the animal and signs of entanglement or human interaction. Identification and life history information was included on a separate page the user could switch to, without losing their data, as an additional aid in determining the type of pinnipeds being reported.

Identification and life history information was included on a separate page the user could switch to, without losing their data, as an additional aid in determining the type of pinnipeds being reported.

Information included: distribution, appearance, migratory habits, mating season and diving abilities. This feature expanded the application’s use from simply a reporting tool to an educational tool as well.

Case Study: Finding Tuscit:

PMMC released a harbor seal, Tuscit, in late December with a satellite tag attached to her. This was on a Harbor seal that had already been through rehabilitation at another facility and released. She failed to return and was recaptured by PMMC, malnourished and showing injuries from a shark attack. After healing from her wounds and gaining weight, she was released at Irvine Cove in Laguna Beach. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla. Thirty (30) days after release, her home territory was the Children’s Pool in La Jolla.

**Seal Spotter**

The application is live and has been developed to work on all smart phone platforms and is available for download on both iTunes and Google Play stores.

**Future Direction:** In the next version of the application, we will strive for complete integration of the application with a data base of information provided by NOAA on all rehabilitated, tagged and spotted harbor seals along the west coast. Not only will this streamline the weight submission processing, it will also allow for an additional feature in the application which will report the identity and recent information on the animal to the user, encouraging future submissions. If this is the first sighting of an animal, the user will receive a message; you are reporting the first sighting of a released animal. Additionally, the sighting carries the animal originated from where a notification with the sighting information.

Acknowledgments: PMMC wishes to thank the University of California, Irvine, Samuel School of Engineering and the Donald Bren School of Information and Computer Sciences for having the foresight to develop this program for students to engage in real-world scenarios resulting in real-world solutions for organizations such as the Pacific Marine Mammal Center. Without this program, this app would have remained a dream. Hats off and a great big thank you to the Seal Spotter team and their contributions: Emily, Ben, William, Lizzi, Lily and Shanta, led by Emily Nettles.