University of Hawaii at Hilo Sabbatical Report

1. Name, Rank, Dept., College:
   Adam A. Pack, Ph.D., Professor, Department of Psychology, College of Arts and Sciences

2. Date range of sabbatical leave:
   8/1/14 - 7/31/15

3. Objectives and planned activities during sabbatical leave:
   A. Objectives:

   By the end of my sabbatical leave I hoped to have achieved the following:
   ✓ Production of drafts of chapters for a book on dolphin intelligence. These will focus on a) the dolphin’s large brain; b) the dolphin’s primary sensory systems; c) the dolphin’s demonstrated cognitive skills; d) the dolphin’s communication skills and mechanisms; e) the dolphin’s skills at comprehending artificial languages; f) the dolphin’s social cognition; g) studies of self awareness in the dolphin; and h) a road map for future studies
   ✓ Collaborative research on dolphins and whales in Hong Kong, Alaska, and the Bahamas.
   ✓ Production of manuscripts of scientific papers for new studies of dolphin cognition and humpback whale behavior
   ✓ Acquire new skills and techniques in marine mammal science (e.g., in marine bioacoustics with emphasis on techniques to study bioacoustics of marine mammals). Apprenticeships and/or formal courses in techniques used in marine mammal science are available at several laboratories on the US mainland and abroad.
   ✓ Work closely with the Dorrance Family Foundation, Conservation International, UHH administration, and instructors Drs. Pelika Bertelmann and Dr. Lida Teneva in the administration and development of Biol 156 and Biol 156 L (Natural History and Conservation of the Hawaiian Islands and Natural History Field Trips).

   B. Activities:

   During my sabbatical leave, I planned the following activities that would contribute to my knowledge base and skill set, to my scientific achievements, and to my future endeavors at UH Hilo.
   ✓ August 2014 – July 2015: A major planned activity is writing a book on dolphin intelligence. I have already outlined potential book chapters and will be investigating potential publishers. This activity will take place over the entire year of sabbatical.
   ✓ September 2014 – December 2014: I plan to collaborate with Matthias Hoffmann-Kuhnt, Ph.D., a researcher at the National University of Singapore to carry out new studies of dolphin echolocation and cognition at Ocean Park, Hong Kong where Dr. Hoffmann-Kuhnt has established a dolphin cognition laboratory. During this period, I will also acquire new knowledge and skills in marine bioacoustics analyses.
   ✓ January 2015 – April 2015: I will continue my long-term studies of humpback whales in Hawaiian waters focusing on describing the characteristics and developmental changes in song produced by immature male humpback whales.
   ✓ May 26 – June 19 2015: I will serve as faculty of record for Biol 156 and Biol 156L offered to Dorrance Scholars during summer session 1 at UH Hilo.
✓ June – July 2015: I will work collaboratively with Dr. Denise Herzing of Florida Atlantic University and the Wild Dolphin Project in the Bahamas to study the behavior and communication systems of wild Atlantic spotted dolphins.

✓ July – August 2015: I will be conducting research on mapping out the social network of long-term associations of North Pacific humpback whales in Southeast Alaska aboard the vessel The Northern Song which launches from Petersburg, Alaska.

4. To what degree were the sabbatical objectives met and planned activities completed?

1. **Production of drafts of chapters for a book on dolphin intelligence.** One of the objectives was the production of draft chapters for a book on dolphin intelligence. During my sabbatical, I produced a solo comprehensive book chapter reviewing in detail the current state of understanding of dolphin cognition and intelligence (Pack, 2015, see below). The different sections of this chapter will form the basis for my book on dolphin intelligence. In preparation of draft book chapters, I conducted a major review of the comparative cognition literature in each of the areas identified in the book chapter. I then drafted several book chapters dealing with these issues. I also investigated several potential publishers for this academic book.

2. **Collaborative research on dolphins and whales in Hong Kong, Alaska, and the Bahamas.**
   - **Alaska Research:** From July 5, 2015-July 30, 2015, I conducted collaborative field research with Captain Dennis Rogers and naturalist Jim Nahmens on North Pacific humpback whales in their Southeast Alaskan feeding grounds. Photo-identification images of the unique trailing edges and pigmentation patterns on the ventral surfaces of over 200 individual humpback whales were obtained along with records of their GPS locations, social affiliates and behaviors.
   - **Bahamas Research:** From June 16, 2015-June 25, 2015, I conducted collaborative field research with Dr. Denise Herzing of the Wild Dolphin Project and Florida Atlantic University on the behavioral ecology, habitat use and communication abilities in Atlantic spotted dolphins and bottlenose dolphins in the Bahamas.
   - **Hong Kong Research:** During my sabbatical, I consulted remotely with Dr. Matthias Hoffmann-Kuhnt of National University of Singapore on several studies of cognitive abilities in captive bottlenose dolphins at Dr. Hoffmann-Kuhnt’s research facility in Ocean Park, Hong Kong.

3. **Production of manuscripts of scientific papers for new studies of dolphin cognition and humpback whale behavior.** During my sabbatical, three manuscripts were produced and published in peer-reviewed scientific journals.
4. Acquire new skills and techniques in marine mammal science (e.g., in marine bioacoustics with emphasis on techniques to study bioacoustics of marine mammals).

A. Apprenticeship in Marine Mammal Bioacoustics at Woods Hole Oceanographic Institution, Falmouth, MA. During eight weeks in the fall of 2014, as part of my sabbatical, I became a Guest Investigator at Woods Hole Oceanographic Institution (WHOI) in Falmouth, Massachusetts. Housed in the Biology Department and the Sensory Ecology and Physiology Laboratory at WHOI, I worked together with Dr. Aran Mooney and his graduate students to compile and analyze bioacoustic vocalizations from rough-toothed dolphins (*Steno bredanensis*) recorded off the Kona Coast of Hawaii Island. We are currently in the process of writing that research up for publication.

B. BioWaves Bioacoustic Training Workshop, San Diego, CA. From November 11-14, 2014, I participated in the BioWaves bioacoustics workshop at University of San Diego, CA to develop knowledge and skills in using various hardware and software tools to record, process and analyze marine mammal bioacoustic signals.

5. Work closely with the Dorrance Family Foundation, Conservation International, UHH administration, and instructors Drs. Pelika Bertelmann and Dr. Lida Teneva in the administration and development of Biol 156 and Biol 156 L (Natural History and Conservation of the Hawaiian Islands and Natural History Field Trips). During the summer of 2014, the Director of Conservation International, Hawaii approached me about the Dorrance Family Scholarship Program at UHH. The Dorrance Family Scholarship Program was partnering with Conservation International to offer a UHH summer course to Dorrance Scholars transitioning from high school to UHH. The course would be conducted in a team-based fashion lead by two staff at both Conservation International and UHH and involving presentations from multiple experts in the natural history of Hawaii from western-trained scientists to local Native Hawaiian practitioners. The course would also need to satisfy a UHH Natural Science GE lecture and laboratory requirement. The Director of Conservation International had already spoken with the UHH Chancellor and the suggestion had been made for me to administrate this course, serve as the faculty of record, and contribute to the team-based presentations that students would receive from scientists. I took on this new educational and administrative challenge as part of my 2014-2015 sabbatical endeavors. Working together with the courses team leaders, UHH administrators, faculty and staff, I was able to create the course as a three credit Biol 156 “Natural History and Conservation of the Hawaiian Islands” course and a one credit Biol 156L course “Natural History Field Trips.” I also worked together with Conservation International and UHH staff to create a course budget and budget justification for the Dorrance Family Scholarship Program. I then worked with UHH staff to secure housing, vans, and other essentials for the program. Eight Dorrance Scholars successfully participated in and completed the program during the first summer session of 2015. As part of their program, I provided Dorrance scholars with a half-day presentation/class in the field on the history, biology, behavior and conservation
on Hawaii’s humpback whales. Overall, the program was a great success and significantly increased my professional development in pedagogy and educational administration at UHH.

6. Continue my long-term studies of humpback whales in Hawaiian waters. During the spring of 2015, I continued my long-term studies of the behavioral ecology and communication systems of humpback whales in Hawaiian waters. Under a research grant from University of Hawaii SeaGrant (on which I am Co-P.I.) and a National Science Foundation CREST grant (on which I am a Participating Faculty), I conducted collaborative research on humpback whale communications by deploying suction cup acoustic recording tags on humpback whale mothers, calves and non-maternal females in waters off Maui. Additional data collected from these and other whale pods included identification photographs, GPS locations, and records of underwater and surface behaviors and social interactions.

7. Other accomplishments. In addition to accomplishing the objectives and activities described in my original sabbatical proposal, I engaged in other scholarly and professional activities not described in that document. These included the following:

A. Presentations of research. While on sabbatical, I gave the following research presentations.


B. Preparation of grant proposals. During my sabbatical, I prepared with collaborators the four extramural grant pre-proposals. I also prepared and was awarded an intramural research grant from the UHH Research Council. All five of these proposals are listed below.


2. Title: “Investigating changes in mesopelagic prey fields in the Bahamas as a contributing factor in the 2013 mass relocation of > 50% of the community of Atlantic spotted dolphins (Stenella frontalis) from Little Bahama Bank 161 km south to the Grand Bahamas. PI = Adam A. Pack; Co-Investigators = Denise Herzing, Marc O Lammers, Whitlow Au. Requested Funds = $324,244 over 2 years. Funding Agency: US Office of Naval Research.


5. Summarize the contributions you believe the sabbatical leave has provided for your own professional development, as well as perceived benefits for your department, school, college, university, and/or profession.

In my opinion, this sabbatical leave was very productive and has provided for my professional development in a variety of ways. First, the publications and book chapter drafts I have developed while on sabbatical have added to my professional development and also will enable me to enhance my Psy/Bio 437 course in Marine Mammal Behavior at UH Hilo. They have also contributed to the corpus on knowledge on marine mammals and thus have made significant contributions to my profession. Likewise, the collaborative research I have conducted on marine mammals either directly or remotely in Hawaii, Alaska, the Bahamas and Hong Kong will not only contribute to my professional development but also to my UH Hilo course on Marine Mammal Behavior as well as to my profession. Second, at UH Hilo, Biology Professor Dr. Patrick Hart and I have been developing the LOHE Bioacoustics Laboratory as part of a National Science Foundation CREST grant (Dr. Donald Price, P.I., Dr. Patrick Hart, Co-P.I., Adam Pack, Participating Faculty). The extensive training that I received in marine mammal bioacoustics at Woods Hole Oceanographic Institution and the BioWaves workshop have added to my knowledge and skills in bioacoustics research, data processing and analysis and will not only be of benefit to my professional career studying marine mammals, but also to the undergraduate students and TCBES graduate students in the LOHE laboratory at UH Hilo. Finally, the duties I took on regarding the Dorrance Scholars has assisted me in my development of administrative as well as teaching skills and better prepared me for projects at UHH requiring high levels of coordination and administrative expertise and support.