The Graduates of Seal Team 6:

Roxanne Beltran & Amy Kirkham

Department of
Biological Sciences
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In this photo (left to right): *Alex Eilers, Amy Kirkham, Roxanne Beltran, Michelle Shero, Dr. Jennifer Burns, and Dr. Greg Frankfurter.*

On the Cover:
Roxanne Beltran and Amy Kirkham with Patches the Seal at the University of Alaska Anchorage. Photograph by Rachel Lee

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"It's crazy...It takes somewhere around three days to get down to the ice—so from Anchorage to the ice in Antarctica, we usually fly from Anchorage to Los Angeles and then to Australia. From there we fly to New Zealand, and then it's another 5-10 hour flight to our destination," chimed Roxanne Beltran, UAA Biological Sciences graduate student studying Weddell seals in Antarctica. To the everyday person, three straight days of traveling may seem like a test of endurance that would push the limits of patience and peace of mind, however, for Roxanne every minute of those three days are a sweet sigh of relief when thinking of the many years of hard work it took to get to this point.

Roxanne is part of the six-man crew, 'B-292,' studying Weddell seals during the Antarctic summers. The research project has been made possible through a National Science Foundation research grant (award # ANT-1246463) to UAA professors Dr. Jennifer Burns and Ward J. Testa, which includes a strong education and outreach component. The self-proclaimed 'Seal Team 6', consists of UAA graduate students Roxanne Beltran and Amy Kirkham, UAF doctoral student, Michelle Shero, an education and outreach liaison, Alex Eilers from the Pink Palace Museum in Memphis TN, and contract veterinarians such as Dr. Greg Frankfurter and Dr. Rachel Berngartt. The team is trying to discover what determines the timing of a seal's important life history events and how climate change may affect these events in the future. events and how climate change may affect these events in the future. The project's official title is "*The Cost of a New Fur Coat: Interactions between reproduction and molt in Weddell Seals in Erebus Bay, Antarctica.*" The team is specifically looking at the breeding and molting patterns of adult, female Weddell seals. Over a four-year period, the team will take data and biological samples from the seals, looking at everything from hormone levels to diving patterns to body mass and the speed at which fur regenerates. The team's main goals are to determine the mechanisms that link reproductive timing to molt timing, and to assess the demographic consequences of potential changes in environmental conditions.

The team coming in for a landing at McMurdo Station, Antarctica.

This season marks the second year of research for Roxanne and Amy, making this excursion one of discovery and development. During the November/December field work, 'Seal Team 6' had focused on assessing the condition of female seals that have given birth to a pup, or that have (for a reason yet to be determined) skipped reproduction that year. The team has done extensive field research, spending 6-11 hours each day collecting data in the field.

After a brief break over the holidays, the team returned to McMurdo for the second half of the field season, when the work is focused on the annual molt. While molting, the seals must stay out of the water to keep their skin temperature up so that they can regenerate fur and prepare themselves for the long winter foraging period, when they gain the weight needed to produce a pup the next spring. During last season, the team found that females who pupped later tended to molt later as well, further emphasizing that reproductive timing and molt timing are linked – understanding the physiological mechanisms behind this link is a key question that the researchers aim to answer.

Through collaboration with a research team in Antarctica that conducts demographic studies (led by Drs. Jay Rotella and Robert Garrott, of Montana State University), Roxanne and Amy's team can ensure the seals that they are handling are part of their target population. Approximately 80% of the seals in the area carry an identification tag, and for most of these animals the researchers know their age and how many times they have pupped in the past. After the team handled target seals in November and December, they used very high frequency (VHF) tags and aerial and ground surveys to relocate the same seals again during January and February. Last season, the team was able to retrace 14 of the initial 24 seals handled—a percentage Roxanne and Amy are very proud of. "It was actually a lot more than we were expecting. We were very happy with that number," said Roxanne.

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As the sea ice melts in the late summer, some of the seals move out of the study area, and the team never expected a 100% recapture rate. Roxanne explains of the seals that were not handled again, "We either saw them but the ice conditions weren't good enough to reach the seals, or we didn't see them at all." Like all good research teams, they had a backup plan, and supplemented their sample size with adult females with the same physiological conditions and criteria as their original sample population. During the molting season, the team also conducted area-wide surveys and recorded the molt status of all flipper-tagged seals, so that they could develop demographic models linking reproductive and molt timing. The team surveyed approximately 3000 seals over a 19-day period.

Having already spent an entire season in Antarctica, the team has become accustomed to the surreal nature of living there. The experience is something most can only dream of—whether that dream is a nightmare or a fantasy is up to individual preference. No matter the case, the reality is that 'Seal Team 6' spends four months out of the year in one the world's most extreme environments at McMurdo Station, a U.S. Antarctic research center located on the southernmost tip of Ross Island. When one conjures up images of Antarctica, desolation and solitude may be some of the first things that come to mind, but the McMurdo station is more like a frozen metropolis. On the experience of first seeing Antarctica, Amy said, "I think it is what our first colony on Mars will look like."

Humans always find ways to survive in the most isolated situations, so the U.S. Antarctic Program has built a 40-building city on a small volcanic island on the edge of the frozen Ross Ice Shelf. Last year, the station had somewhere between 700-1000 people stationed there during the team's research season—out of those 1000 people, only around 20% were researchers based on station (there are many other researchers based at remote sites, also supported from McMurdo Station).

Amy and Roxanne don't have trouble recognizing just how unique their circumstances are and take every chance to emphasize their gratefulness for the opportunity. Amy humbly stated, "We are pretty lucky because a lot of people who work in Antarctica don't get the opportunity to go out on the ice and see the animals that live there because their jobs keep them in town—we feel pretty lucky in that respect. When we are here in Antarctica, we really do get to see the whole picture."

In this photo:
Amy Kirkham in Antarctica.

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The team's appreciation for their experiences in Antarctica doesn't stop at the ice. Alex 'the Educator' Eilers, the team's education and outreach liaison, has worked tirelessly to bring their research into the classrooms of students across America, many of whom have not traveled out of their home states. Alex gained her first exposure to Antarctic research when she collaborated with Dr. Burns on an earlier research project ("Weddell Seals as Autonomous Sensors of the Winter Oceanography of the Ross Sea, NSF ANT- 0838892), as a participant in the PolarTREC program. PolarTREC is a program funded by the National Science Foundation and managed by the Arctic Research Consortium of the United States that directly links researchers and teachers.

Building on that work, Alex now is a direct participant in the research and serves as the team's 'outreach guru.' As part of her work, Alex has created two websites to serve as a link between their research in Antarctica and the students with whom she has visited. Amy praises the work Alex is doing in Tennessee, her home state, explaining, "Alex does great work. She is bringing Antarctic research to kids that have never seen the ocean--she has pictures of kids looking at the heavy duty weather gear that we wear down in Antarctica with huge eyes because they can't imagine ever being that cold." Beyond touring the classroom circuit, Alex has also spearheaded interactive programs for students which include Postcards from the Pole; Fly a Flag Over Antarctica; Get Fit Antarctica; and the Penguin and Seal Scavenger Hunt.

Top Photo:
Alex Eilers presenting to Germantown Elementary School third graders, MD.
Photo courtesy of Germantown Elementary School librarian, Deborah Allen.

Bottom Left Photo:
Alex jumping for joy about her return to Antarctica.
Photo courtesy of Patrick Robinson.

Bottom Right Photo:
Student Flags flying over Antarctic ice.
Photo courtesy of Alex Eilers.

When Roxanne and Amy arrived back in Alaska in the spring following their first season on the ice, the women worked with Alex to develop their very own Weddell seal outreach program for the Anchorage School District (ASD) secondary students. At the start of the school year, Roxanne and Amy attended an in-service event for educators and informed ASD teachers about the potential for them to present their research to enrich the students' learning experiences. "Here in Alaska the research seems so relevant, not only because we are working on it right here at UAA in the middle of town, but because seals are a big part of life in Alaska, especially with Native students that have had the experience of subsistence harvesting and learning how important seals are to the communities here," Amy explained.

It wasn't hard convincing ASD teachers to allow their visits—within days, Roxanne and Amy were inundated with requests, which have since turned into budding relationships between the research team and the ASD community.

The classroom visits were a thing of excitement for students and teachers alike. Roxanne and Amy created a life-size, stuffed Weddell seal they affectionately named 'Patches,' and used it as a demonstration tool to show students how the team collects data while in the field. Roxanne and Amy had the students conduct a morphometric activity in which the students took measurements of the seal's length and girth in order to estimate the seal's mass. The activity was meant to bring real techniques used by the researchers into the classroom, giving students a glimpse into what their futures could potentially look like. Patches traveled with the women from classroom to classroom, receiving a fabric patch of honor with each visit that displayed the name of each student that was reached.

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The activities originally created by Alex Eilers, 'Postcards from the Pole' and 'Fly a Flag Over Antarctica,' were employed by the outreach team in order to keep an on-going relationship with ASD students. The team collected over 400 postcards and 6 flags from the schools they visited during the fall semester. "We offered them to send a postcard down to Antarctica that they had decorated, and we would then send the postcards back to Alaska from Antarctica. The kids are very excited," Roxanne enthusiastically stated.

Roxanne Beltran and Amy Kirkham with a Rogers Park Elementary Kindergarten class.

The 'Fly a Flag Over Antarctica,' project also allowed the students to have a little piece of home travel with the researchers into the field—students decorated flags which would then be flown by the research team when they were working with seals on the Antarctic sea ice. So far, the idea has been a smashing success, with students continually interacting with the research team through the PolarTREC journals and the team's Facebook page.

Roxanne and Amy hope to continue to foster and strengthen the working relationship they've created with the Anchorage School District by continuing the same activities as well as introducing new ones. When asked what she might want to add to the presentation, Roxanne exclaimed, "Videos! You play a ten second video and all the kids are intensely interested, wide-eyed, laughing and talking about how cool it is." Amy and Roxanne saw first-hand the amount of interest the activities generated within the students, with Amy adding, "I think we found a good balance between information and bigger ideas about the scientific process and hands on activities. It worked well, but there is always more to do, especially with upperclassmen that are studying ecology, food web dynamics and population biology." ASD teachers did their fair share of work as well, preparing their students for the classroom visits and tying polar ecosystems and marine biology into their curricula. Some educators have continued to build off of Roxanne and Amy's presentations in later lessons.

6th grade students at Mirror Lake Middle School with Patches the Seal.

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"I talked with one teacher after we left who said that she was continuing to talk about some of the physiological topics we taught because they were so interesting to the students," explained Roxanne.

With 38 classroom visits, these two dedicated graduate students researchers have captivated an audience of nearly 2,000 ASD students. At the end of their outreach, Roxanne and Amy found themselves as inspired as their pupils; as Roxanne noted, "It is the ultimate reward to be hands-on in the field and then bring that hands-on experience to students who are learning similar methods." Roxanne and Amy look to the future with academic aspirations and hopes to one day become educators themselves. Roxanne expressed, "There is nothing that re-inspires me for the science that I'm doing more than teaching people about it, having people really appreciate it and get excited about potentially being involved with science in the future."

The Weddell seal research they are doing is in itself remarkable, but beyond that, Roxanne and Amy are changing the face of science and getting our community's children in the mindset that science is exciting and just within their reach. Roxanne explained, "We had a couple of students who wrote on postcards saying, 'Now I know what I want to do with my life, I want to be a marine biologist.' You read that and you go, 'all the hard work I put in this year and throughout my scientific career, it is all worth it for just that one student. And that won't be the last student that we inspire.'" Indeed, it will not. Roxanne and Amy will return to Anchorage this month prepared for another round of classroom visits with hopes to inspire new cohorts to join the ranks of researchers making a difference in the world—as the students now know, it's just another day in the life of a scientist.

Top Left: 6th grade students at Mirror Lake Middle School with Patches.
Bottom Left: Roxanne Beltran with Mirror Lake Middle School students
Right: Amy Kirkham and Roxanne Beltran with Patches.

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In this photo:
'Seal Team 6' on Antarctic ice preparing for take off.

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Would you like to learn more?

PolarTREC, Weddell Seals in the Ross Sea Homepage:
www.polartrec.com/expeditions/weddell-seals-in-the-ross-sea-2014

Weddell Seal Biology: B-292 Facebook:
www.facebook.com/weddellsealbiology/timeline

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**To schedule a classroom visit,
please contact Amy and Roxanne for more information:**

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