

*Animal Training and Research,
International
&
SLEWTHS Project
Science, Learning, and Exploration
With the Help of Sea lions*

**END OF THE YEAR SUMMARY
2008**

*Animal Training
&
Research International*



Research

Molting Dynamics:

Data collection continued through 2008 to further study the molting patterns of the California sea lion. Nancy Wenkel continued monthly sampling of the five animals that have taken part in the study: Beaver, Sake, Nemo, Jonah, and Cali. After all of the animals had completed their annual molt cycle we observed a short period of time in which four of the animals showed signs of starting a second cycle, though none of them completed the second cycle. More research will need to be done to try to explain this phenomenon. This may include looking for correlations between water and air temperatures. We will continue to collect shed hairs and photograph the molting process in a collection of three males and 2 females through the upcoming year.

Growth and morphometrics:

With the addition two years ago of two new juvenile sea lions (Cali and Ariel) to our collection, we continue to add weekly data collection on weight and monthly length measurements for our on-going, long term morphometrics data collection. Coupled with data collected in past years on our juvenile male sea lions, these efforts comprise a long term study on growth dynamics in California sea lions, contrasting male and female development.

Testing Electronic Barriers as a Deterrence Method with California sea lions:

In May 2008 four of our California sea lions (Beaver, Nemo, Jonah and Ariel) were tested for deterrence reactions to a mild field of pulsed DC electricity. It took a month to create a large test tank and enclosure (over 55' x 40') in the parking lot outside our facility to insure a safe area to conduct the experiment. The electric field was generated by an underwater electrode array across one end of a rectangular, vinyl test pool filled with fresh water. Based on results of the tests highlighted above, California sea lions are extremely sensitive to a mild, underwater field of pulsed DC electricity. The fields evaluated on sea lion test subjects were barely perceptible to the on-site veterinarian (who gradually immersed his hands into the water during operation up to 1,000 μ S for a safety check). It was determined that California sea lions can detect underwater voltage gradients as weak as 0.14 v/cm (about 50 volts) pulsed twice per second at pulse widths as narrow as 80 μ s (in water conductivities about 500 μ S/cm). We found a strong deterrence behavior at pulse widths from 80 to 320 μ s and strong deterrence in the presence of a preferred food source (herring) at pulse widths from 160 to 440 μ s. The voltage gradients and test levels used during California sea lion tests are well below levels that directly injure fish based on published studies (McMichael et al. 1998; Holliman and Reynolds 2002; Reynolds and Holliman 2004) as well as levels used to harm, injure or shock mammalian species in animal damage control or agricultural applications (Blackmore and Petersen 1981; Lefcourt et al. 1986). These tests demonstrate a potential to deter wild California sea lions with a graduated, underwater electric array, especially naive or "green" animals that have not previously experienced such an electric field. These novel results may be useful to agencies and natural resource managers interested in developing non-lethal technologies to deter marine mammal predation on highly valued populations of anadromous and resident fishes. SLEWTHS

is proud to be involved with helping to solve such an important conservation issue for both pinnipeds and endangered fishes. In the coming years SLEWTHS will work with their colleagues at Smith-Root Inc to continue to develop and field test this technology, as well as present and publish these important findings.

Quality of vision testing in a geriatric sea lion:

One of our animals, Beaver, has developed vision problems, a common ailment of older pinnipeds. Beaver is a thirty year old, neutered male California sea lion and we first began noticing some vision loss in 2002. Beaver began missing cues and fish during training sessions. He had developed surface ulcers in his left eye, which we treated topically. It was also determined that he had cataracts in both eyes and one of his lenses had sub-luxated, he was also severely photo-phobic. Because of the risks associated with surgery, his age and our circumstances, we felt that cataract surgery was not an appropriate option for us and we have concentrated on tools to help improve his comfort and care. There was some evidence that Beaver had some vision left, as he had shown a propensity for opening his eyes on cloudy days. Because of that, we developed an individually-specific vision test to determine Beaver's quality of vision as well as testing factors that might prove to be helpful in working with Beaver. We chose to test the vision in his left eye vs. his right eye, black targets vs. white targets to determine if either color had an advantage, stationary vs. moving targets and testing targets at 30 degree increments towards Beaver's peripheral vision. These tests were developed not as scientific examinations but as managerial tools to determine the parameters of his vision, and in this way, better understand Beaver and how to facilitate his husbandry and training.

The trials were conducted in an artificially low-light environment of the fish kitchen and required Beaver to target on a central station. He was then asked to locate a target on either the left or right side of his head. The targets had predetermined characteristics (such as moving, black, 60 degree angle etc.) that were determined by a random number generator.

After over 500 trials, the notable results were that the vision in Beaver's left eye was far superior (94% hit rate) to that of his right (18% hit rate), although he did retain some form of sight in both eyes. Beaver's success rate in his right eye increased dramatically when movement was applied to the target pole up to 60% (depending on the angle). Also noteworthy was that the color of the target poles did not aid or hinder Beaver's success rate. It is believed that Beaver's vision in his left eye (the sub-luxated one) was actually better because the lens is loose and moves out of the way allowing him to "see around" the blurry cataract more easily. This research was conducted as the capstone thesis of Coll Perske at CSUMB and presented at the annual International Marine Animal Trainers Association meeting this year.

Publications, Presentations, Proposals and Permits (P⁴)

Publications

- The staff as a whole wrote and published 2 volumes of our *Inspiring Minds* Newsletter (6/08 and 12/08).

- Yeager, H. and Zeligs-Hurley, J. (2008) Molting Phenology in California sea lions (*Zalophus californianus*). *Soundings*. Volume 33 (3):17.
- Dr. Zeligs and Heather Yeager in collaboration with veterinarians Dr. David Casper and Dr. Steven Holmstrom began drafting a paper for the Journal of Veterinary Dentistry entitled “Voluntary tooth extraction with a trained California sea lion.”

Presentations and conference participation

- In January Dr. Zeligs and Stefani Skrovan attended the Western Fairs Conference in San Diego.
- Dr. Zeligs, Stefani Skrovan, Heather Yeager, Gina Paolini and Coll Perske all attended the 36th annual International Marine Animal Trainers Association conference held Nov 9-14, 2008.
- Heather Yeager presented a paper co-authored with Dr. Zeligs and Stefani Skrovan entitled “Voluntary tooth extraction: It’s just another walk on the beach for Sake, the sea lion.” This paper won the second place award in the prestigious category of Behavioral Training.
- Gina Paolini and Coll Perske also presented a paper co-authored with Dr. Zeligs and Stefani Skrovan entitled “Training Adaptations and Quality-of-Vision Tests for a Blind California Sea Lion (*Zalophus californianus*).”

Proposals

- Dr. Zeligs submitted a proposal # 908 to IACUC that was approved, entitled “Evaluating an electronic barrier with California sea lions”
- Dr. Zeligs submitted a proposal amendment and extension to NMFS to permit #1021-1658-00
- Zeligs, J.A., Smith, D. and Burger, C. Submitted a proposal to the Bonneville Power Administration entitled “Evaluation of Threshold Behavioral Responses of Captive California Sea Lions to a Mild, Electric Voltage Gradient Used to Deter Harbor Seal Predation on Salmon in British Columbia, Canada” that was funded.

Permits

- Renewed our APHIS public display license.
- Renewed IACUC protocols #863, 887
- Received IACUC permit #908
- In the end of 2008, ATR International filed to officially become an LLC (Animal Training and Research International, LLC)

Education and Public Outreach

Sea Lion Stewards Environmental Education Program and Beach clean-up activities

Conducted 19 Sea Lion Stewards half-day programs for over 546 participants who collected over 324 lbs of garbage from our local beach in the process.

Sea Lion Encounters Public Outreach Program

Based on daily performance tallies, an estimated 42,160 people attended performances of *Sea Lion Encounters* in 2008.

Sea Lion Encounters was featured at:

- The Auto Club Speedway in Fontana, CA: February 22-24 and August 29-31
- The Yuma County Fair in Yuma, AZ: April 1-6
- The California Exposition and State Fair in Sacramento, CA: August 15-September 1
- The Central Washington State Fair in Yakima, WA: September 26-October 5

Tours for MLML, CSU, and other academic institutions

15 private tours and/or demonstrations were provided on-site by SLEWTHS.

- 1/22/08 Tour and demo for MLML new student orientation
- 3/11/08 Tour for K. Coale and family
- 4/19/08 Open House – two hours of public viewing and two live demonstrations
- 4/20/08 Open House – two hours of public viewing and two live demonstrations
- 5/9/08 Tour for K. Coale and 2 visiting scientists
- 6/6/08 Tour for Aldo Rose and family
- 7/15/08 Tour for K. Coale and guests
- 8/4/08 Tour for K. Coale and the Dean of Fresno State
- 8/15/08 Tour for K. Coale and Foundation staff
- 8/22/08 Tour and demo for MLML new student orientation
- 10/30/08 provided a half day tour and elaborate training demonstration for Moorpark college's Exotic Animal Training and Management Program's Class of 08.
- 11/29/08 Tour and demo for auction winners donated for Dr. Holstrom

Classes

- A total of 27 undergraduate students from the US and Canada attended 2 intensive immersion classes in marine mammalogy through CSUMB extended education department and 2 additional students audited the classes for no college credit.

Internships

- 33 adult internships were conducted
- 13 Jr. Internships were provided for aspiring future marine mammalogists
- 5 Certificates of Completion in Marine Mammalogy were earned by people who successfully completed both classes and a week-long internship.

Student projects

- Heather Yeager completed the analysis of 3 years worth of data collection for her CSUMB capstone thesis entitled "Mapping the molting patterns in California sea lions (*Zalophus californianus*) to guide fur sample collection for mercury analysis

- in wild populations”, graduated, and published the work in a research briefs column of the IMATA newsletter, *Soundings*. Nancy Wenkel will now take over the continuing study.
- Nancy Wenkel took over molting research from Heather Yeager to continue the project for another year.
 - Coll Perske completed his data collection, analysis and write-up on the quality of vision tests with a geriatric sea lion. He completed his capstone thesis entitled “*See” Lions: Creating a vision test to better the life of one California sea lion*” which was approved, and Coll graduated this year. He also presented this work at the IMATA conference this year.
 - Kate Collins incorporated her work with SLEWTHS as part of her portfolio for community service at CSUMB.

Media

- A front page article featured interviews and photos of our Encounters program in the *Yuma Sun* Newspaper on 3/8/08.
- Sake was featured in the April 21, 2008 addition of The New Yorker Magazine with extreme swimmer Lynne Cox.
- Heather Yeager and our Encounters program were featured in an article on August 17th in the *Sacramento Bee Newspaper* about our work with the California State Fair.
- On 8/31/08 Nemo did his first nationally publicized media on the Speed Channel where he was featured promoting our connection to the Auto Club Speedway (who has the California sea lion as the official mascot).

Consulting and Contract Work

Dr. Zeligs and ATR Intl consulted on the development and design of a new aquarium/theme park for The Dixie Stampede organization.

Dr. Zeligs continued in 2008 to act as the marine mammal biologist consultant for Smith-Root, Inc.

Facilities

Projects

- We installed new stainless steel drain covers on all our permanent pool drains this year to prevent them from animal damage.
- Replaced the N2/3 fencing with a new one.
- Re-covered the back compound ramp with grip strip as well as several surrounding decking areas for safety from slipping.
- Replaced wheels on seats and stairs
- Constructed a new large transportable facility (T4) for use in the electronic barrier research project.

- This years' major project was to duplicate the entire Encounters set-up so that we could conduct simultaneous events. Some of the parts, such as the stages, we had from previous modification but many new things were both built and acquired for this enormous undertaking. This included building a second set of stairs and a new step, developing a new beach-themed set décor, purchasing new stage tarps and tent walls, and many bins, tools and supplies. We created new merchandise table signs, examples, records, and tickets to streamline the encounters merchandising system. We built and installed new skirting and snaps to the rear of the encounters trailer. We designed and built a new tent-weighting system to keep our tents from flying away.
- Randolph Skrovan built a new bumper system for the side of the Encounters decking to help prevent sea lions falling off.
- The SLEWTHS front gate needed several repairs to wood and latch mechanisms this year.
- Siobhan Crosby developed and modified several new and old sea lion harnesses.
- Constructed a new trap door in N1 for protected contact work with our animals.

Acquisitions

- Photographed wild pelicans and (with the help of JZ's father) edited photos to be made into decals to decorate the exterior of the Encounters trailer
- Purchased a second large aluminum transport cage (for Jonah).
- SW donated a refrigerator for use at Encounters and in the staff trailer.
- We designed and acquired new costumes for our Encounters show performances.
- We purchased a second T2 (large transportable pool), two new pumps, new coolers, and tables for our second Encounters set up.
- We purchased a light weight aluminum ramp and outfitted it to make it easier for sea lions to load into transport vehicles.
- We acquired 2 new chairs for our staff room.
- We purchased a new shop vac.
- We upgraded our Encounters trailer to include fancy automatic hydraulic lifts to more properly winter and level our trailer. We also replaced all trailer tires with stronger, higher weight rated ones.
- Purchased a new T3 transportable pool and light weight aluminum stages and fencing. This enables us to make permanent the MLML back compound pool/deck system (now called N4) and use a completely separate, designated back transportable pool for the Encounters set up. Thus, saving us weeks of set up and tear down of facilities before and after public outreach programs!

Animals

Beginning in early November 2008 we suffered repeated illness in our sea lion collection, with 5 separate illness events involving 5/6 of our collection, some of whom lost up to 12% of their body mass before recovering and then being hit again by this unknown wild disease.

As the events unfolded we came to recognize that the pathogen came into our salt water supply (from the ocean) after rainfall, and we began to sterilize the incoming water, first by hand with chlorine and then in early 2009 with a UV filtration system to purify the water. We have now, as a result, succeeded in protecting the sea lions from further illness of this kind. Unfortunately the damage continues in the form of an undescribed eye disease (possibly herpes) that presumably took advantage of the immune-compromised state of our poor animals and severely infected the eyes of 3 out of 6 of them (Nemo, Cali and Ariel) causing partial blindness and severe corneal damage.

Like the first disease, this eye disease is very poorly understood and we are working with top veterinary and human ophthalmologists from all over the country to develop treatments to cure the animals before the eyes are permanently damaged.

The toll this has taken on our staff, animals and finances can not be easily described but is the worst catastrophe to ever befall our program by far. As of mid 2009, the animals are on the mend and appear to be over the worst of the disease but remain with significant corneal damage that we hope to see healed over the course of many months.

-Behaviors started but not completed this year are called *started*, behaviors started and completed this year are called *learned*, work in progress behaviors neither started nor completed this year are called *working on*, and behaviors started in a previous year and finished this year are called *finished*.

Beaver

Beaver is in retirement where maintaining medical and husbandry behaviors are his primary objectives (and happiness)

- Finished eye research
- Working on tooth brushing
- Learned X-ray desense
- Working on look

Sake

In January, we successfully removed an infected tooth from Sake's lower jaw under voluntary, trained control during a one-hour training session.

- Working on breast stroke swim
- Working on down spin

- Working on hydration during stomach tube
- Learned “eye” open behavior and eye drop application (bilaterally)
- Learned tooth injections and mouth x-rays
- Learned head target
- Finished yes
- Finished walk

Nemo

Nemo took part in electronic barrier research on site in May 2008 and continues to take part in multiple public outreach events each season.

- Started follow-me
- Working on water work
- Learned to shift to remote enclosure in Norte parking lot for electronic barrier research
- Finished not
- Finished balance handstand

Jonah

Jonah took part in electronic barrier research in May 2008, and also took part in his first public outreach event at NASCAR in August 2008.

- Started follow-me
- Working on spin-jump
- Working on balance handstand
- Working on not
- Working on tongue
- Working on water work
- Working on Sea Lion Encounters Performance
- Finished transport training

Ariel

Ariel took part in electronic barrier research in May 2008 and continues to take part in multiple public outreach events throughout the season.

- Started protected contact work (line-up to fence, back flippers outside of fence)
- Started bounce
- Started shoulder target
- Started tandem kiss
- Started blood stick
- Started eye present through fence
- Working on tactile desensitization
- Working on water spirals
- Working on compound training
- Working on look
- Finished think
- Finished flip
- Finished diving
- Finished learning Sea Lion Stewards performance
- Finished not

Cali

Cali traveled to the California State Fair in August 2008 and took part in her first Sea Lion Encounters shows and public interactions.

- Started balance/handstand
- Started slide
- Started put

- Started Encounters show performances
- Working on look
- Working on harness
- Working on stomach tubing
- Finished blood sampling
- Finished balance
- Finished clap
- Finished porpoise
- Finished pillar
- Finished diving
- Finished handstand

Fluffy

- Working on retrieval
- Working on “Coo”
- Working on wing lift
- Finished foot hold
- Finished hold

Smitty

- Working on line-up to fence
- Working on “butt” target
- Working on Stand
- Working on bow
- Working on podium work
- Working on level 2 riding
- Working on bit training
- Working on Spanish walk

Staff

5 new people were hired into *Animal Care*

(Ari Smith, Ashley Banet, Ashley Acridge, Kate Collins, Camille Sierra)

8 people left the project after an average longevity of 4.0 years!

(Allison Reesh (7.6 yrs), Chelsie Newbill (3.25 yrs), Siobhan Crosby (4.2 yrs), Chantel Todd (2.4 yrs), Ashley Regalia (2.8 yrs), Gina Paolini (7.6yrs), Coll Perske (4 yrs), Ashley Banet (.5yrs))

4 people became *Senior Animal Care*

(Brandi Dolph, Jessica Arvidson, Rachel Daggett, Ari Smith)

4 people became *Assistant Trainers*

(Ryan Thompson , Nicole March, Brandi Dolph, Rachel Daggett)

2 people became *Trainers*

(Ashley Regalia, Allison Limbaugh)

1 person became a *Senior Trainer*

(Coll Perske)

2 people received their *Multi-year Senior Trainer* anniversary Badges

(Gina Paolini (3), Nancy Wenkel (1))

Heather Yeager became the new SLEWTHS *Head Trainer!*

GP was hired into a full time temporary position Feb-Oct

HY was hired full time starting in June

CP was hired into a full time temporary position from July-Oct

AR, ALR, SMD, and NW all worked short-term single events on contract with SLEWTHS this year