AMONG FRIENDS

Friends of the Elephant Seal Member Newsletter

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www.elephantseal.org

Winter 2015—2016

The Rise and Extinction of Species

Species change gradually over time as mutations in the DNA of individuals occur. Most such mutations have little effect or are deleterious. But some confer enough advantage that the individual survives marginally better and produces offspring that carry that advantage. Over time, many generations, a growing fraction of the population carries that advantage and the species therefore changes. As a species begins to exploit a new food resource, mutations that might otherwise be detrimental may become an asset. As some land mammals began to seek food found in rivers or the sea, for example, webbing between the digits was a significant advantage. In such a process the animals that became the pinnipeds – seals, sea lions and walruses – began 29 – 27 million years ago (29 -27 Ma), as land mammals turned to the sea for food. Throughout the millennia since, the number of pinniped species has increased and shrunk with a maximum number around 15 Ma. The oldest known phocid or "true seal" fossil and the first walrus fossil date to that time. The earliest known otariid – sea lions and fur seals – is from 11 Ma.

A species ability to survive depends upon its ability to adapt to changing situations. For that reason a diverse genetic mix is advantageous. This is a problem with the northern elephant seals because their population was reduced to very few individuals, all in the same colony. Over a long period of time they will expand their genetic diversity. The question becomes: "Will it be in time for the changing environment?"

The figure[1] on page 3 looks at the beginnings and ends of groups of marine creatures descended from terrestrial tetrapods – four legged animals. Each line typically represents a large number of species. For example, one line represents the Pinnipeds (marked by the sea lion profile), another the Cetacea (whale profile).

New species can arise as members of a parent species are divided into two or more environments. A current example of developing speciation is with the orca. The population of orcas has split into two groups - "residents" and "transients." The transients travel in small groups, make long dives in shallow water and feed primarily on marine mammals, often sharing their prey. The residents travel in large groups, with short dives in deep water, feeding primarily on fish. While orcas in the two groups are closely related, they breed within their own group and would find different mutations advantageous because of their different foraging habits. At some stage they are likely to become distinct species.

(Continued on page 3)

The *FES* Evolution

The first team assigned to keep e-seals and humans safely apart donned blue jackets and stepped onto a rookery beach south of the Piedras Blancas Lighthouse in November 1997. Dave and Evelyn Dabritz, the only two docents listed on the first roster that are still active, took those important first steps.

Dave and Evelyn lived and worked in the Los Angeles area, he as Rehabilitation Manager for State Compensation Insurance Fund and Evelyn as a kindergarten teacher, but long weekends were spent with family in Cayucos, a coastal community 30 miles south of Piedras Blancas. They retired and moved back to Cayucos a few months after that 1990 November morning when marine biologist, Brian Hatfield, discovered 19 elephant seals on a sandy beach in the lee of the Piedras Blancas Lighthouse—the first recorded sighting of e-seals in San Luis Obispo County.

Evelyn and Dave Dabritz wearing the 1st blue jacket issued by FES . The 1997 design was borrowed from a coalition of conservation organizations surrounding Monterey Bay

The news spread and the Dabritzes joined other "locals" who flocked to Piedras Blancas for a personal look. Both were volunteers at the Museum of Natural History in Morro Bay where Evelyn headed the schools program and wrote interpretive materials, children's nature stories for publicity and later published four books; both were fascinated with the mysterious and strange-looking creatures they found hauled-out on the beach.

As e-seal population increased, they spilled out of the federally owned 20 acre promontory surrounding the lighthouse onto private land belonging to Hearst Corporation and became a major fascination for those traveling California Highway 1. Dave remembers that thousands stopped, parked illegally and precariously, then breached perimeter fencing and made their way over private property to view the e-seals. There was a steady increase in reports of e-seal harassment. To create photo

(Continued on page 2)

Friends' Focus

Our Legislators Heard Us

The unattached rocks are in the California Coastal National Monument. The mainland is the Piedras Blancas Outstanding Natural Area

On August 5, 2015, Senators Boxer and Feinstein introduced Senate Bill 1971 to provide lasting protection for six majestic coastal sites (including Piedras Blancas) by including them in the already existing California Coastal National Monument (CCNM). Congresswoman Lois Capps introduced a parallel bill in the House of Representatives on September 25, 2015.

The CCNM includes the off-shore rocks and islands exposed above mean high tide, and within 12 nautical miles of the mainland along the 1,100 mile California coastline providing untrammeled nesting habitat for thousands of breeding seabirds and marine mammals on more than 20,000 rocks, islands, exposed reefs, and pinnacles along the California coastline. Last year, at the urging of Senator Boxer, President Obama designated the first onshore addition to the CCNM—the Point Arena-Stornetta Unit, 1,665 acres of coastline in Mendocino County.

National monuments are eligible for the highest level of funding authorized for public lands. Senator Boxer's bill designates the 20 acre promontory around the lighthouse as The Piedras Blancas Unit of the CCNM. A provision of the bill authorizes the Secretary of the Interior and the leadership of the California Department of Parks and Recreation to bring the 424 acres (that include the elephant seal rookery) into the CCNM by signing a joint management agreement.

The 20 acres of federal land and the 424 acres of Hearst San Simeon State Park are currently designated as the Piedras Blancas Outstanding Natural Area and are administered under a joint management contract between federal and state officials. The proposed 444 acre Piedras Blancas Unit of the California Coastal National Monument would be designated and managed in a similar manner.

Our legislators need your voice as they build support for their bills in the U. S. Congress. If you have not already done so, sign our petition at www.PiedrasBlancasMonument.com.

The FES Evolution *(Continued from page 1)*

opportunities, some parents placed their children on the backs of the animals; others threw rocks to force the huge males to rise up in the defensive position.

As the e-seals, began to explore their new rookery, some moved from the beach to the highway; three were struck and killed by cars. One of the collisions resulted in serious injuries to a driver and passenger.

Dave and his museum team severed the head of one of the "road kills," a sub-adult male, removed the flesh, boiled the skull until it was clean, and added it to the Natural History Museum's marine mammal collection.

By 1996, the e-seal population topped 4,000 and executives of Hearst Corporation and San Luis Board of Supervisors were overwhelmed. The chaos demanded fundamental changes including a viable long-range plan.

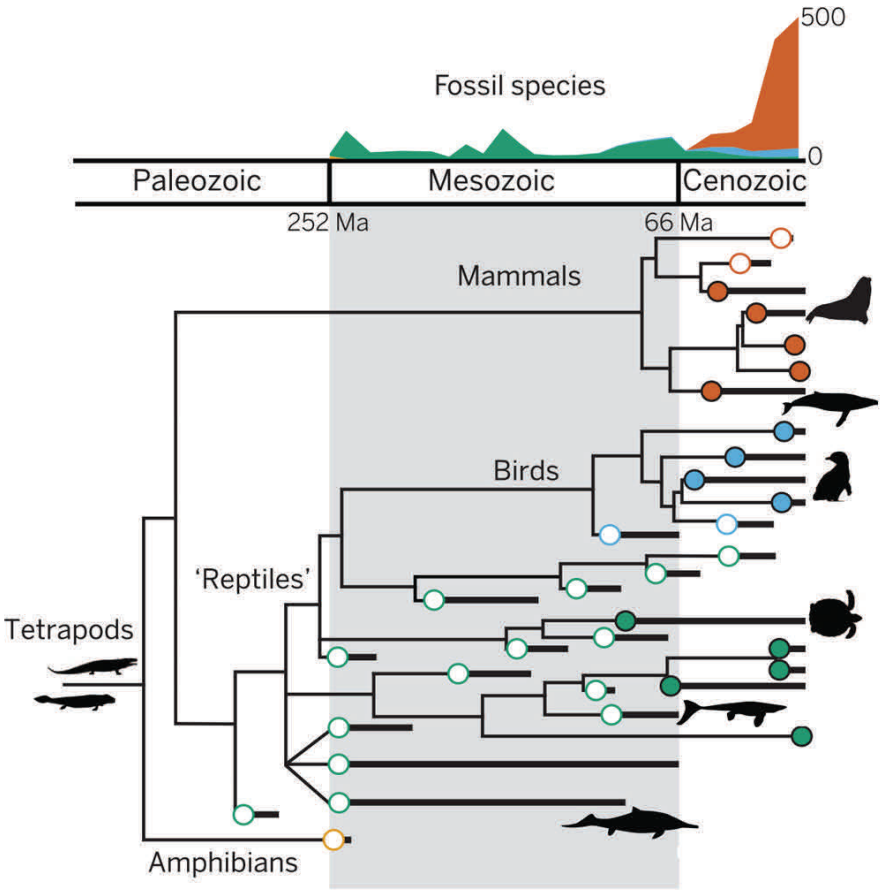
Enabled by a trade of property between the State of California and the Hearst Corporation, California Highway 1 was rerouted to permit construction of a legal parking lot with safe viewing areas. The County Board of Supervisors provided seed money to form a volunteer not-for-profit organization to protect the elephant seals on both public and private land.

Dave and Evelyn Dabritz were among the 30 volunteers that answered the call. The volunteers formed a board, established a reporting structure, wrote by-laws and articles of incorporation, received federal and state approval to operate as a not-for-profit organization, and invited marine scientists to travel from Monterey and Santa Cruz to train the first docent corps.

Dave remembers the first year fondly, "everyone was very cooperative." With a hint of pride, Evelyn reminded us, "There were no boardwalks or fences. Visitors walked among the seals on the beach." The new docents were asked to serve as the eyes and ears of the responsible enforcement agencies. Whistles were issued to be used to correct visitor behavior. "Visitors ignored the whistles, but the seals didn't," Dave chuckled, "the whistles were quickly recalled by the embarrassed leadership."

Aided by the 2003 construction of a boardwalk and fence, the presence of FES docents in the rookery steadily reduced e-seal harassment. The 2005 agreement between The State of California and Hearst Corporation made the entire six miles of rookery beaches part of Hearst San Simeon State Park. Under a 2011 agreement between Friends of the Elephant Seal and California State Parks, current docents provide interpretive services in the rookery as "Volunteers in State Parks."

The current FES docent roster numbers just over 100 volunteers. Next Sunday afternoon, as they have for 18 years, Dave and Evelyn Dabritz will don their blue jackets to greet visitors in the rookery. Why Sunday afternoon? Dave laughed, "No one else wants to work while football is on TV."



Rise and extinction of marine tetrapods

Circles mark initial invasions of marine tetrapod groups. Extinct and extant lineages are denoted by open and solid circles, respectively (yellow, amphibians; green, nonavian reptiles; blue, birds; red, mammals).Top curve summarizes marine tetrapod fossil richness through time.

Continental drift has played a major role in the development of new species through the creation of new environments or the destruction of old. The Tethys Sea once separated India from Asia and Africa from Europe at a time when the earliest evidence of whales and sirenians has been found, about 50 Ma. The separation of South America from the Antarctic about 25 Ma resulted in a circumpolar Antarctic current that caused changes in the food resources in the ocean. This was around the time of the first pinnipeds. The opening of the Bering straits 5 Ma connected the North Atlantic to the North Pacific creating opportunity for new food sources. The closing of the Panama seaway between North and South America around 1 Ma split some populations. Shifting food resources likely account for the splitting of "parent" species into two new species north and south of the tropics. There are several such sister species, including the elephant seal.

Extinction of species is a normal process with individual species typically lasting a few thousand to a few million years. There have been five dramatic mass extinction events with the loss of a significant fraction of species – plant and animal – throughout the earth. These events, seen as brief in geologic time may have taken place over as long as a million years or may, in fact, been much more rapid. Factors thought to play a role are climate change, extreme volcanism (which triggers climate change because of the heavy load of particulates in the atmosphere) and asteroid collisions with the earth. About 250 Ma, at the end of the Paleozoic era, such an event caused the extinction of as many as 95% of plant and animal species. As with less dramatic events, such losses also create opportunities for survivors and this mass extinction ushered in the Age of Dinosaurs.

The next and most recent mass extinction, known as the K-T event, took place 65 Ma and there is considerable evidence that an asteroid impact in the Yucatan and/or volcanism at the boundary of the India and African plates were likely major contributors. A recent publication[2] suggests that the impact may have triggered the volcanism.[3] Half the species on earth, including the dinosaurs, did not survive this event and the period since then is known as the Age of Mammals. All of the marine mammals, as shown in the figure, originated after the K-T event .

A sixth mass extinction is currently underway. This one is caused by us. The rate of species extinction of plants and animals is 1,000 to 10,000 times what it was 500 years ago. The example of the very near extinction of the northern elephant seal is well known to us – reduction by human hunting to the order of 50 seals only 125 years ago. The disappearance of the passenger pigeon and the near extinction of the bison by hunters are common knowledge. Less known are the extinctions from loss of habitat. The impending global warming, not unseen in earth history but at a rate that was never seen and difficult if not impossible to adapt to, will, undoubtedly, increase that dramatic extinction rate.

Suggested reading: *Return to the Sea, The Life and Evolutionary Times of Marine Mammals* by Analisa Berta.

[1] The figure was generously provided to us by Dr. Neil Kelley, Department of Paleobiology, Smithsonian Institution and was taken from the publication: *Evolutionary innovation and ecology in marine tetrapods from the Triassic to the Anthropocene*, N. P. Kelley, N. D. Pyenson, Science 348, 3716 (2015).

[2] *State shift in Deccan Volcanism at the Cretaceous-Paleogene Boundary, possibly induced by impact,* P. R. Renne et al., Science 350, 76 (2015).

[3] For an interesting essay on the controversy over the cause of the K-T event, see www.ucmp.berkeley.edu/education/events/cowen1b.html.

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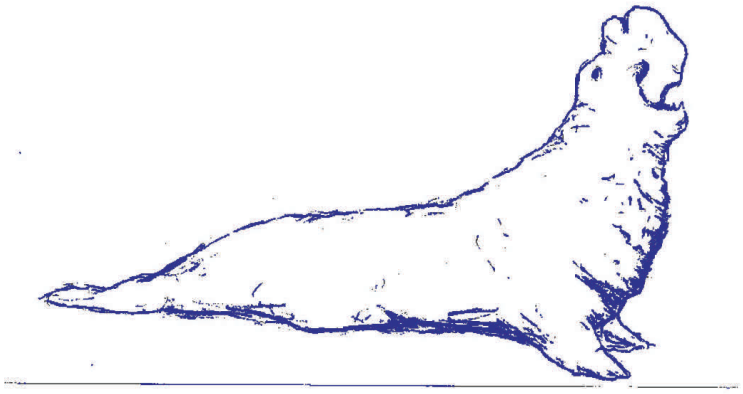

Friends of the Elephant Seal
Exploratory Rookery Tours

Birthing & Nursing
January 16 and 30, 2016

. . . the birthing and nursing of pups and males battling for breeding rights.

Mating & Weaning
February 13 and 27, 2016

. . . male dominance hierarchies, weaning, breeding & delayed implantation.

The Catastrophic Molt
May 14, 2016

. . . the molt and adaptations for 100 day fasts and 5,700 foot dives.

***Each Exploratory* will assemble at:**

The Cavalier Plaza
250 San Simeon Avenue
San Simeon, CA 93452

Doors open for coffee at 9:30;
the presentation begins at 10:00am
and finishes in the rookery about 12:30pm.

Admission is Free
Reservations are welcome, but not required.

Calendar

January **-** Females continue to arrive. Peak of births usually occurs during the last half of month.

February **-** Births end early in the month. The peak of mating is around Valentine's Day. Females begin leaving.

March - Last adults leave. Weaned pups teach themselves how to swim.

April—Females and juveniles return to molt.

May – Females and juveniles molt

June - Subadult males return to molt.

July - Subadult and adult males molt.

August - Last of males molt.

September and October **-** Young-of-the-year and juveniles haul out to rest.

November - Juveniles joined by subadult males. Mature males begin arriving at the end of the month.

December - Bulls continue to return. Females arrive. The first birth is usually mid-month.

FES Board of Directors

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